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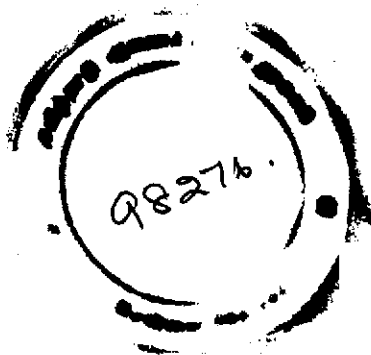
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NOTES ON SOME LOCAL CONDITIONS OF
FORESTRY IN ENGLAND.

The Board of Agriculture lately received through the Foreign Office an application from the International Union of Institutes of Experimental Forestry for information relating to the distribution and growth in England and Wales of certain specified trees. The Board accordingly instituted inquiries on the special points desired by the International Union, and at the same time took the opportunity of inviting the observations of the foresters and others who were good enough to assist them in this matter as to the conditions of supply and demand in the timber trade and as to the prevalence of disease of trees, and of attacks by insects, mammals, and birds in English woodlands. Schedules dealing with the various matters of enquiry were prepared and submitted to selected observers in English and Welsh counties, with the result that more or less complete returns were obtained from nearly thirty reporters in as many distinct districts.

Much of the data so collected is only of importance when viewed in its international aspect, and this will doubtless in due course be utilised and published by the Union. Several matters upon which information was obtained may, however, be of interest to the owners of woodlands in this country; and it is with these, more particularly, that the following notes are

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concerned. For convenience of reference the species are treated in the alphabetical order of their scientific names.

Abies pectinata (Common Silver Fir).—This tree appears to be generally, but sparsely distributed, and nowhere does it attain to first-rate economic importance. While with hardly an exception it seems to grow best on loam, the underlying rock may be of the most varied character, including sandstone, limestone, whin, granite, shale, and chalk. It is met with at all elevations up to 800 feet, at which height it is found to be growing luxuriantly in Westmorland. It appears to be very susceptible to smoke and similar atmospheric impurities, and, as a consequence, it is rarely met with in such districts as North and Mid Durham. Where the conditions of growth are favourable it reaches a girth of 7 to 11 feet, and a height of 100 feet, at an age of 100 to 150 years. The tallest specimen—104 feet at the age of 110 years—was reported from Staffordshire, while a specimen 125 years old in Norfolk is estimated to contain 250 cubic feet of timber. It appears to suffer but little from disease or insects.

Acer pseudoplatanus (Sycamore).—This species also grows best on loam, the subjacent rock being evidently a matter of comparative indifference. Only in one district (North Norfolk) is this tree reported to grow badly, and there the soil is evidently too dry, being a light loam on chalk. Many trees of 8 to 14 feet in girth were reported, a size that is generally reached between the ages of one and two hundred years. In one case (North Riding of Yorkshire) a tree is reported to have attained a girth of 13 feet at 120 years.

Betula alba (Common Birch).—This species was reported from comparatively few districts. Even specimens that are accounted large do not usually exceed a girth of 8 feet, and an age of 100 to 120 years; but an exceptionally large tree, 12 feet 1 inch in girth and 62 feet in height, is reported from Kent, where it is growing on humus soil overlying shale.

Castanea vesca (Spanish Chestnut).—While this tree is most frequently reported as growing on loam, the loam is in some cases argillaceous, and in some cases sandy. Thus

an observer in Oxfordshire speaks well of the growth of the tree, which he says, thrives best on strong land, while from the same county another report indicates that sandy or gravelly loams suit growth best. In most cases the rate of growth is said to compare favourably with that of other hardwoods, a girth of 10 or 11 feet, and a height of 60 feet and upwards being reported for ages not much over 100 years. Not only is this tree met with on a great variety of soils, but it has also a wide vertical range, growing "to perfection" in Westmorland at an elevation of 800 feet. Unfortunately there are many reports of serious injury due to "shake," which frequently appears in trees from 50 to 60 years old.

Fagus sylvatica (Beech).—As was to be expected, this species is most frequently reported from limestone and chalk. Such soils, in fact, constitute the natural habitat of the Beech, and from such situations specimens are reported exceeding 20 feet in girth, 120 feet in height, and 235 feet in cubical contents. In North Durham it is said to resist smoke better than the Oak. From Mid-Durham it is reported as growing well at an elevation of 500 feet, while in Westmorland it is said to grow best in situations 600 to 700 feet above sea level. In view of the increasing demand for beech for technical purposes, and for fuel, and having regard to its beneficial influence on soil fertility, it is probable that an increasing amount of attention will be given to the cultivation of this tree.

Fraxinus excelsior (Ash).—Most of the reports indicate that this tree thrives best on strong and somewhat moist loam. The results when it is planted on poor soils are not satisfactory. The timber of old trees is brittle and dark coloured. Specimens over 12 feet in girth and 100 feet in height at an age of 165 years are reported from Westmorland. It is, however, when 50 to 100 years old that this tree is most valuable, and, on the whole, the results of its cultivation appear to be satisfactory.

Larix europæa (Larch).—In most parts of England the older classes of this species have grown well, the rate of height-growth being frequently one foot per annum up to the age of 80 or 100 years. At that age the girth may vary between 8

and 12 feet, although instances of greater girth are also recorded. A report from Lancashire gives 120 feet as the height, and 9 feet 7 inches as the girth at five feet from the ground of a tree 130 years old. Loams of various character, generally overlying sandstone or limestone, are the soils on which this species is usually found. Clay soil is said to predispose to canker. In Durham and Cumberland the Larch grows well up to 900 feet of elevation, while in Northumberland it is recorded at a height of 1,100 feet, though there it is somewhat unhealthy.

Picea excelsa (Common Spruce).—Comparatively few observations have been made on this tree, and from this it may be concluded that it is not so generally distributed, on an economic scale, as several of the other species. In South Durham it is reported to contain 90 cubic feet of timber at an age of eighty-six years; while in North Durham the smoky atmosphere has left few healthy trees. In Oxfordshire this tree grows well till an age of forty years is reached, when it is apt to die off under the attack of heart-rot. In Notts and Stafford it grows well, reaching a girth of 8 feet at 100 to 150 years. In general it appears to do well on a moist soil, provided there is sufficient drainage. In Westmorland the spruce is reported as forming close woods at an elevation of 1,200 feet; while in Northumberland it grows in mixture with Scots pine at a height of 1,760 feet, where it thrives better than the latter tree.

Pinus sylvestris (Scots Pine).—This tree, like the spruce, is not common in the South-West of England, but in most other districts it is one of the commonest species. Light soils—sands and gravels—suit it best. In the North of England it is found growing well at elevations considerably over 1,000 feet, and is reported to be quite healthy at 1,600 feet. In Oxfordshire it is said to be scarce, but to form fine timber at the age of 100 years. Trees 100 feet high and 8 to 11 feet in girth are frequently noted, the age in many cases exceeding 200 years.

Populus nigra and *monilifera* (Black, or Black Italian Poplar).—Poplars are not extensively cultivated, but the reports regarding them are nevertheless distinctly encourag-

ing. On loams, and especially alluvial soils, they grow well up to an elevation of 600 feet, and instances are noted of specimens 100 feet high, 12 to 14 feet in girth, with a volume up to 180 cubic feet.

Quercus pedunculata and *sessiliflora* (The Common Oaks).—These two Oaks, when the types are distinct, show characteristic features, of which the following are the more important:—

	<i>Q. pedunculata.</i>	<i>Q. sessiliflora.</i>
Flower and fruit	distinctly stalked	sessile, or nearly so
Petiole of leaf	half an inch or less in length.	often an inch long.
Blade of leaf	lobed at the base	gradually merging into the petiole.
Persistence of leaves	fall when ripe	many adhere to the tree during winter.
Branches	spreading	tending upwards.

Q. pedunculata is much the commoner Oak, and, as is well-known, grows best on strong loam, or on a light loam with a clay sub-soil. In some parts of the country, however—notably in Notts—Oaks of large diameter are found on light soil overlying sandstone. While this tree is met with up to 1,000 feet and over, the best specimens occur at considerably lower elevations. Perhaps 600 feet may be taken as the profitable limit of the cultivation of the Oak, at least in high forest. In North Durham the tree suffers from smoke, and there many large specimens are to be found in a dying condition. The largest specimens are reported from the Sherwood Forest district of Notts, where a girth of 29 feet 4 inches and a height of 105 feet are reached. Some of these trees are supposed to be about 1,000 years old, though, as they are hollow or decayed in the centre, the exact age of the oldest specimens can never be determined. While most of the measurements refer to *Q. pedunculata*, a few are specially noted for *Q. sessiliflora*, a specimen of the latter variety in Kent girthing 18 feet.

Ulmus campestris (English Elm).—Like so many other trees, this grows best on a moderate loam, though good specimens are recorded from lighter and heavier soils. In Durham and

Cumberland this species appears to grow well up to 600-700 feet, though it is not very commonly met with in these counties. Many examples of trees 10 to 12 feet in girth, and up to 100 feet in height, are recorded; and in Hertfordshire a specimen is mentioned whose height is 120 feet, and girth 21 feet 7 inches.

Ulmus montana (Scots or Wych Elm).—This species affects the same class of soil as the last, the vertical distribution in England being almost similar. On the whole the Scots Elm does not appear to reach either the height or girth of extreme specimens of the English species. Both are cultivated in parks and hedgerows, rather than in close forest.

Diseases and Injuries due to the attack of Fungi, Insects, Mammals, and Birds.

Disease of the Larch.—As might have been anticipated this is the disease that receives most attention. It is reported to be prevalent in most districts, though perhaps less so in the East of England than elsewhere. From Northumberland an experienced observer reports that scarcely a larch planted since 1860 has escaped. No remedy is suggested, though care in thinning and attention to cultural details are suggested as mitigating agencies.

Rot in the centre of the larch and other conifers is occasionally noted. This is an obscure disease that is certainly encouraged by the character of the situation being unsuitable to the species concerned.

Canker of the Ash appears to be fairly common, and from Glamorganshire there comes a report of a wood of 40 acres which is almost destroyed by this disease. Felling infected trees would appear to be the only preventive measure that is practically applicable.

Nectria ditissima, a minute fungus that attacks dicotyledonous trees, is occasionally noted, as is also *Rhytisma acerinum*, *Hysterium pinastri*, *Nectria cinnabarina*, and other parasites of minor importance.

Of insects there is frequent mention of the commoner species.

The Pine Shoot Tortrix Moth is troublesome in Durham and Glamorgan, against whose attack hand-picking is fairly successful.

The Pine Beetle and the Pine Weevil are common everywhere, and are very destructive under a careless system of management. Both can be kept in check by giving attention to the early removal of dead and dying conifers, including trees that have recently been felled.

The Pine Sawfly is reported from Durham, Stafford Wiltshire, and Glamorgan, hand-picking and crushing being the usual remedies.

Other insects of less importance, whose presence is occasionally noted, include *Sirex gigas* (Durham), *Cockchafer*, *Larch, Spruce, and Beech Aphides*, *Oak-leaf Roller Moth* (very common), *Ash and Elm bark Beetles*, *Pissodes notatus* (Glamorgan), *Bostrichus bidens*, *Phylloperthia horticola*, and *Goat Moth*. The last is reported to be very common on elms in London parks, infested trees being treated successfully with a dressing consisting of a mixture of soot and lime.

Of Mammals note is made of attacks by *Hares, Rabbits, and Deer*, against which netting and fencing are the most approved safeguards. *Squirrels* are very destructive in many districts, barking conifers—especially the Larch and Scots Pine—and destroying the buds of Spruce, Pine, Horse Chestnut, and other trees. The one effective means of protection is shooting. *Voles*—both the field and water species—do a certain amount of damage under special circumstances.

Practically no damage is ascribed to birds, though the bullfinch is twice noted as destroying a few buds, and in a moorland district of Northumberland, blackgame sometimes destroy the leading buds of Scots Pine and Spruce.

Market Conditions.

Carmarthen.—The demand is good for Alder and Birch, the wood of which is largely converted into clog soles. Pole-wood of any species is readily marketable in the Welsh and Lancashire Colliery districts. Ash and Oak find a ready sale for railway and wheelwright work.

Carnarvon.—Medium sized Alder, Birch, and Sycamore is

in good request for making clog soles. Pitwood is readily disposed of for the collieries of Lancashire and other districts.

Cumberland.—Good Ash is in demand for coachbuilding and agricultural implements, and Oak, Beech, Larch, and Sycamore—if of good size—can be readily disposed of to buyers from Newcastle, Lancashire, and Yorkshire.

Durham.—Ash, Larch, Oak, and Elm are in request for cartwright and similar work; while coniferous pole-wood is readily absorbed by the Collieries. Sycamore sells well if of large size. Some wood—presumably Oak—is converted into charcoal, with the formation of wood naphtha and wood tar. The better classes of timber are taken by buyers from Newcastle, Sheffield, and London.

Glamorgan.—Small sized wood of any kind is in good demand for pit props. Ash, Oak, and Elm are used in the manufacture of tools, wheels, agricultural implements, etc.

Gloucester.—Ash and Oak are bought for waggon and railway work, Beech for manufacturing tool-handles, and Elm for tin-plate boxes.

Hertford.—Oak and Ash are readily saleable to cartwrights and large builders, a considerable amount going to London, Woolwich, and Aldershot. Large Sycamore is also readily marketable.

Kent.—The demand for timber of all kinds is good. Oak and Ash are worked up into agricultural implements, and used in railway work; Larch and other timbers are in request for fencing; Hornbeam is made into cogged wheels; Beech finds a good sale for chair-making; Poplar and Lime are used to construct packing cases; Elm sells well for carts and coffins, while Willow is sought for cricket bats. There is an excellent demand for coppice wood of Oak, Hazel, and Ash.

Norfolk.—Birch, Alder, and Beech are bought for conversion into brush-backs, boot-trees and lasts; while Ash, Pine, and Spruce are absorbed in ordinary country work. Large Oak is extensively taken by the North-Eastern Railway Company for their works at York and Newcastle.

Northumberland.—The coal and lead mines, together with the railway works, create a good demand for timber, espe-

cially Larch. Scots Pine is much used in the making of dry casks.

Nottingham.—Collieries and railway companies compete keenly for good Ash, Oak, and Larch. The Sheffield buyers remove large quantities of Beech and Ash for tool-handles; Alder and Birch are in demand for turnery; Elm for bellows, chairs, coffins; Birch for brooms; Scots Fir, Spruce and Ash for barrel staves and hoops.

Oxford.—Agricultural work absorbs much of the Oak, Ash, and Larch; while Beech finds a good market for chair-making. London and Birmingham compete for supplies.

Stafford.—Ash, Oak, and Larch are used for wheelwright work, coach-building and collieries, Manchester, Liverpool, and Birmingham supplementing the local demand.

Wiltshire.—There is a local demand for ordinary timber for fencing, farm buildings, and agricultural implements, while pitwood goes to the Forest of Dean, Beech to the chair works of High Wycombe, and Oak to the railway workshops.

FUNGOID DISEASES OF THE ROOTS OF FRUIT TREES.

In April last the Board of Agriculture received for examination from Norwich a parcel of young fruit trees taken from an orchard of 40 acres, planted in the preceding November, which were apparently dying of a fungoid disease, the ravages of which were said to be very destructive, and to be causing much alarm. The specimens were submitted to the Director of the Royal Gardens, Kew, who reported that they were attacked by a fungus belonging to the genus *Rosellinia*, the spawn or mycelium of which spreads below the surface of the soil, extending rapidly from the root of one tree to another. As this disease appears to be becoming prevalent, it has been thought desirable to reproduce here from the Kew Bulletin of 1896 the following article by Mr. G. Masee, F.L.S., on the various forms of white "root-rot" caused by fungi of the genus *Rosellinia* (or *Dematophora*), together with an account of the best known methods of combating them:—

Amongst the numerous root diseases of various plants caused by parasitic fungi, none are better known or extending over a greater area than the Pourridié of the French, which occurs in France, Italy, Switzerland, Austria, South-West Germany, and has recently been recorded from three widely separated localities in Britain. The fungus causing this disease is called *Dematophora necatrix*, Hartig, which frequently devastates vineyards and orchards; its attacks, however, are unfortunately not confined to vines and fruit trees; potatoes, beans, beet, etc., are also destroyed, and Hartig states that the mycelium soon kills young maples, oaks, beeches, pines, and spruces.

The mycelium first attacks and kills the youngest rootlets, and then enters into the larger branches of the root, in which it rapidly spreads and forms an irregular network of slender strands; finally bursting through the cortex and enveloping the roots in a snow-white, fluffy mycelium, here and there running into slender, cord-like strands, which traverse the soil, and by this means spreads from one tree to another. At a later stage of development, numerous minute, black compact masses of mycelium or sclerotia are formed in the cortex of the roots, and from each of these spring several slender spines, each of which bears an abundant crop of conidia or reproductive bodies at its tip. In addition to the white mycelium, a very characteristic pale brown or olive mycelium is also present on the surface of the roots, formed of septate or jointed threads of variable thickness, having pear-shaped swellings at intervals; these swollen portions finally become free by the disappearance of the intermediate portions of the mycelium, and form bodies capable of germinating and giving origin to a new crop of mycelium. Under certain conditions some of the sclerotia, instead of producing the spine-like bodies bearing conidia, become converted into hollow spheres or pycnidia, containing in their interior numerous minute reproductive bodies or stylospores which germinate at once and produce new plants. Finally, the highest, or ascigerous form of fruit is rare, and only develops on old trunks that have been dead and decayed for a long time. Up to the present the last mentioned form of fruit has only been met with in France, and its structure is such that the fungus proves to belong to the *Tuberacei* or truffle family.

Dematophora necatrix is almost entirely confined to heavy clay soils, where the water drains away with difficulty, whereas *Dematophora glomerata*, Viala, an allied, but much rarer fungus, with a similar destructive habit, hitherto observed only in France, is met with attacking plants growing in loose sandy soil, where the subsoil is wet.

During the spring of the present year (1896) a sample of soil was received by the Royal Horticultural Society from Mr. Hooper, Cambridge, Waikato, New Zealand, containing roots of apple trees attacked by a fungus, with a communi-

cation stating that the roots of fruit trees which penetrated the places where the fungus appeared to reside became infected, the fungus penetrating the tree and ultimately killing it. This material was forwarded to Kew for investigation. Sterile mycelium alone was present, which appeared to agree in every detail with that of *Dematophora necatrix*, and the fungus was provisionally referred to that species in a brief report published in the *Journal* of the Royal Horticultural Society (XIX., Part I., 28). The following account will give an idea of the injury caused by this fungus, as observed by Mr. R. Allen Wight, of Auckland, New Zealand* :—

"This fungus, in the mycelial stage, attacks a great variety of tree roots, amongst the most conspicuous of which are the apple, pear, peach, and all other common orchard trees. The whitethorn is also very subject to its attacks, as well as a great many *Abies*, and several of the native trees and plants. It also attacks the cabbage, the potato, docks, sorrel, fern, and in fact is almost omnivorous, which is a marked peculiarity. The only plants I have ever known to resist it are the resinous pines and roses; the former suffer at first, and the leaves turn yellow, but they ultimately recover, and I never knew one to succumb, whereas the contrary is the case with all other plants attacked."

"In hedges of whitethorn, where roses have been planted at intervals, the thorns are killed and the roses remain intact and quite uninjured. In an orchard it will appear in patches, killing the fern and sorrel, and spreading until it reaches a fruit tree; it then attacks the bark round the stem just under the ground, which speedily rots, presenting the appearance of having been cooked, and has an offensive smell; it then proceeds along the roots, and the tree soon shows withered leaves, which drop off, leaving it bare; and by and by it falls over and lies on the ground. Its movements are uncertain; sometimes a tree here and there dies; sometimes a whole row, and very often acres are swept off. Many entire orchards of fine trees are killed in a few years. This fungus is never found in clay or other damp soils, but always in very friable lands. Professor Kirk, of Wellington, says it is *Lycoperdon gemmatum*, Batsch., and that "tar water" is a certain cure. The last statement is assuredly an error, and I think the first is also. For a great many years I have endeavoured in vain to procure the fruit of this fungus, using all the means that suggested themselves to me, without any success. I have seen large quantities of the *L. gemmatum* growing in orchards where there is no root fungus, and I have seen a very great many orchards, and watched several closely where hundreds of trees are attacked, and could never find the mycelium connected with the *Lycoperdon*.

"The pest is most plentiful on the skirts of the primeval forests and on fern lands adjoining where no cultivation has ever been resorted to. Whole crops of potatoes are destroyed on such lands, and on dry lands where native tree stumps remain it is very prevalent. My own opinion is that it is a fungus native to, and probably peculiar to, New Zealand (in the North Island only). All my experiments with sulphur and lime have failed. Kerosine oil used in winter has alone been of any use, and that has been used pure in winter without killing the trees. The fungi of New Zealand are legion, and very destructive, but this is the worst, and particularly as it is confined to dry soils. Where I am now writing 500 trees have been killed within the last two years, and all remedies tried have failed. The apple scab, the shot-hole fungus,

* *Journ. Mycol.* Vol. v., p. 199.

the oidium of the vine are terrible pests in New Zealand, and the settlers have more to fear from fungus growths than insect pests."

As previously stated, the material received from New Zealand was, in the first instance, referred to *Dematophora necatrix*. Further development of the fungus, and the receipt of additional fruiting specimens from the same country, showed that this was a mistake. Neither does the fungus belong to any known species. It will, therefore, be described as new, under the name *Rosellinia radiciperda*. On arrival, the diseased roots and infected soil were permeated throughout with delicate white strands of mycelium. The roots were laid on the surface of a thin layer of sterilised leaf-mould kept moist and protected by a bell-jar. Two boxes, each about one foot square and six inches deep, were filled to within an inch of the top with sterilised leaf-mould. A thin layer of the infected soil was sprinkled on the surface of the soil in each box; in addition, a portion of the root of an "Orange Pippin" apple tree was thrust into the soil of one box, and two beech seedlings planted in the other. Finally the boxes were covered with glass to prevent contamination from floating spores of fungi, kept damp, and placed at the foot of a wall having an eastern aspect, where they remained from June till the end of August. At the end of a month the roots under the bell-jar were densely covered with a snow-white, fluffy mycelium, giving off numerous delicate white strands which spread into the leaf-mould. By degrees the mycelium on the roots gradually changed to a pale brown colour, and under the microscope the strands of mycelium showed pear-shaped swellings at intervals—hitherto considered as characteristic of *Dematophora necatrix*—represented on the plate (Fig. 7). Viala states that in *D. necatrix* these swollen portions gradually become globose and free if the mycelium is kept very wet, and form reproductive bodies—chlamydo-spores—capable of germinating and producing new mycelium. I was not successful in producing this result with the mycelium of the New Zealand fungus, although presumably, from analogy, this failure may be due to a lack of some essential factor. At a still later stage numerous minute sclerotia burst through

the cortex of the roots, which, in course of time bore clusters of erect stems, each composed of a fascicle of parallel hyphae, which bear conidia at their much-branched tips, as represented in Figs. 8, 9, 10. Scattered at intervals amongst the sclerotia were minute black bodies, which proved to be a second form of fruit, known as pycnidia, and containing minute spore-like bodies — stylospores — in their interior (Figs. 11, 12). The stylospores germinated and produced a delicate mycelium within twenty-four hours when sown in pure water. The same is true of the conidia previously mentioned. The highest or ascigerous condition of fruit was not produced on the roots, owing probably to their disintegrated condition, a more durable matrix being essential for its development. During the period of this investigation a parcel of New Zealand fungi, collected and communicated by W. Colenso, M.A., F.R.S., was received at Kew, and amongst the number was a species of *Rosellinia*, marked "at the base of a fallen and decayed apple tree." Careful examination of this specimen revealed the presence of sclerotia bearing conidia identical with those of the fungus under consideration, mixed with the perithecia or ascigerous condition of Colenso's specimen (Figs. 1-6); and, further, it appears that the perithecia originate from the sclerotia, which previously bear the conidial form of reproduction.

Regarding the boxes previously mentioned it is only necessary to state that the mycelium spread through the leaf-mould, and also attacked the apple tree root and the seedling beeches.

At the close of the experiments all the material, with the exception of microscopic preparations, was carefully destroyed by burning.

PREVENTIVE MEASURES.

Notwithstanding the fact that the New Zealand fungus proves to be distinct from the European root fungus, yet the general habit, mode of attack, and structure of the two are so similar that the same methods of combating the disease will apply to both.

Owing to the habit of the fungus in penetrating and

spreading in the living tissues of the root of its victim, cure is practically outside the question when a plant is once permeated with mycelium; and keeping in view the varied modes of reproduction for facilitating the rapid spread of the disease, no efforts should be spared in the way of preventing such spreading, when the presence of the fungus is once detected.

Undoubtedly the most frequent and rapid mode of spreading is by means of the mycelium travelling in the soil, and a good method of isolating diseased patches is to cut a narrow trench, from nine inches to a foot deep, round such, care being taken to throw the excavated soil into the diseased portion, and not outside of it. This method, which was first suggested by Hartig for the purpose of preventing the spread of subterranean fungi in the German forests, cannot be too strongly commended, especially where the diseased patches are small in area. The amount of success depends entirely on the thoroughness, combined with an intelligent method of carrying out the work. Half attempts invariably result in a loss of capital without benefit. It may be enough to suggest that the disease may be spread by the spores of the fungus, or infected soil being carried by the shoes of labourers, by dirty tools, wheels of carts, animals, etc., from diseased centres. Diseased and fallen trees, and especially stumps and roots, should be at once destroyed by burning. The soil surrounding diseased stumps should be burned after the stumps have been removed, so as to destroy the smaller diseased portions of the root that remained behind.

A second preventive method, which has proved of service in France, is to lay bare the trunk as far below the surface of the soil as can be done without injury to the tree, and to densely coat the exposed trunk and adjoining soil with powdered sulphur. This should be repeated when the channel round the trunk becomes filled up with earth. If, as stated by Mr. Wight, the New Zealand fungus first attacks the trunk just below the surface of the soil, this method should prove beneficial if persevered with.

Stagnant water should not be allowed to remain in the soil, as this favours the spread of the fungus.

Finally, in those cases where the fungus has completely devastated large areas, it is probable that such will be deserted as unprofitable, the trees being allowed to lie and rot, and the fungus to spread in the soil. This is disastrous, being in fact a nursery for the development and diffusion of the enemy. It is not the object of this note to suggest whose business it is to prevent such short-sightedness, but to impress emphatically that such a condition of things should not be tolerated.

DESCRIPTION of the FIGURES, all of which illustrate *Rosellinia radiciporda*.

Fig. 1, Ascigerous condition of the fungus, showing the perithecia, natural size.

Fig. 2, perithecia enlarged.

Fig. 3, section of same, showing the wall to consist of two separate layers, enlarged.

Fig. 4, ascus containing spores, and paraphyses, $\times 400$.

Fig. 5, tip of ascus after treatment with a solution of iodine, showing the arrangement for effecting the opening or dehiscence of the ascus for the escape of the spores, $\times 400$.

Fig. 6, spores from an ascus, one of which is germinating, $\times 650$.

Fig. 7, brown mycelium, with swellings at intervals, $\times 500$.

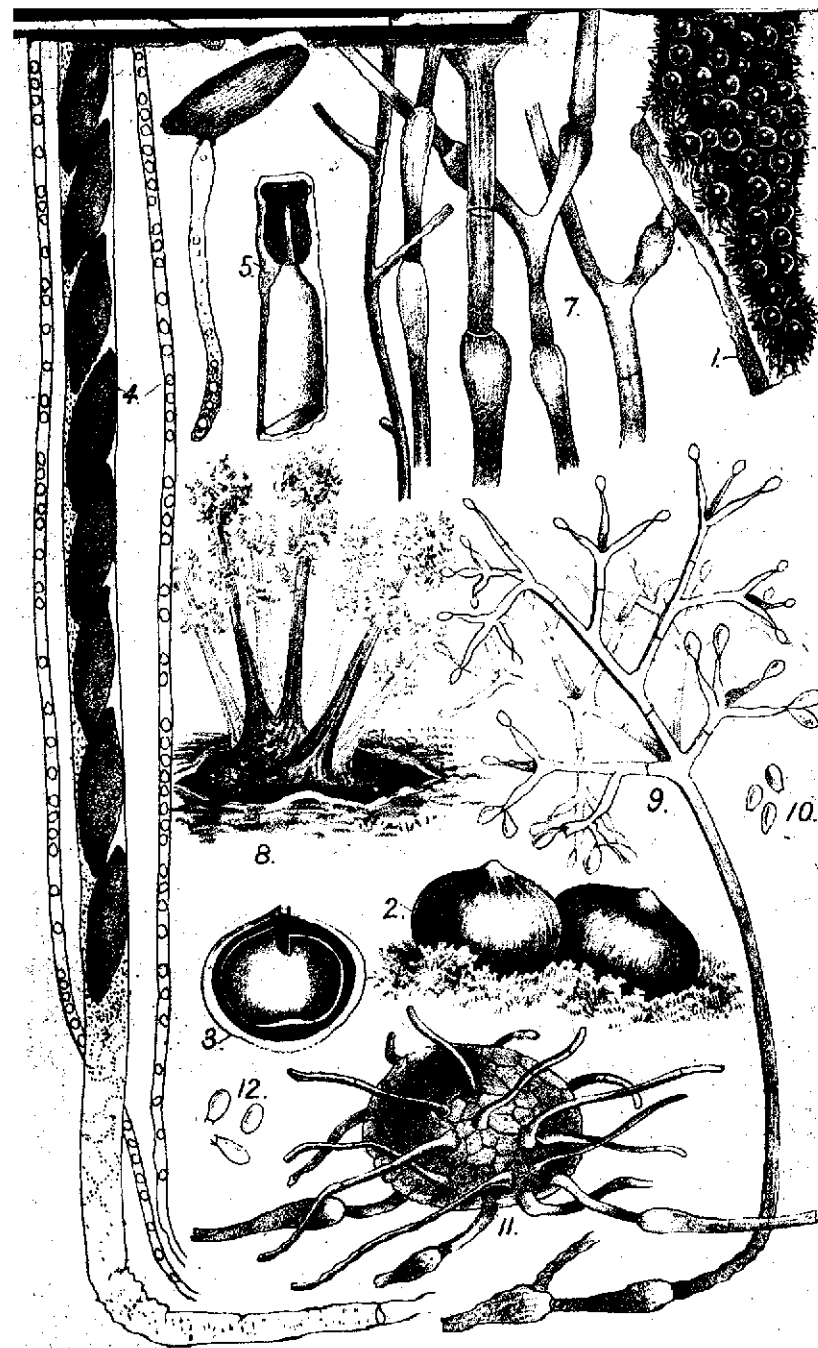
Fig. 8, a black sclerotium bursting through the cortex of a root, from which spring several slender branches bearing conidia, $\times 50$.

Fig. 9, a single thread composing the branches, branched and bearing conidia at the tip, $\times 400$.

Fig. 10, free conidia, $\times 400$.

Fig. 11, a pycnidium springing from the olive mycelium enlarged.

Fig. 12, stylospores or reproductive bodies produced in the interior of the pycnidia, $\times 400$.



Rosellinia radiciporda, Masee.

THICKNESS. When present on the comb or wattles there may be a complete and rapid disappearance of the malady; but when the feathered areas become invaded it is more per-

FAVUS IN POULTRY (*Tinea favosa*).

Favus is a disease produced by a minute parasitic fungus known scientifically as *Achorion Schonleinii* (Remak). This fungus attacks the comb, wattles, and neck, etc., of birds, and causes the feathers of the latter to fall off; sometimes one side of the neck only may be affected, becoming quite depilated, whilst the other shows no signs of invasion; but, as a rule, it is the comb that suffers first and most from the attack.

Tinea favosa is common to man, the cat, dog, rabbit, and is particularly prevalent in rats and mice. Mr. J. White Fox informs me that it is rarely met with, however, in human beings in this country.

It is very destructive in poultry-yards, and, being highly contagious, often spreads with great rapidity. A single diseased cock soon contaminates the whole run. Several outbreaks that have come to my notice have been traced to a new male bird from an affected yard. From the number of enquiries I have recently received, I imagine the disease is on the increase in this country.

The first signs of an attack of favus are small pale, irregular, cup-like spots on the comb or wattles, generally appearing on the comb first. These spots grow together, and sooner or later form a confluent covering of a dirty yellowish-grey substance, which is often arranged in concentric layers. These crusts often grow to a considerable thickness. When present on the comb or wattles there may be a complete and rapid disappearance of the malady; but when the feathered areas become invaded it is more per-

sistent. I have seen the breast, and especially the rump, denuded by this fungus, which, when present on the feathered parts, usually ends fatally unless treatment is resorted to. The feathers become erect and dry and fall off, and leave behind the denuded skin covered with yellowish grey crusts, showing here and there depressions from which the feathers have fallen. The fungus may easily be observed by scraping the diseased surface or the skin under the crusts, and examining the debris under the microscope. It will then be seen to consist of a number of fine threads, the mycelia, and numerous spores, sometimes nearly the whole mass composed of the latter. To examine the fungus, the debris from the skin and crusts should be put on a slide, and then moistened with distilled water and a little acetic acid.

Nearly all breeds seem equally susceptible, but I have never known this disease to occur in Indian Game. Zürn states that those of Cochin China descent are most liable to it.

Care should be taken in handling patients, as the disease can be transmitted to man, on whom it is not so amenable to treatment as in birds. I fancy, however, that the disease can only be planted either naturally or artificially on an abraded surface—at least, in experimenting on poultry I have found this to be the case.

TREATMENT

Consists in bathing the invaded parts with warm water and soft soap, and then applying some ointment to destroy the parasite. Nitrate of silver well rubbed into the comb and wattles has been found of great benefit; an ointment of 5 per cent. of the nitrate of silver in lard may be used for this purpose. I have found red oxide of mercury, one part, to lard eight parts, an excellent remedy if used for several days. A correspondent of the Board of Agriculture advises "powdered zinc, copper, and iron rubbed on the damp comb." At the recent Poultry Conference, at Reading, *thymol* was mentioned as a possible remedy for favus, it having been used successfully in treating ringworm, a somewhat similar parasitic disease in the human subject.

In any case, it is most essential to well foment the diseased parts previously to applying the ointment, and to remove as far as possible all the favic crusts with a blunt knife. One cannot be too careful in examining a fresh bird before turning him into the run, which, needless to say, should not be done if any signs of "favus" are noticed upon it.

Should the disease appear, the bird should be at once isolated and treated, as when the parasite reaches the feathered tracts it is so much more difficult to eradicate.

FRED. V. THEOBALD.

THE CONSUMPTION OF MAIZE.

A noteworthy feature of our import trade in grain and grain products has been the remarkable increase during the past few years in the supplies of maize. Since 1895 our annual receipts of this product in the form of grain have risen from 33,944,000 cwts. to 62,700,000 cwts., while in the same interval the entries of maize meal have risen from 164,000 cwts. to 1,815,000 cwts. In each of the past four years our imports of the whole grain have exceeded 50,000,000 cwts.; whereas the annual entries prior to 1895, while frequently exceeding 30,000,000 cwts., only twice show an importation of more than 40,000,000 cwts.* The milled product, on the other hand, was, until 1897, always an insignificant item in this trade, but in that year maize meal suddenly figured to the extent of over 1,000,000 cwts., and in the past twelve months the total consignments were almost double that quantity.

The maize imported into this country is used for the most part as feeding stuff for live stock, though some of it is employed in the brewing, distilling, and other industries, and in the manufacture of proprietary foods and confectionery. Its cheapness as compared with other feeding grains has no doubt stimulated the growing demand for it amongst stock owners, for during the past three or four years the average value of maize grain has been from 6d. to 1s. per cwt. lower than that of the cheap imported feeding barleys.

The chief source of our supplies is the United States, whence we have received in recent years over 60 per cent. of the entire annual importation, and among the remaining

*In 1890 the quantity of maize grain imported was 43,438,000 cwts. The course of these imports for the past 25 years may be seen from the quinquennial averages, which are as follows:—1871-75, 19,663,000 cwts.; 1876-80, 37,104,000 cwts.; 1881-85, 27,961,000 cwts.; 1886-90, 33,436,000 cwts.; 1891-95, 32,884,000 cwts.; and 1896-99 (4 years), 56,357,000 cwts.

purveyors of maize to our markets the principal are Argentina, Roumania, and Russia. Canada is also credited with a considerable contribution in the annual Statements of Trade, but the shipments from the Dominion consist almost entirely of grain produced in the United States. From the latter country we received in 1899 direct consignments amounting to over 39,000,000 cwts.; Argentina furnished 7,731,000 cwts.; Roumania, 7,354,000 cwts.; and Russia 2,640,000 cwts. Practically the whole of the maize meal imported is supplied by the United States.

Maize occupies a larger area than any other crop in the United States, its acreage usually ranging from 75,000,000 to 80,000,000 acres, with a production approaching 2,000,000,000 bushels annually. Of this large production about 90 per cent. is retained for home consumption, and of the remainder over three-fourths is distributed amongst European countries, mainly the United Kingdom, Germany, Netherlands, and Denmark; while Canada takes most of the balance.

In the United States, as elsewhere, maize is chiefly utilised as food for stock, especially for pigs, but it also enters largely into human consumption in various forms, and in the southern States maize bread is a popular diet. Other uses to which this grain is put in America include the manufacture of starch, glucose, whisky, and alcohol. The quantity of maize annually consumed in the United States in the manufacture of glucose is estimated at 40,000,000 bushels, and practically the whole of the starch of commerce for the entire country is derived exclusively from the same grain. Apart from the grain, the stalk and blades are also valuable as feeding materials and for other purposes, though these portions of the plant are generally left on the field to be burned before the planting of the next crop. The following passage from a report* by the Department of Agriculture at Washington presents a concise description of the economic value of maize from an American point of view:—"It is predominantly the characteristic cereal crop of the United States, and its money value is, perhaps, greater than that of any one crop,

* Composition of Maize. U.S. Department of Agriculture. 1898.

with the exception of cotton. It has been shown that it is a valuable food for man, and that it is the chief food of the domestic animals of our great country. In addition to this, large quantities of starch are made from it, and also glucose and grape sugar. It not only serves as our food, but also furnishes a part of our drink, in the form of the various grades of Indian-corn whisky. In addition to this, it is the source of an immense industry in the manufacture of alcohols, high wines, and Cologne spirits. The stalks, which a few years ago were considered an injurious residue, have been found to possess most valuable properties as cattle food. Especially is this true of the outer shells. The inner portion of the stalk—the pith—possesses remarkable properties as an obturator in the manufacture of battle-ships. It possesses a high degree of resilience and porosity, and when perforated by a shot or shell it instantly closes the aperture made by the projectile, and thus prevents the entrance of water into the vessel. It also has peculiar properties rendering it suitable for the manufacture of pyroxylin varnishes, gun-cotton, and high explosives. By reason of the nature of its construction it is easily nitrated."

In Argentina the cultivation of maize is extending, though at a slower rate of progress than in the case of wheat. According to the Argentine Census of 1895, this crop occupied 3,073,000 acres, or 1,093,000 acres more than in 1888, when the total area under maize was estimated at 1,980,000 acres. In 1899 over 1,122,000 tons of maize were shipped from Argentine ports to various countries, of which the principal were the United Kingdom, France, Belgium, Brazil, and Germany.

Among European countries the production of maize has found its greatest development in Hungary, Roumania, and Italy. In Hungary the crop occupies roughly 6,000,000 acres, and approximately 5,000,000 acres are devoted to its cultivation in both Roumania and Italy. Russia has something over 2,000,000 acres under maize, and France and Austria cultivate 1,400,000 acres and 800,000 acres respectively.

The maize produced in Austria-Hungary is consumed within the Empire, into which there is also a small net annual

importation of about 2 million cwts of this grain; it is utilised largely for feeding stock, chiefly pigs, and for the manufacture of spirits. Roumania exports about 13 million cwts. annually, or approximately a third of the crop grown in the country, her principal customers being Belgium, Austria-Hungary, and the United Kingdom. After Roumania, Russia is the principal exporting country in Europe, the total production amounting in a fair season to over 20 million cwts., of which on the average of the last five years for which figures are available nearly 9 million cwts. have been exported. There is a fluctuating export from Bulgaria varying from one to six million cwts. yearly.

With regard to importing countries, Germany would appear to be the principal maize importer after Great Britain, her annual net receipts amounting to 18 million cwts. in addition to a home production of 6,900,000 cwts. Denmark, which does not grow maize to any extent, has since 1897 imported a considerable quantity from the United States and Russia, mainly as a cheap feeding stuff for swine, the net importation in that year amounting to 8,357,000 cwts., and in 1898 to 8,387,000 cwts. The net importation of maize into France has averaged 6,540,000 cwts. in recent years, whilst the quantity grown has amounted to about 14,319,000 cwts. Holland and Belgium are also importers of this grain to the amount of several million cwts. annually.

MANURING OF POTATOES.

In the *Journal* for September last (Vol. VI., p. 169) some account was given of the experiments carried out by certain agricultural colleges in the manuring of potatoes, the point more especially investigated being the value of artificial manures, whether alone or in combination with dung. Attention may now be usefully drawn to some further experiments made in the course of 1899 by the Durham College* of Science* and the Agricultural Department of the Yorkshire College, Leeds.†

The Durham College experiments were carried out under the direction of Professor Somerville on ten farms in the county of Durham, of which four, however, for various reasons, gave results which were not considered comparable with the remainder. The experiments on the six other stations may, Dr. Somerville says, be considered entirely satisfactory, and the results as trustworthy as can be secured from a single season's trial.

The experimental area at each farm was divided into twelve plots, the first four receiving various quantities of artificial manures, and the next five 12 tons dung with artificials, the quantity of fertilising constituents present in the latter being, except on one plot, less than on the four where they were applied without dung. The tenth plot had 12 tons dung alone, the eleventh 18 tons dung with artificials, while the last was left entirely unmanured. The results from the

* County Councils of Cumberland, Durham, and Northumberland. Technical Education. Eighth Annual Report on Experiments with Crops and Stock.
† The Yorkshire College, Leeds, and the East and West Riding Joint Agricultural Council. Results of Experiments on Potato Growing, 1899.

whole six stations have been averaged, and, in estimating profits, the calculations have been based upon the yield of the large or saleable potatoes only.

The results Dr. Somerville finds to be as follows:—The artificials alone paid well, the average yield on these four plots being 8 tons 18½ cwts. per acre, the average increase over the unmanured plot 3 tons 12½ cwts., and the average net profit nearly £8 per acre. Of the four artificials used alone, that consisting of a mixture of 2½ cwts. of sulphate of ammonia, 5½ cwts. superphosphate, and 1 cwt. muriate of potash paid best, mainly on account of its relative cheapness, as there was not very much difference in the yield on all the four plots.

Where artificials were added to 12 tons dung, the average increase due to the former was 1 ton 3¼ cwts. (the dunged plot yielding 8 tons 2½ cwts., and the plots receiving dung and artificials averaging 9 tons 5½ cwts. per acre); and the net profit on the use of the artificials was here £1 12s. per acre. It is noticeable that the average yield from dung and artificials was only 6¼ cwts. more than that from artificials alone, although in making this comparison it must be borne in mind that where the artificials were used in combination with dung, a smaller quantity of fertilising constituents was in four cases out of the five applied than when they were used alone. The average yield from 12 tons dung alone was 16 cwt. less than that from artificials alone. Twelve tons dung alone increased the value of the produce by £8 10s. 3d. per acre over the unmanured plot, which implies a return of 14s. 2d. per ton of dung used, besides its residual effect. On two plots which received the same quantity of artificials, one of them receiving in addition 12 tons dung, there was an average increase from the artificials alone of £10 14s. 6d., and from the artificials with dung of £13 10s. 9d.; the increase due to the dung was therefore £2 16s. 3d., representing a return of 4s. 8d. per ton of dung applied.

The experiments showed that, as an addition to dung, all the dressings of artificials were profitable, the net returns varying from 23s. to 47s. per acre. Had the potatoes been

valued at 50s. per ton instead of £3, the profits on the artificials would have varied from 12s. to 30s. per acre.

At four of the stations where the experiments were carried out, the potatoes followed several years' lea, either directly (in two cases) or after a single year's interval of a cereal crop; at the other two plots they were taken after a cereal crop grown in ordinary rotation. It was noticed that the artificials when used alone did best at the four stations upon which the potatoes were taken after several years' lea, and that at the remaining two the plots getting dung took the lead. There was, Dr. Somerville says, considerable evidence that the season was exceptionally favourable to the action of artificial manures (or rather, perhaps, unfavourable to dung), but, allowing for this, there can be little doubt that a good general mixture of artificials can be relied upon to produce a first-rate crop of potatoes after lea. In the present instance, moreover, the artificial dressings did very well after stubble also, but the more restricted accumulation of organic matter (humus) in the soil after stubble makes the use of dung much more important than is the case where the land has been broken up out of lea.

Professor Campbell's experiments were carried out at the Garforth Farm of the Yorkshire College, Leeds, and on three other farms, there being in all five series of plots. In comparing the results the average of the five series is taken; the potatoes are valued at 50s. per ton (large and small together). The whole cost of the artificials has been charged against the crop; but in the case of the dung, which is not all exhausted in the first year, it has been assumed that it will be about half exhausted, and its value has accordingly been put at 2s. 6d. per ton. The main question studied was the determination of the kinds and quantities of artificials which may be applied with greatest profit along with farmyard manure.

Professor Campbell states that the "standard" dressing of artificials (1½ cwt. sulphate of ammonia, 3 cwts. superphosphate, 2 cwts. sulphate of potash, costing altogether £2 11s. 4d.) applied with 10 tons dung per acre yielded about 1 ton of potatoes more than the dung by itself; but a double dressing of dung alone yielded better results, in the dry

season of 1899, than 10 tons dung with 6½ cwts. artificials. By withholding each of the three artificials in turn from the standard dressing (with dung) it was found that, while the addition of the complete mixture yielded somewhat the largest crop, it also yielded the smallest profit. Other plots were devoted to testing the effect of doubling the quantity of potash, superphosphate, or ammonia in the above standard mixture. As a result, neither the omission of any one of these ingredients in the artificials added to ten tons dung, nor the doubling of them had a marked effect on the crop. The heavier dressings gave uniformly higher yields, but when the value of the increase was compared with the extra cost the profits were found not to be sufficient to recommend the practice. The results were thus not encouraging to those who make a practice of applying large quantities of artificials along with farmyard manure; although the season was peculiar, and might have affected the results.

On three plots no dung was given; one receiving 10 cwts. of mixed artificials showed an estimated profit over the unmanured plot of £2 2s. By omitting the superphosphate this profit was reduced to 12s. 3d., and by omitting the potash a loss of 18s. 4d. was incurred. It is only when the use of farmyard manure is involved that there is any doubt as to the value of these artificials for manuring the crop. These last three plots were only included to emphasise the necessity for potash when dung is not applied.

SOME EXPERIMENTS IN PIG-FEEDING.

In continuation of the reports of various experiments on pig-feeding for bacon which have recently appeared in this Journal,* it may be interesting to notice here the results of an experiment undertaken by the Agricultural Department of the Yorkshire College, and also some practical observations made by Mr. John M. Harris, in an article published in the Journal of the British Dairy Farmers' Association, on the results of a series of experiments in pig-feeding carried out by a local committee at Calne, Wilts.

The object of the experiment carried out at Garforth under the direction of Professor Campbell, of the Agricultural Department of the Yorkshire College, Leeds, was to determine the value as flesh formers of sharps and maize respectively mixed with barley meal, and also the effect of feeding these rations in a sloppy and in a dry condition. To one lot of pigs gluten was also given with the ordinary food for the purpose of determining the effect of a higher albuminoid ration. Before entering upon the main experiment the pigs were tested over a certain period in order to secure as far as possible uniform lots. On August 10th last, 24 pigs, each about seven weeks old, were separated into lots of six each and fed uniformly for 124 days on a mixture consisting of one part barley meal, one part bran, and two parts sharps, served with about four times its weight of water in which it had been previously steeped. At the conclusion of this preliminary test it was found that, taking the whole period of 124 days into consideration, the average live weight increase per head per day was practically the same for each lot. From this result it appears that, on the whole, the individuality of the animals may be overcome by taking a

sufficient number in each lot and by exercising due care at the outset in their selection. The practice of making preliminary tests of the character described is therefore commended by Professor Campbell to all engaged in experimental work in the feeding of animals; that such precautionary trials are necessary is, he thinks, amply proved by the merited scepticism with which reports on feeding experiments have been so often received by farmers.

The main experiment began on December 19th last, when the pigs in each lot were fed on the following rations:—Lot I., two parts barley meal, two parts sharps, and one part gluten; Lot II., one part barley meal, and one part maize; Lot III., one part barley meal and one part sharps. In each of these three lots the ration was given with four times its weight of water. In the case of Lot IV. the ration was similar to that of Lot III., one part barley meal and one part sharps, but it was given with only twice its weight of water so that while the food given to Lot III. was in the usual sloppy condition, that given to Lot IV. was of the consistency of oatmeal porridge. The pigs in each lot were given as much as they would eat. The experiment was continued for eight weeks, and the principal results are shown below:—

	Lot I.	Lot II.	Lot III.	Lot IV.
	C. Q. LB.	C. Q. LB.	C. Q. LB.	C. Q. LB.
Weight on Dec. 12th	9 2 12	9 2 0	9 3 14	10 0 0
Weight on Feb. 6th	12 3 6	12 1 4	12 3 12	14 0 10
Total increase in live weight during Experiment	3 0 20	2 3 4	2 3 26	4 0 10
Increase per head per day	1'1	0'9	1'1	1'4
Total pork, in stones of 14lbs.	77'1	74	77'9	85'2
Lbs. food consumed during the Experiment	1,904	1,904	1,904	2,254
Lbs. food consumed per head per day	5'7	5'7	5'7	6'7
Lbs. food for 1lb. increase in live weight	5'3	6'1	5'7	4'9

The effect of adding maize and sharps respectively to the ordinary ration of barley meal is shown by the results obtained with Lots II. and III. The pigs receiving sharps yielded a higher percentage of pork, and each pound of

* Vol. VI., pp. 213, 363, 490, 519.

increase in live weight was obtained with 0.4 lbs. less meal than when maize was substituted. If Lot I. is contrasted with Lot III., it will be seen that the higher albuminoid ration given to the former yielded a greater increase in live weight, but the total pork was about the same in each case.

The most marked feature of the experiment is, however, the contrast in the results obtained with Lots III. and IV. The pigs in each of these lots received the same kinds of food, but the quantity of water mixed with the ration of Lot III. was double that given with the food of Lot IV. It will be noticed that the pigs which received the drier ration yielded 124 lbs. more increase in total live weight, 73 stones more pork, and produced each pound of increase with a consumption of 0.8 lbs. less meal. The extra food taken by Lot III. was therefore, as Professor Campbell points out, evidently wasted in heating up the large supply of water which the pigs were obliged to consume.

The conclusions drawn from the experiment are "that the mixture of barley meal and sharps is better than barley meal and maize; that the latter mixture may be somewhat improved by the addition of a highly nitrogenous meal; and, finally, that a great deal of food may be wasted, particularly in winter, when pigs are fed upon food containing more water than is necessary for the requirements of the body."

It appears that the ration given to Lot IV. cost about 19s. more during eight weeks than that given to Lot III., but the value of the increased weight of pork of Lot IV. was 42s. 6d., thus leaving a balance of 23s. 6d. in favour of the drier food. Professor Campbell points out that the period during which the pigs were on different diets was only eight weeks, and that had the experiment been prolonged the results would undoubtedly have been more marked.

The feeding experiments with which Mr. Harris' article deals were carried out at Calne with the aid of the Wilts County Council and with other local assistance. Up to the present sixty-four experiments, involving twenty-four diets, have been undertaken with 640 pigs, and of these twenty-four diets nine have been employed on an average three times each, so that the results obtained, which are embodied in the table given below, may be regarded as fairly reliable.

In a few prefatory remarks Mr. Harris expresses the opinion that the breed of pig which has been found by bacon curers most suited for the production of lean bacon is the large white Yorkshires, either pure or crossed with pure Berkshires; and that a pig for profit should weigh at six or seven months of age from 130 lbs. to 170 lbs. dressed weight.

Rations.	Cost of Producing 20lbs. Increase—Dressed Weight.	Value of Diet as Determined by	
		Suitability of Flesh Produced for Bacon.	Suitability and Quantity of Flesh Produced, and by Rate of Increase in Dressed Weight.
	(1) s. d.	(2) Points.	(3) Points.
Barley meal ad lib., separated milk and 3 lbs. potatoes per diem	4 7½	967	1,000
Barley meal and separated milk	5 3	988	903
Maize meal and separated milk	4 2	945	877
Three parts of maize meal, one part bean meal	4 11	951	590
Barley meal	5 1½	974	519
Three parts of maize meal, one part pea meal	4 7½	908	486
Maize meal	4 6½	939	484
Two-thirds barley meal, one-third bran	5 0½	990	449
Two-thirds maize meal, one-third bran	4 5½	964	404

The separated milk was fed at the rate of one gallon per pig per diem.

The first column of the table shows the actual cost, as shown by the Calne experiments, of obtaining 20 lbs. increased dressed weight, irrespective of the quality of the flesh and the rate of increase, the prices of food being taken at the following rates, viz.:—Barley meal, £5; maize meal, £4 10s.; bran, £4; pea meal, £6 3s. 4d.; and bean meal, £7 15s. per ton; separated milk 1d. per gallon; and potatoes, 2s. per sack of 240 lbs. In the second column the diets are compared solely from the point of view of the suitability of the flesh obtained for the production of the best bacon: the best quality being indicated by 1,000 points. In the third column the foods are compared from the point of view

not only of the quality of the increased dressed weight, but also of the time required for its production, 1,000 points being assigned to the diet which gave the best results.

It will be seen from the third column that, judged from the standpoint of general efficiency, the three diets first mentioned were found to be more profitable than any of the others. The chief factor in determining the position of the different foods when compared for their general efficiency is the rate of increase in dressed weight; thus while the average weekly increase in dressed weight with a diet of barley meal, separated milk, and potatoes was 15½ lbs., that with barley meal and separated milk was 10½ lbs., with maize meal 7 lbs., and with maize meal and bran only 4½ lbs. Hence it arises that bran, while standing first among the supplementary foods for the production of the best bacon (see column 2), occupies a low position for general efficiency (col. 3) on account of the slow rate at which the pigs fed on it increased in live weight, and because a high percentage of the increased live weight was lost when the pigs were killed and dressed.

Arranged in order of merit for cheapness, in conjunction with efficiency, the nine diets mentioned above fall as follows:—

Barley Meal, Separated Milk, and Potatoes.
Maize Meal and Separated Milk.
Barley Meal and Separated Milk.
Maize Meal and Bean Meal.
Maize Meal and Pea Meal.
Barley Meal.
Maize Meal.
Maize Meal and Bran.
Barley Meal and Bran.

The net results of the experiments show, in Mr. Harris's opinion, that it is advisable to use barley meal, soaked in cold water, as a staple food, and to supplement this as far as possible by fresh separated, skim or butter milk, at the rate of one gallon per pig per day, and when procurable by boiled potatoes also, not more than 3 or 4 lbs. for each animal; while barley meal and whey (where cheese is made) might be usefully supplemented by about 1 lb. of bean or pea meal per day. As regards the comparative values of barley and maize the experiments are held to have demon-

strated that the former is rather more valuable than the latter as a staple food for pigs intended for lean bacon; though when barley is much dearer than maize—say 10s. per ton—maize may prove to be more economical, especially when fed in conjunction with a suitable proportion of food rich in albuminoids, such as separated milk or bean meal. Where dairying is not carried on, bran, toppings, bean meal or pea meal may, it appears, be used with care as a substitute for milk, but the dairy farmer is held to possess a great advantage in the profitable production of the class of pig required for making the best quality lean bacon.

AMERICAN FARMERS' INSTITUTES.*

The American "farmers' institute" is an outgrowth of farmers' societies of various kinds, which began to assume definite and separate shape early in the seventies, when several States undertook to hold farmers' meetings for the purpose of giving popular lectures on agricultural subjects. The origin of the itinerant lecture system for the instruction of farmers is to be sought, however, long before this time, for as early as 1842 or 1843 such lectures were inaugurated by the New York State Agricultural Society. In 1859 the Massachusetts State Board of Agriculture appointed a committee to consider and report upon the propriety of instituting meetings similar to teachers' institutes; and in 1871 the same Board voted that the various agricultural societies of the commonwealth be requested to organise an annual meeting for lectures and discussions at such time and place as may be convenient for each society, these meetings to be denominated "The Farmers' Institutes of Massachusetts." In February, 1879, the State Board made it a rule that each agricultural society should hold not less than three "farmers' institutes" yearly, and, upon fulfilling this and other requirements of the Board, each society received an annual grant of £125. At the present time in nearly every State and province in the United States institutes or meetings of a similar character are held with more or less frequency and regularity; and in most of the older States the movement has

* 1.—Farmers' Institutes, by L. H. Bailey. Bulletin No. 7, U.S. Department of Agriculture. 2.—Farmers' Institutes, by A. C. True and F. H. Hall. Experiment Station Record, Vol. vii., U.S. Department of Agriculture. 3.—Report of Ontario Agricultural Department. 4.—Report of Department of Agriculture, British Columbia. 5.—Report of Secretary for Agriculture, Nova Scotia.

passed the experimental stage, and has become a recognised part of governmental or educational machinery.

The function of the farmers' institute is well described in the following passage from an article by Messrs. True and Hall:—"The institute is the adult farmers' school. Here they may learn from scientists and investigators the principles which underlie the art of agriculture, and from successful farmers the best methods of applying those principles. The scientist at the same time learns the needs of the farmer and the problems regarded as most necessary of solution, and finds out from the results of actual practice the truth or falsity of theories and deductions made from experiments on a limited scale. The views of both farmer and experimenter are broadened, and sympathetic relations are established by the close social contact which marks the institute in its most perfect form."

Though the institutes are not conducted under the same auspices throughout the country, the character of the meetings is in most respects essentially the same in every State. The farmers may meet for half-a-day every month, or at longer intervals, for four or six days. The meetings are usually held in the winter, when the pressure of work is relaxed; but they are also held at other seasons of the year in some States. The programmes are planned to promote the interchange of ideas, and a full and free discussion takes place on subjects introduced by specialists or successful farmers who have attained more than local reputation. All persons in attendance, the humblest as well as the most prominent, are urged to ask questions and to mention facts gained from personal experience. A "question box" is frequently made use of, and answers are given by the conductor of the institute, or by someone specially fitted to supply the information asked. At the evening session a popular lecture is usually given upon some subject of general agricultural interest, but it is made somewhat more elaborate and complete than at the day session, and less opportunity is given for discussion.

The numerous agricultural colleges and experiment stations which exist in the United States are closely associated with

the institutes; and even where no official or legal connection exists the college teachers are expected to interest themselves in this external work. The institute work is therefore sometimes regarded as a system of university extension.

It would appear that the institutes are at the present time undergoing a transformation owing to the desire of farmers to receive more specific instruction. There is a demand for courses of technical lectures on various subjects, and itinerant "dairy schools" and "schools of horticulture" have been organised in various States. The administration of the institutes is of two kinds, viz., under governmental auspices, or in the hands of an educational institution. The Government control may be exercised in four different ways, viz., through a State Department of Agriculture, or by an independent State officer, or through county organisations or rural societies which receive State bounties. The work of the institutes proceeds directly from government departments in nineteen States comprising all those east of and including New York and Pennsylvania. There are also nineteen States in the South and West in which the institutes are directly under the auspices of the agricultural college or experiment station. In a number of States specific appropriations are made for carrying on the work of the institutes, while in some States the funds provided for this purpose are more or less discretionary, and are derived from general appropriations to the State Department of Agriculture, from bounties dependent upon the number of participants in the institutes, or from the funds of the college or experiment station. In nine States the annual appropriations from the State funds in aid of farmers' institutes exceed £1,000 annually.

From statistics collated by the Office of Experiment Stations it is estimated that about 2,000 institutes were held in the United States during 1899, and that they were attended by over half a million farmers. The importance of institutes as factors in the general education of farmers in some of the States is shown by the number of meetings held and the average attendances. In Wisconsin there are now annually held 120 institutes, with an attendance of over 50,000 persons; in

Massachusetts 125 institutes, with an attendance of about 11,000 farmers; in West Virginia over 60 institutes with a total attendance of 14,000; in Minnesota, 50 institutes of two or three days each, with an attendance at each of from 300 to 1,000; in Indiana, 100 institutes, with an attendance of over 25,000; in Kansas, 135 institutes with a total attendance of 20,000; in Michigan, there are institutes in nearly every county, with a total attendance reported to reach 120,000; in Nebraska, 60 institutes with a total attendance of over 26,000; in Pennsylvania, about 300 institutes with a total attendance of over 50,000; in Ohio, 250 institutes in 88 counties, with an aggregate attendance of about 90,000; in New York, over 300 institutes yearly with a total attendance of about 75,000; in California, about 80 institutes annually with a total attendance of 16,000.

Twenty of the States publish in more or less complete form the proceedings and papers read at the institutes, but in the other States the reports in the local and agricultural press are the only records. In New York the annual reports of the State Agricultural Society contain in full the proceedings and papers presented at the institutes; in thirteen States the reports of the State Boards of Agriculture have devoted more or less space to reports of these meetings; Minnesota, Ohio, Pennsylvania, Tennessee, and Wisconsin issue special publications containing institute papers. The Minnesota "Institute Annual" is issued in an edition of from 25,000 to 30,000, and the Wisconsin "Farmers' Institute Bulletin" in an edition of 50,000 annually.

In Canada farmers' institutes have made most headway in the province of Ontario, where they are organised under the direction of the Department of Agriculture. The Government appropriation for the work of the institutes amounts to £2,000 yearly, this sum including the salary of the superintendent of farmers' institutes, who is an officer appointed by the Department. The province is divided into 96 institute districts, and in the year ended June 30th, 1899, 677 meetings were held with a total attendance of 119,402 persons. "As a rule," the Superintendent reports, "the best meetings are held in villages or small towns. In the larger towns the audience

consists not only of those who attend for the purpose of obtaining practical information, but also those who attend for mere amusement."

In Manitoba the farmers' institutes are organised by an Act of the Legislature, which enables an institute to acquire a legal status and to qualify for a Government grant when its paid-up members number 25; the annual subscription per member must not be less than 2s., and for each paid-up member the provincial Government makes a grant of 2s. The Department of Agriculture sends out lecturers to visit the institutes twice in the year. In British Columbia the provincial Government also makes a grant of 2s. per member enrolled in aid of the institutes and provides lecturers for two meetings each year. In 1899, 105 meetings were held at which the total attendance was 3,317.

There are no regularly organised farmers' institutes in the province of Quebec, but a large number of farmers' clubs have been established which work on somewhat similar lines to the institutes. The provincial Government makes an annual grant of £5 to £10 to each club, according to the number of members, and pays the salaries and travelling expenses of official lecturers, who attend the meetings of the clubs. In 1898 there were 516 farmers' clubs in existence in the province. In Nova Scotia also the institutes are replaced by agricultural societies, which are partially supported by grants in aid from the provincial funds. To qualify for a grant a society must have 25 members with annual subscriptions amounting in the aggregate to not less than £8 10s. annually. In 1899 the number of qualified societies was 119, with 6,974 members. The subscriptions received by the societies amounted to £1,750 and the Government grant to £2,090.

AGRICULTURAL AND MISCELLANEOUS NOTES.

ERADICATION OF MOSS IN PASTURES.

In an earlier number of this Journal* a short account was given of some experiments undertaken at the South-Eastern Agricultural College at Wye to test the effects of mechanical and chemical treatment for the eradication of moss from grass land. Small plots of pasture on two of the college fields have been under such treatment for the past two years. The fields are both thin pastures on a light loam, with chalk a few inches below. They are always grazed, and are particularly subject to a dense growth of moss in the winter. As none of the reasons usually assigned for the presence of moss, such as sourness, deficient aeration, or great poverty of the soil seemed to apply in this case, the plots were set out to try the effects of various methods of mechanical and chemical treatment. The former consisted in subjecting each of three separate plots in both fields to one of the following processes:—1, Lifting the turf; 2, rolling; 3, raking. In the chemical trial plots were dressed respectively with sugar, sulphuric acid, lime, superphosphate, basic slag, salt, and sulphate of iron.

From a report of the results of the experiments of the past two years, published in the Journal of the South-Eastern Agricultural College in April last, it appears that the chemical treatment has had little or no apparent effect. The soil is very chalky, and consequently lime and basic slag had done no particular good, though superphosphate seems to have fed the grass a little, and so kept the moss down. Of the mechanical processes the rolling has been most effective. The rolled plots are now almost free from moss, and the beneficial effects of the continued rolling are very manifest.

* Vol. VI., Sept., 1899, p. 243.

The raked plots have also improved, and are less mossy than the surrounding land. On the other hand, lifting the turf has been a failure, and the plots so treated have become practically a continuous cushion of moss.

It is held that the experiments show that the prevalence of moss on light loamy lands resting on chalk is associated with the open texture of the soil, in which the worms work very freely and continually lift the surface, and that constant rolling and harrowing, with the treading of sheep, are the only ways of keeping the moss down.

COLD STORAGE OF FRUIT.

The experiments conducted by the Kent County Council in 1898 on the cold storage of fruit have been reported in a previous number of this Journal*, and the Board have now received a copy of the further report on the experiments carried out during the past year. It was considered desirable to experiment with larger quantities in order to ascertain with exactitude to what extent cold storage could be made of real commercial value, but difficulty was experienced in obtaining supplies sufficiently large for the experiment. It is one thing for a grower to send for trial a small quantity of fruit which he does not miss, but quite another to send a larger bulk which represents a real monetary value; many fruit-growers were willing to send a basket or two, but were inclined to hold aloof when it came to a question of 20 or 30. In this connection it is observed that in no quarter has so little interest been evinced in the cold storage experiments as in the home districts. Colonists, shipping agents, and representatives of foreign governments have been interested, and nine-tenths of the inquiries which have been received have come from what may be termed outside sources.

The consignments which were received in 1899 consisted of black currants and plums. With regard to the former, the fruit kept fresh for some time, and demonstrated on a large

* Journal, Vol. VI., June, 1899, p. 85.

scale what was proved in the previous year on a small scale, that the fruit will keep for some time in good condition while waiting for a favourable market. Some misunderstanding arose about sending it to market, which prevented the result of the experiment being stated financially. In the case of the plums the results were very successful. One grower stated that he had seen his consignment of plums (consisting of 40 halves of Cox's Emperor) at the market after being in the cold store three or four weeks, and found them in good condition, and realising double the price they were worth when put into the cold chamber. Another grower sent a consignment of Victorias, the price of which when stored was 7s. per half, but they realised 9s. per half when put on the market.

In conclusion, the County Superintendent of Horticulture observes that out of three consignments one was a success as regards the effects of storing, and the other two were successful both as regards storing and marketing.

OILY CIDER.

A report* by Mr. F. J. Lloyd, F.C.S., upon the results of the investigations pursued by him during 1899 in connection with experiments in the manufacture of cider, which have been carried out at Butleigh for several years past by the Bath and West of England Society, contains some information relating to a disorder described as "oily cider," because it causes bottled cider to become thick and pour out like oil. This oiliness, which is apparently a species of ropiness, though it is not of the thick consistency of ropy milk, is stated to be caused by substances produced from sugar; hence, the greater the proportion of sugar in the cider, the greater the tendency to oiliness. Consequently, the trouble is most marked in bottled cider, as cider is usually filtered and bottled when it has a specific gravity of 1.015 to 1.020, and therefore contains far more sugar than cider kept

* Journal of the Bath and West of England Society, 4th Series, Vol. X.

in cask, which is generally filtered only after the specific gravity has fallen to 1.010. It has been observed at Butleigh that when the same cider has been partly bottled and partly left in cask, that in bottle has been distinctly oily, while that in the cask has remained free from this defect.

Oiliness was observed for the first time in the cider at Butleigh in July last, and Mr. F. J. Lloyd undertook some experiments with a view to discover the cause as well as a remedy. What is known as oily or viscous wine was found by Pasteur to be due to a bacterium termed a "streptococcus," because it consists of little spheres having the habit of growing in chains. But no analogous bacterium has been found by Mr. Lloyd, even after the most careful examination of many samples of oily cider, and he believes that in cider the change is due to the action of some other organism, viz., a bacillus which was found in every sample he examined. That the oiliness is caused by some living organism is shown by the fact that a bottle of good cider into which sediment from a bottle of oily cider had been placed became oily within two months. And in this connection Mr. Lloyd points out how necessary it is to remove tainted liquid from the cider house, to completely destroy that living bacterial matter which, in the form of a sediment in bottle or cask, may, if disseminated, cause a veritable epidemic of the complaint to which it can give rise. The nature of the organism will be the subject of further inquiry. Careful investigations were made to discover how the germ gets into the cider, but with no very definite result. The only possible explanation left open is that the trouble is due either to the contamination of the fruit itself, or of the water which is used for washing the bottles and barrels at Butleigh, though, as this water comes from good springs, it is hardly possible. But there are, it seems, many facts which it is difficult to account for by this assumption; as, for example, why in such cases all the cider was not oily.

The final problem was to discover, if possible, a remedy. Bottles of cider were stored with a view to prove whether, as some makers state, the oily characteristic disappears naturally in course of time. An experiment was also under-

taken to ascertain whether aërating the affected cider would cure it. The pomace from a cheese was carefully broken up and placed into a large open tub; bottles of oily cider were emptied on the pomace, the contents of the tub were then well stirred, and, after standing for twenty-four hours, the mass was placed in the press, and re-pressed as in the manufacture of small cider. It was found that the juice thereby obtained had nearly lost its oily character. It was placed in a barrel to ferment, and eventually entirely lost the oiliness, together with its former peculiar taste, and the liquid seemed likely to become very fair draught cider.

SPRAYING OF CHARLOCK.

An experiment in spraying charlock was carried out in 1899 at four centres in North Wales, viz., three in Carnarvonshire, and one in Montgomeryshire, under the direction of the Agricultural Department of the University College of North Wales, Bangor. Six plots, each one-eighth of an acre in size, were utilised for the experiment at each centre; four of them were treated with dressings of sulphate of copper of the following strengths, viz.:—Plot I., 25 gallons of a 2 per cent. solution; Plot II., 50 gallons of a 1 per cent. solution; Plot III., 50 gallons of a 2 per cent. solution; Plot IV., 25 gallons of a 4 per cent. solution; the remaining two plots were dressed with solutions of sulphate of iron, Plot V. receiving 40 gallons of a $7\frac{1}{2}$ per cent., and Plot VI., 40 gallons of a 15 per cent. dressing. At the time of dressing the charlock was pretty far advanced at two of the centres in Carnarvonshire, viz., Penrhyn and Tanyfynwent, and was mostly in bloom. At the third centre in that county, Madryn, what was at first taken to be charlock turned out to be wild cabbage, or "smooth-leaved charlock," and the dressings had no effect whatever on it. A few true charlock plants, however, which grew amongst it, were considerably injured on some of the copper sulphate plots. It has been discovered in other experiments also that spraying

has no effect on the "smooth-leaved" variety, so that the results at Madryn are in keeping with facts already known.

On June 7th the Carnarvonshire centres were visited, and notes were made on the various plots. At Penrhyn all the dressings appeared at this time to have had some effect. More charlock had been injured on the copper sulphate plots than on those dressed with sulphate of iron. The most satisfactory plot at this date was Plot IV.

At Tanyfynwent the copper sulphate solutions had had a decided effect on all the plots to which they were applied. The sulphate of iron, on the other hand, had had very little effect, though the stronger solution (Plot VI.) had been slightly more effective than the other. As far as could be seen at this date, none of the solutions had had an injurious influence on the corn at any of the centres.

The centres were visited again on June 10th. At this time it was observed at Penrhyn that on Plot I. the charlock leaves were very much shrivelled, and the flowers partly shrivelled. On Plot II. the leaves were also greatly shrivelled and the flowers only partly so, as on Plot I. Here it was observed, further, that the corn was slightly tinged. A large part of the leaves and flower was shrivelled on Plot III., and the corn was also tinged. On Plot IV., the leaves were almost entirely shrivelled, and the flowers were considerably damaged. The corn was tinged on this plot again. On Plot V., the charlock was not much affected. The leaves were a good deal shrivelled on Plot VI., but the flowers were not touched.

At Tanyfynwent, the leaves and flowers were much shrivelled on Plot III., but on the other plots there was not very much to be noticed. The sulphate of iron appeared to have had little or no effect on the charlock.

Up to this time the dressings had been more successful on the whole at Penrhyn than anywhere else, though the results here cannot be said to have been very satisfactory when compared with those obtained at other places where similar experiments had been conducted. On June 16th this centre was visited for the third time. It was estimated then that about 75 per cent. of the charlock had been killed on Plot

III. On the other plots, however, the charlock had greatly revived and was running to seed, although the leaves, especially on the sulphate of copper plots, appeared to have been permanently injured. An additional dressing of a one per cent. solution of sulphate of copper at the rate of 50 gallons per acre was applied to one-half of Plots I., II., IV., and VI., on June 16th, but it did not make very much difference in the appearance of the plots.

The plots at Melyniog Fawr were visited also, but here none of the dressings were successful. The sulphate of copper, however, was slightly more effective, as in the other centres, than the sulphate of iron.

In these experiments sulphate of iron failed altogether to produce any appreciable effect. Sulphate of copper gave better results, although, it must be admitted, they were far from satisfactory. In one case only, Plot III. at Penrhyn, did the sulphate of copper have any effect of real value. But there is no doubt that, on most of the other plots to which it was applied, it succeeded in checking for a time the growth of the charlock, which subsequently, however, revived and seeded. It is clear that spraying, if carried out under favourable circumstances, may be attended with success. But the results depend largely upon certain conditions, one of the chief of which appears to be the age of the charlock. The dressings do not seem to be so effective by any means when the plant is in bloom as when it is sprayed at an earlier stage. It is observed with respect to the relative value of sulphate of copper and sulphate of iron that the experiments conducted by this College agree with the majority of those carried out in different parts of England, in which, likewise, sulphate of copper produced the better results. As far as the effect on the corn is concerned, it is stated that in no case was it injured by any of the dressings to any appreciable extent.

GRAIN RATIONS FOR COWS.

For a number of years past experiments in the feeding of dairy cows have been carried on in summer under the direction

of the State Experiment Station at Copenhagen, and a report has been recently published on the results of the experiments conducted in 1898 and 1899, which were devoted mainly to the determination of the feeding value of mixed grain and maize respectively. In both these years Indian corn or maize was compared with barley and oats, the common grain feeds for milch cows in Denmark. Seven farms co-operated in the work, and furnished 264 cows in 1898 and 241 in 1899 for the experiments. The rations of the cows during the preparatory and post-experimental periods were the regular rations given on the farms, the grain fed in all cases consisting of one-half barley and oats and one half maize. During the experimental period proper the cows were divided into three lots. Lot A received barley and oats only, while lot C received maize only, and lot B received the mixture of barley, oats, and maize. The maize and mixed grain were fed in equal quantities. In addition to these materials, all the lots received equal amounts of oil cake, mangolds, and hay, with straw *ad libitum*. The quantities of maize and mixed grain that replaced each other varied on the different farms from 1.65 to 3.3 lbs. daily per cow, and this constituted from one-half to two-thirds of the total ration of concentrated feed.

The results obtained as regards the fat content of the milk showed only insignificant differences, on the average, for all the herds. The small differences were in favour of the mixed grain, but too small to have any practical importance, being within 0.1 per cent. The same was true of the results of the complete chemical analyses.

As regards the quantities of milk yielded by the different lots, the lots fed with maize only produced, on the average, slightly more milk. The production of butter fat was, however, almost identical for the different lots, with a tendency to lower results for maize.

The weighings made of the cows at the different periods of the experiment showed that the maize fed lots increased slightly more in live weight than the cows of either of the two other lots, the increase per head per day being 0.21, 0.25, and 0.33 lb., for lots A, B, and C respectively. The consumption of straw was not influenced by the kind of grain fed.

The keeping quality of the butter produced on two of the farms participating in the experiments was ascertained by the method adopted in the scoring of butter at the Permanent Danish Butter Exhibitions, the butter being scored twice, a few days after it was made, and again 14 days later. The butter produced by the maize-fed cows scored somewhat higher and kept slightly better than that from the two other lots. The analyses of the butter fat showed that the iodine number and the refractive index were increased to some extent by the maize ration, and the volatile fatty acids were changed in a similar manner as when oil cakes were fed. The churning temperature of the cream from the maize-fed cows was somewhat lower (0.7 to 1.1 F.) than that from the other lots, other churning conditions being the same.

WHITE SPOTS ON BUTTER.

The white crystals that sometimes appear on the surface of print butter have often been noticed. They are entirely unlike mottles or the white curd spots that may occasionally be noticed on the freshly cut surface of butter. The crystalline form and salt taste of this deposit shows it to be pure salt which was well mixed through the mass of the butter when it was made, but which has come to the surface of the butter in crystalline patches. These crystals sometimes accumulate in such quantities as to form a white incrustation nearly covering the entire exposed surface of the butter. These white spots are seen most frequently in winter, and especially on one pound prints or blocks of butter which have stood in a refrigerator. They often appear within twelve hours after the butter is made and increase in size as long as the butter remains under conditions favouring their formation. Such spots are not an indication of defective salt, of poor workmanship, or of bad butter; they simply show that the butter has been kept in a cold place which at the same time was so dry that the water of the brine evaporated leaving the salt on the surface.

A demonstration of this fact was made by taking two separate pounds from a churning of freshly made butter and placing them in two glass jars. About an inch of water was poured into one jar and the same quantity of sulphuric acid into the other, the butter being raised above the liquids in each case. The butter was thus exposed to a dry air in one jar and to a moist atmosphere in the other. The jars were tightly covered and left in a refrigerator in which the temperature was about 50° Fahrenheit. Within a few hours crystals of salt began to form on the surface of the butter in the jar of dry air. In a few days these crystals increased in size until nearly the entire surface was covered with salt rosettes. On the other butter, which, during the same time, had been exposed to a moist air at the same temperature, there were no crystals. The surface of this butter, however, was completely covered with drops of brine.

In a second trial, when the conditions were the same except that the two jars of butter were placed in a room where the temperature was about 70° Fahrenheit instead of 50° Fahrenheit, the same results were obtained.

The results of these experiments show that the incrustation of salt upon the surface of butter can be prevented by keeping the butter in a moist atmosphere. Such conditions are ensured either by sprinkling the floor with water, or by having a sufficient number of open vessels of water in the refrigerator or the place where the butter is kept.

[16th Annual Report of the Agricultural Experiment Station of the University of Wisconsin.]

NOTES ON CALF-REARING.

The Board have received from the Durham College of Science a copy of a special report on calf-rearing, by Mr. W. T. Lawrence, manager of the Cumberland and Westmorland Farm School, at Newton Rigg, near Penrith. The method of calf-rearing practised at the County Council Farm has been so successful that the governors have issued this report in the hope that it may prove useful to farmers.

The principal features of the treatment adopted at the Newton Rigg Farm in the first twelve weeks of the calf's life are thus described:—

"As soon as the calf is born it is taken to a pen away from the cow-house, where it is rubbed down with straw and well bedded with the same material. In the course of about half-an-hour it is fed with about a pint of its mother's first milk at blood heat; no medicine is given, the colostrum containing all that is necessary both for feeding the calf and moving its bowels. Afterwards the following rules of feeding are followed closely:—

First Week.—Its own mother's warm milk three times a day, commencing with about a pint and a-half at a time, and increasing to two quarts by the fourth day. At the third day the calf is taught to drink without the fingers.

Second Week.—Two quarts of warm new milk (not necessarily its own mother's) three times a day.

Third Week.—Two quarts of warm milk, half new and half skim (or separated) three times a day, with half-pint of linseed soup to each quart of skim milk.

Fourth Week.—Ditto, with a handful of sweet meadow hay twice a day to pick at.

Fifth Week.—Two and a-half quarts of warm skim milk three times a day, a half-pint of linseed soup to each quart, and a little sweet meadow hay after morning and evening meals; to be continued with gradually increasing quantities of hay till the end of the eighth week.

Ninth Week.—Omit the linseed soup, and after the mid-day milk give a single handful of broken linseed cake, and a little pulped swedes (grass instead of swedes in summer); hay as before.

Twelfth Week.—Omit mid-day milk, and give three-quarters of a pound of mixed linseed cake and crushed oats, and half-gallon of pulped swedes (grass in summer) at mid-day, continuing morning and evening skim milk and hay as before."

When the calf has reached the age of five months, milk, Mr. Lawrence says, may, if necessary, be discontinued, and 1lb. a day of mixed linseed cake and crushed oats be given with larger and increasing quantities of hay and roots (sliced or whole); but if skim milk be plentiful calves should be given one or two drinks of it each day, even up to the age of eight or nine months.

Side by side with linseed soup, cod-liver oil has been tried at Newton Rigg as a substitute for the cream removed from skim milk, and has been found to answer admirably. It is administered to the calves in the following way:—One tablespoonful of cod-liver oil to each two quarts of separated milk to be given is measured into a calf bucket; the warm milk is then poured on it, whereupon the mixture is poured

into another calf bucket to mix or emulsify the oil, and at once served to the calf. The use of cod-liver oil involves much less trouble than is incurred in the preparation of the linseed soup, but the expense is somewhat greater if genuine cod-liver oil be used.

Where there is an insufficiency of milk for the calves on account of cheese-making or milk-selling, Mr. Lawrence recommends the use of a calf meal made as follows: ground linseed one part by weight, flour one part, ground linseed cake two parts; 2½ lbs. of this mixture should be stirred in five quarts of boiling water for the day's allowance of a calf, and be given warm at three meals to one under eight weeks old, and at two meals afterwards, a bare tablespoonful of sugar and nearly half a teaspoonful of salt being added to the porridge for each meal. The cost of keeping a calf on this food is stated to be a fraction under 2s. per week. If some skim milk be available, say one gallon a day for each calf, it should be given with half this allowance of porridge, and the calf meal should then consist of equal parts of ground linseed, flour, and ground linseed cake. Stress is laid upon the point that milk or porridge should not be given hot, milk as sucked by the calf directly from the cow cannot be above the temperature of her blood (101° to 102°), and therefore food fed by hand should not be hotter than this.* In conclusion, Mr. Lawrence states that it is best to keep spring born calves in for the first year, except perhaps during the best summer months when they may be put on a pasture for a few hours daily.

The cost of calf-rearing for a year under the system above described is as follows:—

For first twelve weeks:—

	£	s.	d.
120 quarts of new milk, at 1½d.	0	15	0
Cod-liver oil or boiled linseed	0	1	6
112 gallons of separated milk, at 1d.	0	9	4
6 stones of hay, at 4½d.	0	2	3
10 lbs. of American linseed cake, at 9d.	0	0	8½

*Calves which are fed with new milk are liable to "white scour," which frequently proves fatal; but this complaint has been treated with success at Newton Rigg by giving the calf, as soon as "white scour" appears, two teaspoonfuls of castor oil, and about twelve hours afterwards, one-third of a bottle of "gaseous fluid" filled up and shaken with warm milk; the dose is repeated if required on the following day.

	£	s.	d.
For next fourteen weeks:—			
147 gallons of separated milk, at 1d.	0	12	3
49 lbs. American linseed-cake, at 9d.	0	5	6
24½ lbs. of crushed oats, at 8d. per stone	0	1	2
10½ stones of swedes	0	0	5
38½ stones of hay, at 4½d.	0	14	5
For remaining 26 weeks:—			
84 gallons of separated milk, at 1d.	0	7	0
182 lbs. linseed-cake	0	13	0
91 lbs. of crushed oats	0	4	4
65 stones of swedes	0	2	8½
91 stones of hay	1	14	1
	6	1	8

Calves thus reared and sold at a year old at the local spring sales of store cattle, easily fetched £8 5s. each, thus paying the market price for home-grown produce eaten, 6d. a gallon for the new milk, and 1d. per gallon for the separated milk consumed, and leaving something over £2 for first value of the calf. The manure produced is taken as a set-off against the value of attendance and litter.

COD-LIVER OIL FOR CALVES.

Experiments have been carried out, under the direction of the Agricultural Department of the Yorkshire College, at the Manor Farm, Garforth, to determine the value of cod-liver oil as a substitute for milk fat and for meal in rearing calves.

Fifteen young calves were purchased on May 16th, 1899. From that date to June 7th they all received new milk, at first four times a day, and later three times a day, the total quantity given being increased from 1 to 1½ gallons. On June 17th they were weighed and divided into three lots of five each. Lot I. continued to receive 1½ gallons of new milk per head daily. Part of the new milk supplied to Lot II. was then replaced by separated milk and about ½ oz. of cod-liver oil; while in the case of Lot III. part of the new milk was replaced by separated milk and a small quantity of meal, composed of two parts linseed meal, one part oatmeal, one part rice meal, and one part locust bean meal, all ground as fine as possible, and passed through a sieve. From June 19th the three lots were fed twice a day instead of three times, but still continued to receive the same quantities of

milk as before. On July 15th the quantity of cod-liver oil was increased to two ounces, the maximum quantity given. On this date they were all given a little linseed cake and bran, about six pounds of each among the fifteen, which was gradually increased until May last, when they were getting 45 pounds of linseed cake and 28 pounds of bran, together with meadow hay.

The milk given to Lot I., at 8d. per gallon, cost 1s. per head per day; in the case of Lot II. the cod-liver oil at 5s. per gallon, weighing about 150 ounces, and the separated milk at 2d. per gallon, cost under 4d. per head per day; while for Lot III. the meal at 1d. per day and the separated milk as before, cost slightly more than 4d. per head per day. All the calves had access to fresh hay. The cod liver oil was simply stirred up with the milk. The calf meal was given in the form of gruel mixed with the separated milk.

The calves were weighed on eleven occasions, beginning with June 17th, 1899, and ending with May 2nd last; the weight of the five calves in each lot at the beginning and end of the period of twelve weeks during which the foods were tested, viz., June 17th and September 9th, was as under. The weight of the calves in May last is also shown.

	Lot I. Whole Milk (Weight of 5 calves).	Lot II. Cod Liver Oil (Weight of 5 calves).	Lot III. Calf Meal (Weight of 5 calves).
	cwt. qrs. lbs.	cwt. qrs. lbs.	cwt. qrs. lbs.
June 17th, 1899	5 2 11	5 1 21	5 2 8
September 9th, 1899	12 1 5	11 1 23	10 2 8
May 2nd, 1900	30 0 2	29 3 23	29 0 19

The average daily increase in weight per head per day during the twelve weeks from June 17th to September 9th, viz., the period during which the foods were tested, was as follows:—

Calves on Whole Milk-	1.8 lb per head per day.
„ Cod Liver oil	1.6 „
„ Meals	1.3 „

From a comparison of the figures it is evident, Professor Campbell remarks, that although the new milk calves did best, as was bound to be the case, the expense, which was about three times as great as for the group which received cod-liver oil, was out of all proportion to the increase. The

cost of the latter group was only one-third of that in the case of the new milk calves. It will be noticed that the calves on cod-liver oil did better than those on meals, and apart from the superiority of the oil in this respect, another point which is said to be very much in its favour is the small amount of labour involved as compared with the preparation of calf-meal, and moreover there is apparently very little difficulty in getting calves to take it.

When the calves were about two-and-a-half months old the cod-liver oil and new milk groups showed very little difference, and both lots were very much superior to the calf-meal group, but after the calves were weaned the cod-liver oil group appeared to suffer most from the change. Early in the winter ten other calves were purchased, and reared on separated milk and cod-liver oil, but when the milk was stopped the oil was given among the bran, and this is said to be a better system than suddenly stopping the cod-liver oil along with the milk.

The result of the experiments indicates, in Professor Campbell's opinion, that cod-liver oil can be recommended with some confidence as a substitute for cream and also for meal in rearing calves, but he advises that caution should be exercised in the use of cheap brands of cod-liver oil; in the above experiments the oil used was of the very best quality. No experiments were made to demonstrate whether more than two ounces of oil per day would be beneficial. A larger quantity appeared to keep the bowels too open, but this looseness of the bowels seemed to be quite distinct from ordinary scour, inasmuch as the calves were not unthrifty.

EXPERIMENTS IN THE PASTEURISATION OF MILK AND CREAM.

Some interesting inquiries relating to the pasteurisation of milk and cream have been carried out at the Wisconsin Experiment Station by Messrs. Farrington and Russell, who have published the results of their experiments, so far as they have proceeded, in the last Annual Report of the

station. In a few preliminary observations on the conditions of efficient pasteurisation the authors state that two distinct rules have been formulated as necessary, viz. (1) the avoidance of a cooked taste or flavour in the treated product; and (2) the destruction, as far as possible, of fermentative or disease bacteria. They point out that milk heated to a temperature of 160° F. or over acquires a more or less pronounced scalded flavour, varying in intensity with the period of heating, contact with the air, and other factors. "To destroy the different bacteria requires a temperature that varies with the condition of the germ. If the organisms are present in the resistant spore stage, no single application of heat will entirely destroy them, unless the exposure is made for a number of hours. In the vegetating, growing condition, which stage comprises about 95-99 per cent. of the organisms present, by far the larger majority are killed when milk is heated to 135°-140° F. for 10-15 minutes. Even such disease forms as cholera, diphtheria, and typhoid fever germs cannot withstand the above temperature, while the sour milk species for the most part succumb readily under these conditions."

But while these conditions as to heat and time of exposure might be considered sufficient for ordinary pasteurising purposes, the fact that the tubercle bacillus is more resistant than the other disease-forms mentioned has caused the temperature at which that germ is destroyed to be regarded as the proper limit for pasteurisation; and in general practice this limit has been a temperature of 155° F. for 15-20 minutes. Milk or cream pasteurised at this temperature is, however, rendered much thinner, although the amount of fat remains unaltered; the cream on such milk does not rise to the surface, and the impression is created that the product is deficient in butter-fat owing to the fact, discovered by Messrs. Babcock and Russell, in 1896, that in milk heated above 140° F. the fat globules become uniformly diffused throughout the product, instead of being aggregated in tiny clots or clusters as is the case in normal milk. Some recent investigations of Dr. Theobald Smith* as to the

exact temperature and time limit at which the tubercle bacillus loses its vitality have, however, indicated that an exposure of 140° F. for 20 minutes is, in ordinary circumstances, sufficient to destroy the organism of bovine tubercle, and this result, if confirmed by further tests on a practical scale, should permit of such modification of the pasteurising temperature as would overcome the usual objections urged against pasteurised products.

The experiments of Messrs. Farrington and Russell were accordingly designed to determine the effect of a temperature of 140° F. on the consistency and creaming property of milk. The plan of the experiment is described as follows:—

"From a quantity of thoroughly mixed 4 per cent. milk that had first been run through the separator, a sample jar was filled and placed in cold water. This raw milk, marked 'Normal,' served as a standard for comparison. The balance of the same milk was then heated in a Pott's pasteuriser to a temperature of 140° F. for varying periods of time (15-60 minutes) and several samples withdrawn. The remainder of the milk was then raised to the ordinary pasteurising temperature, 155° F., for 15-30 minutes, and also sampled in a similar way. All samples were then kept in cold running water at a temperature approximating to 50° F. Daily observations were made as to the thickness of the cream line on each jar and as to the keeping quality of the milk. One of the advantages to the consumer in the use of bottled milk as against the more primitive method of dipping from cans is that the quality of the milk can be approximately estimated by the thickness of the cream layer. In pasteurised products the cream does not rise readily, and naturally the purchaser infers that the quality is inferior, whereas it may contain a normal amount of fat."

The thickness of the cream on the samples of milk heated to 155° F. and 140° F. respectively, compared with that on normal milk, as shown by these experiments, is given below. The samples heated to 140° F. were taken in triplicate.

* Jnl. of Exp. Med., 1899, p. 217.

Thickness of Cream on Milk in quart bottles.

Date.	Time of observation after pasteurisation (hours)	Inches of cream on normal milk.	Inches of cream on Pasteurised Milk.		
			155° F. for 15 min.	140° F. for 15 min.	140° F. for 30 min.
April 26	20	2	0	2 1½ 2	—
	43	—	1½ dim	2 1½ 1½	—
	6	1½	0	1½ 1½ 1½	—
April 27	22	1½	0	1½ 1½ 2	—
	46	1½	1½ dim	1½ 1½ 2	—
	6	1½	0	1½ 1½ 1½	—
April 29	30	1½	0	1½ 1½ 1½	—
	100	—	1½ dim	—	—
May 1	21	1½	0	1½ 1½ 1½	—
	45	1½	0	1½ 1½ 1½	—
	21	1½	0	—	1½ 1½ 1½
May 2	72	1½	Faint	—	1½ 1½ 1½
	20	1½	0	—	1½ 1½ 1½
	20	1½	0	—	1½ 1½ 2
May 4	100	—	dim	—	2 2 2
	125	—	2	—	2 2 2

The foregoing results are held to show that pasteurising at 155° F. and subsequent cooling to 50° F. so changes the character of the milk that the creaming of the same is not only greatly retarded but actually lessened in quantity. The cream line in the pasteurised milk was, it appears, invariably less sharply defined and could not readily be perceived until the milk had remained in cold water for about 48 hours. In the case of the milk pasteurised at 140° F. for either 15 or 30 minutes the cream is stated to have risen quickly and as completely as in normal milk, while the close uniformity of the results obtained with the triple samples at this temperature shows that the creaming of such milk was practically uninjured.

In this connection the authors observe also that in samples pasteurised at 140° F. for 60 minutes the creaming property was also normal, and this they regard as an indication that the period of exposure in pasteurisation has no material

effect in diminishing the creaming property of the milk, the latter being more affected by the temperature employed.

As regards the keeping quality of milk pasteurised at 140° F., it was found by a series of tests that there was practically no difference in the keeping quality of milk heated to that temperature for either 15 or 30 minutes, and milk heated to 155° F. for 15 minutes. These results were further confirmed by a bacteriological examination of the pasteurised milk.

A number of trials were also made to test the effect of heating on the "body" or consistency of the cream, and the results showed practically no difference between the consistency of normal raw cream and that heated to 140° F. for 30 minutes.

The authors conclude their report on these experiments with the following observations:—"The temperature recommended for the pasteurisation of milk and cream in the past has been 155° F. for a period of 15 to 20 minutes. This limit was chosen because it had been regarded as the point at which the tubercle bacillus is destroyed in a moist medium. When, however, cream or milk is heated to a temperature of 140° F., or above, the physical condition of the fat globules is changed so that cream appears much thinner, and milk loses its property of rapid creaming. This objection can be overcome, as is shown by the preceding experiments, if milk or cream is not heated above this temperature."

"Not only is the creaming property of the milk and the 'body' or consistency of cream unaffected, but the keeping quality is practically as good as it is where the product is heated to a temperature of 155° F. All that is necessary to secure good keeping quality is to destroy the vegetative bacteria, and as this is accomplished at the temperature of 140° F., if the exposure is made for a sufficient period of time, no advantage in this respect is to be gained by heating to a higher temperature. This being true, it only remains to determine with certainty how long an exposure must be made to destroy the tubercle bacillus. The temperature limit that has heretofore been considered necessary where the

exposure was made at 140° F. was one hour, but recent extensive experiments by Dr. Theobald Smith, in which all conditions have been most carefully controlled, show that this time can be materially shortened where milk is agitated during pasteurising. A thorough retest of this point is now being made under factory conditions, and the exact time period will be determined on the basis of these trials."

"The use of a temperature of 140° F. will do away with the only objection that has ever been urged against pasteurised products."

THE COMMONS ACT, 1899.

The regulation of Commons, which the Commons Act 1876, was intended to promote, has not been carried out under its provisions to more than a very limited extent. In the 23 years since 1876, the Act has been effectively applied in only 26 cases of regulation. This small number may be attributed in great measure, and especially with respect to small Commons, to the complicated procedure and the amount of the costs. The Commons Act, 1899, was passed for the purpose of providing simpler and less expensive machinery for placing Commons under local management, with a view to their improvement, protection, and preservation as open spaces. Under the new powers any district council may make a scheme for the management of a Common within the district, due notice being given of the intention; and unless objection be taken either by the Lord of the Manor or by persons representing one-third in value of such interests as would be affected, the Board of Agriculture may confirm the scheme, with or without modification, whereupon the scheme will have full effect. The new Act will, it is believed, be found useful in many cases where there is a general agreement that a Common ought to be placed under due control, and where only powers to make improvements and to enforce bye-laws for preventing encroachments and nuisances are essential. Shortly after the passing of the Act the Board issued to all the district councils in England

and Wales a circular letter explaining its provisions, together with a copy of the regulations made by the Board containing the prescribed forms of scheme and of notice of intention to make it. The provisions of the Commons Act, 1876, with respect to the regulation of Commons are not repealed, and may still be found serviceable in certain cases.

Among the miscellaneous provisions in the Commons Act, 1899, is one relating to the notice by advertisement which the Board are required to give before they confirm an order of exchange, &c. By section 19 it is enacted that section 150 of the Inclosure Act, 1845, shall have effect as if "two successive weeks" were therein inserted instead of "three successive weeks," and as if "one month" were therein inserted instead of "three calendar months." This alteration materially shortens the time occupied in carrying out exchanges of land, and reduces the expenses by the cost of one advertisement.

PIG CURING IN THE UNITED STATES.

Some interesting information relating to the growth of the hog-packing industry in the United States has been issued by the Bureau of Statistics at Washington. The so-called packing industry, or the wholesale curing and packing of hog products, is centred mainly in the Western States, where it is intimately associated with the business of slaughtering, dressing, and exporting cattle and sheep. The origin of the pork packing trade, as it is now understood, cannot be traced further back than 1818, when an establishment was set up in the city of Cincinnati, which remained the chief centre of this trade until 1862. The location of the industry has always been in close proximity to the great maize growing States, and as the centre of maize production has moved westwards it has been followed by the hog-packing trade. Thus, in the fourth, fifth, and sixth decades of this century, Cincinnati and Louisville, on the Ohio River, in the midst of a flourishing maize country, were the headquarters of the curing and

packing industry, but in the early sixties this business, following the movement of the maize fields, began to move further west, first to Chicago, which has since been the chief centre, and more recently to Kansas City and Omaha.

The city which has gained most pre-eminence in the packing industry in the Western States is Chicago. Fifty years ago the population of that city did not warrant the establishment of packing establishments upon a large scale, and the position of Cincinnati and Louisville was considered far more advantageous. Within a dozen years, however, these conditions changed completely, and the natural advantages of Chicago's position became manifest. The broad plains of Illinois and of the trans-Mississippi States were planted with corn, and the hogs were raised in great numbers, while its position at the head of Lake Michigan and at the converging point of the great East bound railroads gave Chicago an advantage in transportation which was rapidly utilised by enterprising packers. The immense advances which have been made in packing, the methodical, mechanical, clock-like method of killing and packing, the utilisation of all parts of the animal and of all by-products, the advances in refrigeration, the introduction of summer packing, the improvements in transportation, and many other reforms have been intimately associated with the rise of packing in Chicago, and from 1862 this city has remained indisputably the chief pork packing centre of the world.

Though the tendency in the packing industry is toward the continuance of the present westward movement and the supersession of Chicago by cities lying still nearer the corn belt, the advantages possessed by Chicago can never be entirely lost, and that city must remain for a long time the natural outlet, and consequently the natural packing centre, for a large territory. But the advantage of locating the packing industry as near as possible to the place where the hogs are raised, however, has led to the rise of packing establishments to the west of Chicago, notably at Kansas City and Omaha. The prospects for the packing industry at Kansas are said to be excellent, and its growth has been very rapid, due largely to the nearness of the cornfields

and the rail facilities provided for Eastern or Southern movement. As late as 1879-80 Kansas City was seventh on the list of packing centres; three years later it was already second, a position it has since held. The development of Omaha has been similar, but less rapid. As late as 1885-86 Omaha was eighth in rank of the great winter packing centres; four years later it had become third, which position it has since maintained.

The following table shows the number of hogs slaughtered and packed at the principal slaughtering and packing establishments of the United States in each of the years (ended 1st March), 1894-95 to 1898-99 :—

Places.	1894-95.	1895-96.	1896-97.	1897-98.	1898-99.
	No.	No.	No.	No.	No.
In the Western States . .	16,013,645	15,010,635	16,923,978	20,201,250	23,651,695
In the Eastern States . .	3,098,500	2,612,500	2,790,600	3,072,100	3,164,000
Total	19,102,145	17,613,135	19,719,878	23,273,350	26,815,695

In 1898-99 the number of hogs slaughtered and packed in Chicago was 8,016,675; the corresponding figures for Kansas being 3,107,053, and for Omaha 1,977,922. According to the Cincinnati *Price Current* the total number of hogs slaughtered and packed in establishments in the Western States in 1899-1900 was 22,200,000 as compared with 23,652,000 in the previous year. In connection with this statement it may be observed that in 1899 the total importation into the United Kingdom of salted and cured pig meat from the United States amounted to 6,354,000 cwts., comprising 5,912,511 cwts. of bacon and hams, and 164,042 cwts. of salted pork.

CONVEYANCE OF AGRICULTURAL PRODUCE FROM RUSSIA TO LONDON.

According to the *Commercial and Industrial Gazette*, of St. Petersburg of 6th May last, the Russian Government has been engaged for some time in arranging a quick steamer

service between the Baltic and London for the conveyance of perishable goods, eggs, game, butter, etc. Detailed conditions, both technical, commercial, and political (as regards nationality of crew, etc.), were worked out by a special Commission of the Department of Commerce and Manufactures last November. It was intended to offer a Government subsidy to the Company accepting the undertaking, in return for its fulfilment of the various conditions, etc. Various foreign steamship companies were approached on the subject, with the result that the firm of Helmsing and Grimm have accepted all the obligations imposed by the Commission, without a subsidy, upon a guarantee, however, that for ten years the Russian Government will not grant a subsidy to any other steamship company for a similar purpose. Should this offer be accepted, then, from this autumn, Messrs. Helmsing and Grimm's fast vessels will run weekly from Riga to London, specially fitted up for the export of eggs, game, meat, butter, etc.

Butter and game from Siberia and the Steppe Governments will be conveyed overland in specially arranged refrigerating trucks. The trains along the whole route from Kurgon (on the Siberian Railway, in the Government of Tobolsk), *via* Tula and Moscow to Riga, will be furnished with special ice compartments, &c. A special ice-house depôt will be constructed at Riga for the preservation of the goods pending shipment. The firm will apply the reduced rates of the Northern Sea Route, and grant facilities for insurance and payment on delivery. The maximum rates will be published, beyond which the firm in question cannot charge. This does not prevent other companies running similar services at the same time, even at lower rates, but they would naturally be forced to grant the same conveniences and facilities for payment.

REGULATIONS FOR THE IMPORTATION OF MEAT INTO GERMANY.

The Board of Agriculture have received, through the Foreign Office, a copy of a memorandum by the Commercial Attaché to

H.M. Embassy in Berlin on the "Inspection of Meat" Act, which passed the German Reichstag on the 22nd of May last. It will be seen that Section 14 excludes all "tinned meats" from importation into Germany, as well as sausages and other mixtures of chopped meats. The canned meat imports from British Colonies are thus shut out from the German market. As regards other importations of meat, certain regulations are, in the second part of section 14, laid down which remain in force up to the 31st of December, 1903, after which date the regulations affecting this remaining part of the meat imports may be modified.

The following are the provisions of Section 14A of the "Inspection of Meat" Act:—

The importation of meat in air-tight closed boxes or in similar casings, as also of sausages and other mixtures of chopped meat, is forbidden within the German Customs limits.

In other respects, the importation of meat into the German Zollverein will be regulated by the following provisions up to the 31st December, 1903:—

1. Fresh meat may only be imported in whole carcasses which, however, in the case of cattle (with the exception of calves) and of pigs may be in complete halves.

To the carcasses there must be attached the pleura, peritoneum ("Brust und Bauchfell"), the lungs, the heart, and kidneys. The Bundesrath is empowered to extend this regulation to other organs.

2. Prepared meat can only be imported when experience has shown that all possibility of injury to health is excluded, or when, on importation, the absolute freedom from injurious properties can be ascertained with certainty. This regulation, it is considered, cannot be carried out in consignments of salted meats ("Pöckelfleisch") when the weight of single pieces is less than 4 kilos. (about 8lbs. 13ozs.); this rule does not apply to ham, bacon, and intestines ("Därme").

Meat which has undergone a process for the purposes of preservation, but which has, in its chief features, still retained the properties of fresh meat, or which can, by a suitable process, regain the properties of fresh meat, is not to be considered as prepared meat; such meat is subject to the provisions of sub-section 1.

For the period after 31st December, 1903, the regulations dealing with the importation of meat are to be revised by law. Should such new regulations not have been completed by that date, then the regulations of sub-section 2 as to importation will remain in force until further notice.

THE TUBERCULIN TEST FOR CATTLE IMPORTED INTO CAPE COLONY.

The following regulations for the examination and quarantine of imported cattle for tuberculosis were proclaimed in Cape Colony on April 21st last, and will come into operation on August 1st next:

1. The word "cattle" in these Regulations shall be taken to mean and include all animals of the bovine tribe.
2. No cattle shall be allowed to enter this Colony by sea until the conditions set forth in these Regulations are complied with.
3. If there shall be produced to the Officer authorised by the Government to make the necessary examination of cattle under the provisions of the Animal Diseases Act No. 27 of 1893, a certificate signed by a duly qualified Veterinary Surgeon of the country from which such animals have been brought, to the effect that they have, before being embarked, been submitted to the test known as the tuberculin test, and have not given any reaction indicative of the presence of tuberculosis, and if, upon examination, the Government officer shall have reason to believe that they are free from any contagious or infectious disease he shall forthwith give a permit for their landing at any port or place in this Colony.
4. In the absence of a satisfactory certificate as aforesaid the cattle shall be removed to a place provided by the Government for quarantine purposes, and shall be subjected by a Government Veterinary Surgeon to the necessary testing by tuberculin to ascertain whether they are or are not affected with tuberculosis.
5. In the event of the test indicating the existence of

tuberculosis, the animals shall not be removed alive from the quarantine station but shall be destroyed there, and the owner shall be allowed to deal with the carcasses as he may think fit, provided, however, that the flesh shall not be used for human consumption unless the said officer shall give a certificate that it is fit for that purpose.

6. All expenses of inspection, quarantine, destruction, and otherwise shall be borne by the owner of such cattle.

7. The foregoing Regulations shall not apply to cattle entering by sea from the Colony of Natal, so long as similar regulations remain in force in that Colony, nor shall they apply to cattle imported solely for purposes of slaughter, provided that, before being landed, they shall be inspected by the officer referred to in the third section of these regulations and declared to the best of his belief to be not unfit for human consumption, and the owner or importer shall sign and deliver to such officer an undertaking to the effect that none of such animals shall be used or disposed of for any other purpose than for *immediate* slaughter for food.

DENMARK'S PRODUCTION OF MILK AND BUTTER.

Professor Bøggild of Copenhagen has published in the *Ugeskrift for Lægmænd* the results of an inquiry undertaken by him to ascertain the approximate production and consumption of milk and butter in Denmark, a subject of considerable interest in view of the large exports of butter from that country. The estimates put forward by this authority are based on returns furnished by the dairies about three years ago.

The number of dairies owned by co-operative associations and by companies, in operation on 25th May, 1897, was 1,145. From 1,068 of these establishments, information was obtained as to the production of butter and cheese in the year 1896, the 77 dairies from which such details were not forthcoming being situated in towns. The total output in the twelve months according to the statements furnished by

the former amounted to 127,738,600 lbs. of butter and 20,952,800 lbs. of cheese. On the assumption that the quantity of butter thus accounted for represented nine-tenths of the entire production of the country, the remaining tenth being allowed for the butter produced in the 77 urban dairies, and in a number of smaller estate and private dairies, the total quantity of butter manufactured in Denmark in 1896 is estimated to have been about 141,933,000 lbs., which on the number of milch cows returned in 1898, viz., 1,067,138, gives about 123 lbs. of butter per cow.

If it be further assumed that 27 lbs. of milk was required for each pound of butter; that 22,000,000 lbs. of whole milk were utilised in the manufacture of cheese; that 400,000 calves consumed on an average 440 lbs. of whole milk; and that the consumption of new milk, cream, and half-skimmed milk in households represented a daily consumption of 1.1 lb. of whole milk per head of the population; then the total produce of milk in Denmark in 1896 would appear to have been about 4,953,058,000 lbs. made up as follows:—

	lbs.
Milk used for butter	3,832,158,000
Milk used for cheese	22,000,000
Milk used for calves	176,000,000
Milk used for households	922,900,000
Total	4,953,058,000

This quantity would represent an average milk yield per cow of 462 gallons.

From the foregoing figures, and the statistics of imports and exports, some idea may be gathered of the amount of butter consumed in Denmark. The home production and imports in 1896 amounted to 177,518,000 lbs., while the exports were 133,166,000 lbs., thus leaving 44,352,000 lbs. for consumption in the country. Of margarine it is estimated that the quantity utilised for home requirements was about 22,000,000 lbs., so that the total consumption of butter and margarine was roughly 66,000,000 lbs., or about 30 lbs. per head of the population. This head rate, Professor Böggild remarks, is much below the ordinarily accepted estimate of 44 to 55 lbs. per head per annum; but he points out that according to the statistical data referred to above, the

consumption in 1896 could not have exceeded an average of 33 lbs. per head.

In 1898, which is stated to have been one of the most productive years of the dairying industry, Professor Böggild estimates that the total production of butter in Denmark was 155,716,000 lbs., and by applying the same methods of calculation to determine the production of milk, he obtains an average milk yield per cow in that year of 497 gallons.

The weak points in the foregoing calculations are the assumption that the output of the dairies represented nine-tenths of the entire production of the country, and the estimate relating to the milk utilised per lb. of butter and for feeding calves and household consumption. It is, however, maintained by Professor Böggild that the only estimates which may admit some modification are those relating to the utilisation of milk for cheese, calves and household purposes; but even when these are reduced by one-half the results for 1898 give a total production of milk of 4,764,782,000 lbs., or 446 gallons per cow, which in Professor Böggild's opinion may be taken as a minimum estimate.

(*Ugeskrift for Landmand.*)

BELGIAN MILK REGULATIONS.

In addition to the general regulations and, in particular the prohibition to place food for sale in contact with lead or other metals which might be injurious, the preparation and sale of the milk of cows and other animals are subject in Belgium to the following conditions:—

All vessels containing milk deprived of a portion of its cream, which is intended for sale, must have a dark blue band all round the outside, at least two inches broad, upon a background or second band of white. Such vessels may not be used for the sale of whole milk. In the case of milk lightly skimmed by hand, and containing at least $1\frac{1}{2}$ per cent. of fat, the blue may be replaced by a red-brown band.

Carts may also be used for the carriage of skimmed or separated milk, provided that they bear above the top the inscription "Skimmed Milk" in dark blue letters at least two inches high on a white ground.

No milk may be sold for human consumption which contains any added water or foreign substance whatever, such as preservative agents. This prohibition applies equally to colostrum milk; to milk altered by microgerms or infectious material; and to the milk of animals whose food may have contained some poisonous plant, or which may have been given medicine containing poison, or which are suffering from a contagious disease. Nevertheless, the milk of cows affected with foot-and-mouth disease may be sold after having been heated by a special process approved by the Minister of Agriculture and Public Works.

[*Decrees of 18 Nov., 1894; 31 Oct. 1898; and 9 Jan., 1899.*]

JAPAN'S PRODUCTION AND IMPORTATION OF AGRICULTURAL PRODUCE.

In his report to the Foreign Office on the foreign trade of Japan for 1899, Mr. A. H. Lay states that the growth in the importation of food-stuffs other than rice becomes more noticeable year by year. Manufacturing Japan is driving agricultural Japan into the background. The yield of agricultural produce is practically at a standstill. In 1899 an increase in the totals of imports under the following headings may be noted:—beans, pease and pulse, fresh eggs, and salted fish, etc. Flour, meal and starches have undergone a diminution in quantity (though 1898 showed a very considerable increase), but this is not to be wondered at considering the good grain crop, almost without parallel, of 1898. The harvest of wheat and barley in 1899 was comparatively small owing to the bad weather, which was so disastrous to the rice, and moreover the area devoted to the cultivation of these cereals is not now so large as it was a few years ago, so that the demand for foreign flour, meal,

and starches will presumably be much more felt during 1900. Rice, too, is expected to show a rise of no inconsiderable extent during 1900, the import figures for 1899 having been exceptionally low.

A striking instance of the tendency of Japan to import raw materials and manufacture them at home is to be witnessed in the growth of the importation of raw wool. The woollen industry has made great strides in Japan during the past few years. The import duty of 5 per cent. on wool, which was formerly levied, was abolished on April 1st, 1896, and the exemption of the raw material from customs charges imparted an impetus to the development of woollen manufactures. The demand for woollen goods and woollen clothing among the Japanese has been rapidly growing since 1896. The value of the raw wool imported during 1899 is set down at £441,452, and shows an increase in the price of wool, as compared with 1898.

[*Foreign Office Report, Annual Series, No. 2,397. Price 2½d.*]

LIVE STOCK IN THE UNITED STATES.

According to the returns collected by the Department of Agriculture at Washington, the number of live stock on farms in the United States on Jan. 1, 1900, comprised 13,537,524 horses; 2,086,027 mules; 16,292,360 milch cows; 27,610,054 oxen and other cattle; 41,883,065 sheep. Compared with the numbers returned for the corresponding period of 1899, this year's figures show a decline of 127,783 in horses; 48,186 in mules; 384,171 in oxen and other cattle. On the other hand, there is an increase of 302,245 milch cows and of 2,768,612 sheep.

EGYPTIAN EGG TRADE.

The *Reichs-Anzeiger* of the 23rd March publishes a report from the German Consul at Cairo on the subject of the egg

trade of Egypt. This branch of the export trade has, it would appear, been in existence for about five years, and last season's export amounted to about 30,000 boxes, each containing 1,440 eggs, whilst this season's export is expected to amount to 50,000 boxes. The season lasts from the beginning of December until the end of March. The eggs come principally from the provinces of Upper Egypt—Keneh, Girgeh, Assiout, and Fayoum, the latter of which supplies the best kind of eggs. The eggs of Lower Egypt are much larger than those of Upper Egypt, the latter being very small. The eggs are collected in the villages by native middlemen, who dispose of them to exporters in Cairo in parcels of 100,000 and upwards. The eggs are carefully dried and packed in wooden boxes—1,440 in each box. Owing to the scarcity and consequent dearness of wood in Egypt, the whole of the packing material has to be imported from Europe. When packed, the boxes of eggs are despatched by rail in closed waggons to Alexandria for shipment. About one-half of the exports are sent to Liverpool by cargo steamers, the passage taking about 12 days. Considerable quantities are sent to France, especially at the beginning of the season, and there is also an export trade to Austria.

The eggs are used chiefly for industrial purposes—biscuit making, &c. Prices in London and Liverpool vary from 43s. to 87s. per box, the average being 48s. to 50s. The price at which the eggs are bought in Egypt varies according to the market in Europe, and under especially favourable circumstances has reached 150 piastres (say 30s. 6d.) per 1,000, but at other times they have only fetched half this amount.

Business in Cairo is in the hands of two large firms, one of them being German; and in Alexandria five large and a number of smaller houses are engaged in the trade. According to the Customs statistics, in which eggs were separately distinguished for the first time in 1897, the total exports in 1897 were 13,670,000; in 1898, 34,982,000; and in 1899, 39,793,000.

The imports of eggs from Egypt into the United

Kingdom in each of the first three years have been as follows:—1897, 6,562,000; in 1898, 17,926,000; and in 1899, 30,573,000.

BELGIAN MARGARINE LAW.

The following are the principal provisions of the law of 4th May, 1900, to regulate the sale of margarine in Belgium. The date on which this law comes into force will be announced subsequently, but it will not be later than the 1st January next.

The term butter is reserved for fat obtained from milk or cream by churning, with or without the addition of ferments, colouring matters, or salt. Other alimentary fats resembling butter in their external characters, such as appearance, consistency, colour, odour, taste, are termed margarine.

Mixtures of butter and margarine for sale are prohibited. Margarine for sale may not contain more than ten per cent of fat derived from milk. It must be mixed with substances which, while being inoffensive and incapable of altering its organoleptic characters, will facilitate its distinction from butter. Particulars of these substances will be given later in a Royal decree.

Produce destined for direct export is exempted from these provisions, if declared prior to manufacture.

Margarine must be delivered from a manufactory or wholesale dealer in vessels bearing the word "margarine" on every face, in letters at least four-fifths of an inch high, with the name and address of the firm.

Butter and margarine may not be sold on the same premises; and butter merchants or producers may not keep margarine, even for their personal consumption, on premises where butter is sold.

All shops where margarine is sold, as well as vehicles serving for peddling margarine, must bear the words "Sale of Margarine" in distinct type at least eight inches high, and clear of all other inscriptions. In market places margarine may only be sold at spots specifically indicated

by the communal authority, and at least twenty-five yards from any butter stall.

All vessels or wrappers in which margarine is sold must have the word "margarine" in letters distinctly visible to the public, at least four-fifths of an inch high, and clear of all other matter; as well as the name and address of the seller. If sold in blocks, these must be cubical in shape and marked in a similar manner.

Abnormal butter, *i.e.*, butter of which the characteristics differ from those of most pure butter, without exhibiting clearly adulteration or serious alteration, may not be sold. A Royal decree will specify the physical and chemical indications by which these characters may be recognised.

BELGIAN AGRICULTURAL BUDGET OF 1900.

The State expenditure in Belgium for the promotion of agriculture, which is provided for in the Budget of the Minister of Agriculture for 1900, included the following items:—

Grants for compensation for animals slaughtered by order of the authorities, expenses of applying tuberculin test, and subsidies to organisations for insurance of live stock	£ 56,000
Veterinary inspection	8,000
Grants for the improvement of breeds of farm animals	20,000
Veterinary and agricultural education	32,160
State Botanic Garden	3,936
Agricultural experts and experiment stations	6,640
Grants for agricultural council and societies	10,400
Annual statistics	2,240

Making a total under the head of Agriculture of £139,376. In addition, provision is made for an expenditure of £9,050 on the Agronomic Stations and Analytical Laboratories.

(*Moniteur Belge*, No. 131.)

AGRICULTURAL WAGES ABROAD.

The First Annual Abstract of Foreign Labour Statistics issued by the Board of Trade contains some information

relating to the wages of agricultural labourers in foreign countries. The countries dealt with in the Abstract are France, Hungary, Russia, Sweden, and the United States.

For France the particulars relate to the years 1882 and 1892. The average daily wages of day labourers and market gardeners are given as follows:—

	Labourers with board.		Labourers with-out board.		Market Gardeners.	
	1882. s. d.	1892 s. d.	1882 s. d.	1892 s. d.	1882 s. d.	1892 s. d.
MEN						
Summer - - -	1 7	1 5½	2 6	2 4½	2 5½	2 4
Winter - - -	1 0½	1 0½	1 9½	1 7½	1 10½	1 9½
WOMEN						
Summer - - -	0 11	0 10½	1 6	1 5	1 5½	1 4½
Winter - - -	0 7½	0 7½	1 1½	1 1	1 1½	1 0½
CHILDREN						
Summer - - -	0 7	0 6½	1 0½	0 11½	0 11½	0 11
Winter - - -	0 5	0 4½	0 9	0 9	0 8½	0 9

In the case of Hungary a statement is furnished showing the average daily wages of manual labourers employed in agriculture in the year 1895. The figures, which relate to Hungary proper, are as follows:—

Occupation.	Daily wages for the kinds of works specified below.					
	Harvest.	Threshing.	Mowing.	Vineyard.	Wood-cutting.	Other work.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Men provided with board and lodging	1 5½	1 4½	1 4	1 0	0 11½	0 10½
Men not provided with board and lodging	1 11½	1 9½	1 9½	1 3½	1 3½	1 2½
Women provided with board and lodging	0 11½	0 10½	0 9½	0 8½	0 8½	0 7½
Women not provided with board and lodging	1 3½	1 1½	1 1½	1 0½	0 11½	0 10½
Carters (one horse)	s. d.					s. d.
	3 1					
Carters (two horses)	5 3½					
Carters providing own horses and carts						7 0½

The information relating to wages of Russian labourers is compiled from *The Industries of Russia: Agriculture and Forestry*, published in 1893 for the World's Columbian Exposition at Chicago, by the Russian Ministry of Agriculture and Crown Domains. The period to which the wages relate is stated to be 'during late years' (i.e., preceding 1893) in the case of annual wages, while the daily wages relate to the period 1882 to 1891.

The average annual wages of adult labourers engaged by the year ranged from £3 to £10 8s. per annum for males and from £2 10s. to £6 for females. The highest average rates were paid in the Southern Steppe Governments and St. Petersburg, Courland and Astrakhan. The wages are exclusive of the value of board and lodging, which are stated to be provided free by the employers in the case of workpeople engaged by the year.

The range in the average daily wages of labourers engaged by the day is shown below:

	Average daily wages.	
	d.	s. d.
During Spring Sowing	7	to 1 5½
During Haymaking	10	to 2 0½
During Wheat Harvest	9½	to 2 7½

In these cases, also, the highest wages were paid in the Southern Steppe, Baltic, and Lake Governments. The average daily wages are those of labourers engaged by the day and not providing their own teams and implements. The wages paid to those men who provide their own teams and implements are stated to be from 33 to 50 per cent. higher than those recorded above.

According to the Journal of the Russian Ministry of Agriculture and Crown Domains, the range in the average daily wages of day labourers in the agricultural districts of European Russia in 1899 was as follows:—

	With Board.	Without Board.
	d.	d.
During Spring Sowing	3·6 to 8·4	4·8 to 10·8
During Haymaking	4·8 to 10·8	6·0 to 13·2

These figures do not apply to labourers providing their own teams and implements, whose wages are much higher.

The *Abstract* does not furnish details of the wages of agricultural labourers in Belgium, but information on this

point was collected at the Belgian Agricultural Census of 1895. In that year the average wages for day labourers or ordinary service were 1s. 7d. a day without board, and 11½d. a day with board. For women the average daily wages were 11¼d. without board and 6½d. with board.

For Sweden, particulars are given of the wages of farm-servants and agricultural labourers for a number of years from 1865 to 1897. The rates at intervals of five years and for 1897 are given as under:

Years.	Yearly Wages.				Daily Wages.			
	Yearly cash wages commonly paid to servants boarded by their employer.		Value of servant's yearly wages in kind and money.		Wages paid for a day's work in Summer.		Wages paid for a day's work in Winter.	
	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
1865	£ s. d. 6 10 0	£ s. d. 2 17 9	£ s. d. 15 14 5	£ s. d. 9 13 4	s. d. 1 4½	s. d. 0 9½	s. d. 0 11	s. d. 0 5½
1870	5 12 3	2 11 1	15 10 0	9 15 7	1 3½	0 8½	0 9½	0 5½
1875	9 15 7	3 11 1	122 6 8	12 14 5	2 2½	1 0½	1 6	0 8½
1880	7 15 7	3 10 0	20 6 8	11 16 8	1 7½	0 10½	1 1	0 7½
1885	8 3 4	3 15 7	19 15 7	11 5 7	1 8½	0 11½	1 1½	0 7½
1890	9 2 3	4 4 4	21 12 3	12 3 4	1 11	1 1½	1 3½	0 9
1895	9 18 11	4 17 9	22 15 7	12 10 0	2 0	1 1½	1 4	0 9½
1897	10 11 1	5 6 8	23 14 5	13 0 0	2 1½	1 2½	1 5½	0 10

For the United States statements are given of the average wages per month, by the year or season, of the ordinary daily wages for casual labour, and of the daily wages at harvest. The general averages for all the States and Territories are as follows:—

MONTHLY WAGES OF AGRICULTURAL LABOURERS.

	Without board.	With board.
	£ s. d.	£ s. d.
1866	5 12 0	3 12 9
1875	4 1 3	2 13 0
1885	3 15 3	2 11 5
1890	3 16 5	2 11 11
1892	3 17 6	2 12 3

The highest rates are returned from the Pacific and Mountain States, and the lowest from the Southern States.

The average daily wages for casual labourers at ordinary times and at harvest are given below.

	Average Daily Wages for Ordinary Service.		Average Daily Wages at harvest.	
	Without board.	With board.	Without board.	With board.
	s. d.	s. d.	s. d.	s. d.
1875	4 6	3 3	7 1	5 7½
1885	3 9½	2 9½	5 10	4 7
1890	3 10	2 10	5 5	4 3
1892	3 10	2 9	5 5	4 3

In 1892 the range in the wages of day labourers on ordinary service without board was from 2s. 7d. in South Carolina to 7s. 1d. in Washington; with board, from 1s. 10½d. in North and South Carolina to 5s. 9d. in Washington. The range of the averages of harvest wages in the same year for labourers without board was from 3s. 11d. in South Carolina to 9s. 4½d. in California and North Dakota and for labourers with board 2s. 11d. in from Mississippi to 7s. 1d. in California, Minnesota and North Dakota.

It will be noticed that there was a marked reduction in the wages paid for agricultural labour in the United States between 1875 and 1885, but since the latter year there has been apparently little change, although there has been a considerable fall in the value of agricultural produce.

For Denmark certain statistics of wages were published in the *Tidskrift for Landokonomi* in 1893. From these it would appear that, in that year, the average wages of labourers engaged by the day on Danish farms were as under:—

	Summer.	Winter.	Harvest.
	s. d.	s. d.	s. d.
Day farm labourers without board	1 4½	2 1½	2 5½
Day farm labourers with board	8½	1 4	1 8½

For farm labourers engaged by the year, the rates were as follows:—

	Total wages per annum.
	£ s. d.
Adult male labourer	11 2 8
Cowman or herdsman	11 5 0
Dairymaid	6 1 6
Housemaid	5 13 0

In 1893 wages were highest in Fyen, West Jylland, and Schleswig, and lowest in Hjørring, Aalborg, and Thisted districts.

The difference in the wages of an adult labourer in these districts ranges from 43s. 4d. to 65s. yearly. It seems that complete statistics of annual average wages for the whole kingdom are wanting for earlier years, so that a comparison can only be made for certain districts. According to a statement by Captain la Cour, formerly Secretary of the Royal Danish Agricultural Society, the wages of labourers engaged by the year in Fyen in 1872, 1883, and 1893, were as follows:—

Year.	Adult Male.		Woman.	
	£	s. d.	£	s. d.
1872	7	11 8	4	1 3
1883	9	4 2	5	19 2
1893	12	1 7	6	3 6

As regards the wages of day labourers, a comparison can be made for a longer period. The average wages of day labourers, finding their own board, were 1s. 1¼d. a day in 1871, 1s. 4¼d. in 1883; 1s. 5½d. in 1888; and 1s. 10¼d. in 1893.

SHEEP-BREEDING IN HUNGARY.

Sheep-breeding has declined considerably in Hungary partly in consequence of the changes in the system of farming having reduced the area of land suitable for sheep, and partly owing to the great fall in the price of wool caused by the competition of imported varieties. The diminution of the Hungarian flocks since 1870 represents a loss of 7,000,000 head. In 1870 15,076,000 sheep were enumerated in the country, in 1880 there were 9,838,000, and in 1895 8,122,681.

In Hungary particular attention has been given to the production of wool. From an early period flockmasters adopted the Negretti-Merino sheep on account of the excellent quality of its fleece, and large flocks of this breed have been kept by most of the prominent landowners; but the rapid fall in the price of wool which accompanied the introduction of considerable supplies from Argentina and the Cape was followed by a diminution of the Hungarian flocks, and numbers of pure-bred Negretti sheep were sent to the butcher. In many cases the merinos were crossed with

English breeds in order to obtain a more meaty sheep suitable for exportation. But this trade was checked by the sanitary restrictions on the importation of sheep imposed by France and other countries, and all efforts to increase the home consumption of mutton have failed.

The breeding of milch sheep is now regarded as the most important branch of sheep farming in Hungary, the popular breed being the "Zackel sheep"; while the "Czigaja sheep" is also kept for the production of milk. Both these races also furnish mutton, and the Czigaja is useful for its wool; but the Zackel fleece is a mixture of wool and hair, and of little value.

Sheep's milk is utilised mainly for home consumption in the form of cheese, and in many districts it is the principal article of food. Among the varieties of Hungarian sheep's-milk cheeses exported are *Liptauer*, *Szeklyer*, and *Kaskavul*; the last-named is sent chiefly to Roumania, it resembles the Italian cheese known as *Caccio di Cavallo*. The manufacture of Roquefort cheese has been introduced in recent years into Hungary.

EXPORT OF GRAIN FROM ARGENTINA.

Mr. Consul Mallet, in his Report to the Foreign Office on the Trade of Rosario for 1899, stated that the harvested wheat and linseed crops for 1899-1900 promised to be about 25 per cent. less in quantity than the 1898-99 crop, but the grain was of much better quality. Prospects were therefore brighter than they have been for some years past, but the financial position of the grain farmers, which had become unsatisfactory, had not, it appears, been much bettered by the year's exceptionally good harvest. This is attributable to the improvement in the value of the currency in which the farmers' expenses are paid, as also to the high rates of freight for shipping that ruled during the year having reduced the profits on grain to a very small margin.

The amount of wheat for export during the year 1900 from

the whole country will, Mr. Mallet thinks, amount to 1,300,000 tons, of which Rosario and river ports will probably contribute 850,000 tons, as compared with about 1,200,000 tons from these ports in 1899.

A larger area of linseed was sown, the grain is stated to be of very good quality, and the amount for export will probably exceed last year's export by about 10 per cent.

About the same quantity of maize was sown as last year, but as the harvesting of this crop did not commence until May, and the result depends so much on the weather, it was too early at the time of Mr. Mallet's report to forecast the amount there would be for export. The recent drought and exceptionally hot weather is said to have caused some damage, so that it is probable the yield will not be nearly so large as last year.

[Foreign Office Report, Annual Series, No. 2422. Price ½d.]

BRITISH EXHIBITS AT THE LIVE STOCK SHOW AT MOSCOW.

A live stock exhibition, followed by a sale by auction, was held at Moscow on May 9th-13th. Though these exhibitions are annual, this was the largest ever held in the city, both from the number of exhibits and the briskness of business done. The exhibits included some 270 head of cattle, 35 sheep, 180 swine, and 80 saddle horses. The cattle were mostly Simmenthal, of which there were 100 head, for which there was a greater demand than for other breeds, though all the exhibits were not sold off. The maximum price obtained was 701 roubles (£73). Among other breeds exhibited were Dutch and Jersey, besides 5 Shorthorns, 5 Aberdeen-Angus, 5 Mountain-Scotch, and 5 Ayrshire, specially ordered direct from Great Britain, most of which obtained prizes. The names of the British breeders of these cattle were ticketed on to their respective inclosures. The British breeds were fine examples of their kind, and attracted considerable attention.

For swine, of which there were in all 180 head, there was a brisk demand, every exhibit being sold. They included some

30 pure-breds ordered direct from England, black Berkshire, Yorkshire, Lincoln and chestnut Tamworths. The maximum price obtained was 320 roubles (£33), the minimum 66 roubles (£7). Tickets affixed to each inclosure gave the names and addresses of the British breeders of these swine.

The sheep exhibited were 35 in number, mostly Oxfordshire Down, Shropshire and South Down, for which at the subsequent sale there was a good demand.

In addition to the above some eighty saddle horses were exhibited, mostly Steppe breeds, half-breds, Anglo-Arabs and hunters, with a few English trotters.

In spite of unfavourable weather and an inconvenient locality the show attracted some thousands of visitors, and it is proposed to still further extend and improve the show capacity for next year.

THE WARSAW WOOL FAIR OF 1899.

An account of this fair was given in a Foreign Office Report published in 1898,* and Mr. Consul-General Murray gives the following information as to the business done at the fair in 1899 in his annual report on the trade of Poland. Sheep farming in that country, Mr. Murray observes, has been going out of favour steadily for some years, as the small demand and the low prices caused the farmers to think they could do better with cattle. Besides this, they not only diminished the number of their flocks but tried to cater for the demand for inferior qualities of wool, but in this line they were unable to compete with foreign wool. This steady decrease in the quality of wool produced has had the effect of running up the prices of good qualities.

In the early spring of 1899 much of the new clip was already sold, chiefly to speculators. The expectation, however, that for this reason the amount of wool brought to the fair would be smaller than usual proved incorrect, as the

* *Journal*, Vol. V., p. 238, Sept., 1898.

speculators who had bought the wool brought it to the fair to re-sell. The actual diminution in the quantity of wool must be ascribed to the shearing and washing, to the weather, and to the diminution of production.

The quantity of wool put on the market in 1899 was 8,326 packs of 240 lbs., as compared with 9,741 packs in 1898, and 11,770 packs in 1897. The considerable increase which has taken place in wool prices generally is well illustrated by the following table, which shows the prices obtained for different qualities at the Fair during the past three years:—

QUALITY.	Per Pack of 240 lbs.					
	1899.		1898.		1897.	
	From—	To—	From—	To—	From—	To—
Extra fine	£ s. d. 13 0 5	£ s. d. 13 8 9	£ s. d. 8 9 2	£ s. d. 11 13 4	£ s. d. 8 5 0	£ s. d. 10 16 0
Fine	10 2 1	10 10 5	7 16 3	8 19 2	7 3 0	7 18 0
Medium	8 16 0	10 2 1	7 0 7	7 14 2	5 10 3	7 1 0
Ordinary	6 17 6	7 19 4	5 3 2	6 17 6	4 12 0	6 0 0

[*Foreign Office Report, Annual Series, No. 2,425, Price 2½d.*]

AGRICULTURAL IMPORTS OF THE UNITED STATES.

The agricultural imports of the United States, which consist chiefly of sugar, coffee, hides and skins, wool, silk, vegetable fibres, fruits, tea, tobacco, and wines, had an average annual value during the five years ending June 30, 1894-98, of £76,823,000. Two commodities alone, viz., sugar and coffee, account for nearly one-half of this sum, and the countries which contribute most to the supply of these two products are naturally the leading factors in the import trade. Brazil, which furnished two-thirds of the coffee imported into the United States, headed the list with a total export of £12,420,000 whilst Cuba, the principal source of the sugar purchased, ranked

next to Brazil in importance with a total of £7,792,000. After Brazil and Cuba, the United Kingdom was the most important contributor to the import trade in the products of agriculture. The average annual value of the agricultural produce purchased from the United Kingdom amounted to £6,893,000, or about 9 per cent. of the total, but the figures have fluctuated considerably; thus in 1894, the value was only £4,131,000, in 1895, 1896 and 1897 it ranged from £7,216,000 to £10,371,000, and in 1898 it dropped to £5,364,000. A large part of the imports consisted of the produce of British dependencies re-exported by the mother country. Wool and hides were the leading articles, while feathers, cotton, tea, flax, sugar, and spirituous liquors were also items of considerable importance.

Germany ranked fourth among the sources of supply, the agricultural imports from that country during 1894-8 having an average yearly value of £4,793,000, or about 6 per cent. of the total. Apart from beet sugar, which formed the principal item, the most important articles were hides, hops, rice and rice flour, wines, bristles, coffee, and spirituous liquors. Some of the leading products received from Germany were re-exports.

Among the other countries contributing to these imports the following may be mentioned in the order of the average value of their supplies, viz:—China, Japan, France, Italy, Mexico, Dutch East Indies, and Hawaii, the average annual imports from these countries ranged in value from £2,515,000 for the last-named country to £3,600,000 in the case of China. The imports from Canada were valued at an average of £2,060,000 yearly.

Over one-half of the agricultural produce imported into the United States during 1894-1898 came from countries lying wholly or in chief part within the tropics. These imports, consisting largely of products that cannot be supplied from United States soil, had an average annual value of £40,153,000. From countries outside of the tropics there were during the same period average yearly imports of agricultural products to the value of £36,670,000. An important part of these latter imports, however, undoubtedly

consisted of tropical products received indirectly as re-exports.

BUTTER TRADE OF LA ROCHELLE.

Mr. Consul Warburton in his report to the Foreign Office on the trade of La Rochelle states that the remarkable feature in the agriculture of that district of France is the extraordinary development of the dairy business, which is superseding every other kind of farming, a large amount of capital being invested in co-operative and other dairies.

To such an extent has butter-making been taken up, that the two departments of the Charentes, which a few years ago did not export any butter, now supply one-fourth of the total amount sold in the Paris market, and three times as much as Normandy and Brittany.

This development is said to have brought a great increase of prosperity to the farmers, who get good prices for as much milk as they can provide, the dairies returning them the butter-milk for fattening purposes, with the result that they are laying down all the land they can in grass and green crops for winter feeding, and keeping as many milch cows as possible.

The State railway has organised butter trains, which leave every evening and collect the butter at different stations, reaching the Paris market early in the morning; in summer the butter is carried in refrigerating waggons, so that it arrives in perfect condition.

[Foreign Office Reports, Annual Series. No. 2393. Price 1½d.]

AGRICULTURAL CO-OPERATIVE AND INDUSTRIAL ASSOCIATIONS IN THE UNITED KINGDOM.

The Labour Department of the Board of Trade have recently issued a Directory of industrial associations in the United Kingdom, giving the name of the society, together with the

name and address of the secretary. The number of associations connected with agriculture, apart from chambers of agriculture and co-operative societies, is very small, and only one employers' association is recorded; of trade unions, two are reported to exist in England and one in Scotland, and there are two unions connected with the corn milling trade.

Of co-operative distributive societies there are in Ireland 80 agricultural societies, and 24 poultry societies. Under the head of workman's co-operative productive societies are eight associations for co-operative farming and dairying in England, whilst in Ireland there are 49 co-operative dairies and 151 co-operative agricultural and dairying societies. There are also 12 productive societies in England connected with the bread and flour trades, and 14 co-operative bakeries in Scotland. Of co-operative agricultural and credit banks, eight are recorded in England and 61 in Ireland.

AGRICULTURAL EDUCATION IN AUSTRIA.*

Agricultural and forestal education in Austria may be classified in three groups: primary, secondary, and higher; the basis of the distinction being the subsequent destinations of the students attending the various schools.

The object of the lower or primary schools is chiefly to render the pupils capable of practically cultivating a small farm, on which the owner or occupier himself undertakes the whole or part of the actual labour in the field. The intermediate schools are intended to prepare the students for the agricultural and forestal administrative service, which demands no direct participation on the part of the owner or manager in the manual labour. The higher education aims at giving the highest scientific knowledge within the domain of agriculture and forestry, both as regards practice and

*Die Land- und Forstwirtschaftlichen Schulen in Oesterreich. By Friedrich von Zimmerauer.

technical instruction and scientific research. The three classes of institution are thus quite independent of each other, and a lower or intermediate school does not in any way prepare for one of a higher grade.

The education may be further sub-divided according to the completeness of the instruction given, *i.e.*, according as it comprises all branches of agriculture or only special subjects.

From these two points of view, therefore, agricultural education, as it exists in Austria at the present day, comprises: (a) primary instruction, given in (1) the practical schools of agriculture and forestry and winter schools, (2) special schools devoted to horticulture, arboriculture, viticulture, hop-culture, dairying, domestic economy, and brewing; (b) secondary instruction, provided in (1) the so-called superior high schools of agriculture and intermediate schools of agriculture and forestry, (2) one oenological and pomological institute, one superior school of pomology and horticulture, and one superior school of brewing; (c) higher education, represented by the Imperial High School at Vienna, ranking as a university, and by the Agricultural Department of the University of Cracow.

In addition to these establishments there are also chairs or courses of agriculture, and to some extent of forestry, at all the Imperial polytechnic academies. Agricultural instruction is compulsory in the normal schools, and there are courses for adults connected with the popular schools, and created specially to meet the requirements of the rural population. As complementary to all these different forms of education there should also be mentioned the travelling lecturers and numerous special courses often in connection with technical schools.

The number of independent institutions providing agricultural instruction, at the end of the scholastic year 1898-99, was 159. Of these, two, as already noticed, represent the highest class of education, ranking as universities, 18 are of the intermediate class, and comprise 12 general schools, three forestry schools, two viticultural, pomological and horticultural schools, and one school of brewing. The remainder are primary agricultural schools, 40 of them being general,

the courses lasting throughout the year, and 57 being winter schools only, but the instruction given being also of a general character. The special schools in this category comprise seven for forestry, 13 for dairying and domestic economy, 18 for gardening, fruit, vine, or hop culture, two for brewing, and two for distilling.

The total attendance at all these 159 schools during the year 1898-9 was 5,343; there being 497 students at the Vienna High School or the Agricultural Department of Cracow University, and 1,203 at the various intermediate schools.

As illustrating the diversity of nationalities in the Austrian Empire, it may be mentioned that, according to language, these schools may be divided into 65 German, 62 Bohemian, 6 German-Bohemian mixed, 17 Polish, 3 Slavonian, 2 Italian, 1 Servian-Croatian, 1 German-Italian, 1 German-Ruthenian, and 1 German-Roumanian.

The Imperial High School at Vienna was founded in 1872. Since 1884 there have been three separate curricula, quite distinct from each other, viz: agriculture, forestry, and rural engineering. Candidates for admission must be bachelors of a State gymnasium, or of equivalent standing, but other persons may be permitted to attend the lectures as listeners only, if sufficiently advanced. The course lasts three years. The Agricultural Department of the University of Cracow has been in existence since 1890—the course there also lasts three years.

Higher education in agricultural subjects is further provided by courses in Imperial polytechnic academies; among which may be specially mentioned the courses on rural engineering at the German and Bohemian Polytechnics at Prague.

Among the intermediate schools, the most important are those of Tetschen-Leibwerd and Tabor, in Bohemia, and Dublany, in Galicia. The course at all the intermediate schools lasts three years, except at two special institutions.

The Vienna High School and Cracow University are State institutions; as is also the Klosterneuburg Oenological and Pomological Institute among the secondary schools. The majority of these intermediate schools are provincial institutions. Nearly all the general primary schools are kept up

by the province or a society: the winter primary schools are mostly maintained by some association. There are four State primary schools of forestry.

THE BUTTER AND LARD TRADE OF HAMBURG.

Sir William Ward, H.M. Consul General at Hamburg, states in his last annual report that the prices which ruled in this important butter market during the year 1899 were considerably higher than in previous years.

The actual prices fluctuated from 95 shillings per barrel (of 95 kilogrammes, or 210 lbs.) in June to 135 shillings in the beginning of October. The average price for the year was 112½ shillings, as compared with 98½ shillings in 1898, and 103 shillings in 1897.

At the end of 1898 a committee was organised for the purpose of regulating the excessively high prices ruling during the closing months of that year, and, though not entirely successful in its labours, has since enabled the public to obtain the finest qualities of butter at firmer prices. Last year's export trade was of limited extent, owing to the inferior quality of German butter, which, according to local opinion, cannot compete with Danish and Swedish brands in the markets of the United Kingdom, and also because British colonial butter is said to be preferred.

Producers in Schleswig and Holstein have repeatedly—although apparently in vain—urged that the butter made by them should be submitted periodically to the test of duly appointed authorities, so that the exportation of only good qualities may be assured. Advantageous railway rates had a favourable effect on the butter trade with the interior of Germany. Russian butter found its way again to the Hamburg market in 1899, and is stated to have met with increasing favour. The prices asked for Finnish butter were too high, and prevented larger importations. Canadian and American butter was imported in small quantities only, and it is not considered likely that this trade will increase.

The lard trade, which was subject to considerable fluctuations in 1898, chiefly in consequence of the Spanish American War, remained steady in 1899, and the difference in prices during the whole season did not amount to more than three shillings per cwt. Sir W. Ward states that speculation in this article appears to have decreased considerably, and orders are now, as a rule, given merely for immediate wants. The consequence is that stocks are now much more limited at Hamburg and other importing centres, which will become more and more dependent upon the leading markets of the United States of America. Returns showing the importations of lard into Hamburg last year have not yet been published, but it is estimated that the exportations from America to Germany in 1899 were about equal to those of the preceding year, and as Austria imported a very small quantity of lard last year from Hamburg, it is assumed that the consumption of this article considerably increased in Germany in 1899.

[*Foreign Office Report, Annual Series, No. 2,431.*]

POULTRY KEEPING IN THE HIGHLANDS.

The Congested Districts Board for Scotland are taking steps to improve the methods of poultry keeping in the remote and sparsely populated districts of Scotland, where the industry is stated to be at present unremunerative, principally because there is no ready market for the eggs, but also because the crofters do not sufficiently realise the great importance of selling their eggs as soon as possible. In each district a local shopkeeper or carrier collects eggs for a wholesale merchant, but no business-like methods are adopted, and, as a rule, neither the producer nor the retailer appears to realise the importance of freshness, and little regard is paid to quality and size.

The Congested Districts Board therefore suggest, and propose to aid, the establishment of agencies for the

rapid and systematic marketing of eggs from the congested districts. It is proposed to make arrangements with a large dealer in the south to take as large a quantity as can be produced every week, and a group of crofters in a district would then undertake to supply the required number of guaranteed fresh eggs. One of the crofters, who should be somewhat skilled in sorting, packing, etc., would be employed to attend to this important matter; and the others would undertake in turn to carry the boxes of eggs, empties, etc., to and from the station or steamboat pier. The purchaser would be able to rely on eggs of a definite quality, and in time deliveries might become more frequent and a trade developed in new laid eggs.

It is believed that much good would result if small associations of this kind were locally formed, and that interest in improved breeds and methods would be stimulated, and much of the existing prejudice against poultry rearing as "women's work" would disappear. The Board are of opinion that enlightened self-interest would induce the producer to study things for himself, and that if the high rate of railway charges for the carriage of eggs is at present an obstacle, the railway companies will modify their rates if they see a steady traffic developing itself.

AGRICULTURAL EXPORTS OF ARGENTINA.

The exports from the Argentine Republic, which may be said to be exclusively of an agricultural character, chiefly comprise wheat, maize, linseed, wool, flour, hides, hay, mutton, cattle and sheep. The extent to which these commodities were sent out of the country in 1898 and 1899 is shown in the table given below, and it appears from the returns given in the *Review of the River Plate* that the only other items of importance are sheep and goat skins, hair,

tallow, bran, pollards, quebracho (a wood containing tannin) tobacco, butter and sugar.

		1899.	1898.
Wheat	Tons	1,763,000	671,000
Maize	"	2,105,000	745,000
Linseed	"	273,000	152,000
Wool	Lbs.	529,788,000	310,152,000
Flour	Tons	53,000	25,000
Hides	No.	3,384,000	3,631,000
Hay	Tons	44,000	38,000
Frozen Wethers	No.	1,960,000	2,501,000
Live Cattle	"	108,000	140,000
" Sheep	"	521,000	562,000

Consequent on a favourable harvest, wheat, maize, linseed, and flour show a considerable increase, whilst, on the other hand, the live stock trade and frozen wethers show a decline. With regard to the destination of the above goods, full details are not available in regard to all the items, but of the frozen sheep it may be said that they were practically all consigned to the United Kingdom, together with about 89,000 of the live cattle and 407,000 sheep, whilst the other European countries took about 96,000 sheep, and Brazil took 14,000 cattle. Hides were largely exported to the United States and Germany, and hay to Brazil and Cape Colony.

In a report on the trade of Philadelphia for the year 1899, Mr. Consul Powell states that a cheap telephone system for the use of farmers is in operation between the cities of Anderson, Pendleton, and Ingalls, in the State of Indiana. The line is not an experiment but is in active daily operation, and it gives a service which is reported as comparing favourably with those of the regular companies. The line, which is 14 miles in length with five stations, is

Cheap Telephone System for Farmers.

unique, inasmuch as the conductor employed is the top wire of a barb wire fence, the continuity being assured by special devices at highway and railroad crossings. The success of this novel telephone line is stated to be due largely to the perfect insulation. The top strand of the wire fence is treated to a generous coating of rubber paint, and common galvanised wire is used at the fence sections to continue the circuit to a connection with the next fence, the same arrangement being carried out at the railroad crossings. In order to carry the line across the road or highway, the circuit is either placed beneath an inverted trough, covered by the material of the road, or it is carried overhead by means of two poles, one on each side of the crossing. The cost of this telephone outfit is extremely low, as there is no expense for copper wires, and poles are only needed at the crossings. Where the number of subscribers is not too large the service is said to be satisfactory, and local farmers state that they have used the "fence line" to converse with friends eight miles distant, even when the fence posts were still saturated with the morning dew, a condition under which the line is supposed to work with least satisfaction. It is stated that the line has been such a practical success that the farmers in the neighbourhood are organising companies for the purpose of placing themselves in telephonic communication throughout the whole district. A further evidence of the practicability of the barb wire telephone is found in the case of a commercial company whose offices are connected with works which are 13 miles distant. The cost in this case is only £20 per year, and there is the added advantage that, there being only two other subscribers on that wire, the line is almost always available.

In a Foreign Office Report on the trade of Chicago for the past year, it is stated that an opening would appear to exist for the sale of British seeds, particularly oats, in Kansas. In the course of an agricultural inspection during 1899, a field of oats was examined, part of which had

Opening for British Seeds in Kansas.

been sown from seed imported from Scotland and the balance from local seed. The yield from the Scottish seed was 55 bushels per acre, and that from local seed only 28 bushels.

[Foreign Office Report, Annual Series, No. 2414. Price 2d.]

From the port of Kherson this year grain will be exported abroad direct for the first time, and the vast Dnieper region, despatching grain hitherto exclusively to Odessa, will thus be in direct connection with the foreign market. Under present conditions steamers can load at Kherson to 17 feet, completing cargo, if necessary, at Odessa, but it is hoped that with the deepening of the Dnieper estuaries this may soon be unnecessary.—*Odessa Listok*.

**Grain Export
direct from
Kherson**

By an Act dated 21st December, 1899, the South Australian Government has created a Board of eight members, six of whom are to be elected by the vine growers throughout the province, to inspect vineyards and imported vines or grapes, and order the destruction of any found infected with phylloxera. Vine growers contribute to a "Phylloxera Fund" according to the area of their vineyards, and wine makers and distillers also pay into this fund a tonnage on the grapes they purchase, compensation being paid out of it to the owners whose vines are destroyed. The Governor of the Colony is also empowered to prohibit the importation of vines or grapes.

According to a report by Her Majesty's Consul General at Warsaw, the number of beet sugar factories in Poland is now 46, three new factories having been started during the past year; the beet plantations in 1899 occupied an area of

**Sugar Beet in
Poland.**

128,678 acres, as against 115,931 acres in 1898, so that the area under beet, which had increased by 7,126 acres in 1898, again increased by 12,747 acres in 1899. The produce obtained from this area was 16,044,000 cwts. of beetroot, and 1,843,600 cwts. of sugar, which was somewhat lower than the yield of 1898, when 2,107,000 cwts. of sugar were obtained.

For beet plantations 1899 was most unfavourable, though not so bad as in Podolia and Volhynia. The roots were sodden with wet, and contained very little sugar. When the crop was all got in it was found that throughout the district between Pniew and Wloclawek, Gostinine and Lenczyca, where most of the beet plantations lie, the average crop was about 6 to 7 cwts. per acre less than the year before, besides which the condition of the roots was very bad.

[Foreign Office Report, Annual Series, No. 2425. Price 2½d.]

For a considerable period residents in the large towns of Russia, especially Moscow and St. Petersburg, have derived their supplies of table butter from Finland, while the home made article, on account of its inferior quality, was used only for pastry, ships' provisions, and similar purposes. Of recent years, however, the rapid development of the Russian dairy industry has led to a great improvement in the quality of the native butter. Dairying on the Danish system was introduced into Russia proper (except the Baltic provinces, where the dairy industry is nearly equal in development to that of Germany) about 25 years ago, the dairies being mostly situated in the districts of Jaroslaw, Wologda, Kostroma, Twer, and Smolensk. The butter from these districts is improving every year in quality, and finds a ready sale at good prices, both in Russia and abroad. In Siberia the modern dairy movement is only about five years old, but since the Siberian railway was opened the industry has progressed rapidly. The town of Kurgan is the centre of the dairy industry in West Siberia,

Russian Butter.

and in the East, where the dairies are less numerous, Omsk and Kainsk are the principal centres of production. The manufacture of butter in Siberia is making very great strides, and is expected in a few years to be very considerable. Government experts, assisted by imported Danish dairymen, are at the head of the Russian dairy movement, both in Siberia and in Russia proper. (*Smör-Tidende*.)

The returns received by the Registrar-General for Ireland, as in previous years, from proprietors or occupiers of land throughout that country, who were reported as having silos or otherwise making ensilage show that 88 silos or stacks of ensilage were enumerated in Ireland in 1899. The number is considerably below the 114 recorded in 1898, but many of the replies stated that no ensilage was made during the season of 1899 owing to the weather being so favourable for the saving of hay. More than half the silos were in the province of Leinster.

The total area under woods and plantations in Ireland in 1899 was 308,495 acres; of which 46,533 acres were returned as being under larch, 36,628 acres under fir or pine, 15,343 under spruce, 26,604 under oak, 7,392 under ash, 9,952 under beech, 2,930 under sycamore, 3,303 under elm, 3,764 under other trees, and 156,046 under mixed trees. There has been since 1851, on the whole, an increase in the total area, amounting to about 3,500 acres, or 1½ per cent. Particulars of various operations carried out in the year ending 30th June, 1899, show that 856 acres were planted with trees, while the area returned as cleared was 1,354 acres, the total number of trees felled amounting to 847,956.

Of these, 274,548 were used for "propping," which appears to have been the chief purpose to which the timber of almost all descriptions was applied. Other specified uses comprised also:—3,528 trees for sleepers, 43,402 for paling, 32,529 for fuel, 58,332 for furniture and building purposes, 5,478 for carts, waggons, etc., and 5,157 for clog soles. One loan (for £600) was sanctioned for planting for shelter, the total amount so sanctioned since the Act 29 and 30 Vic, cap 40, came into force being £30,550, in 132 loans.

[*Agricultural Statistics of Ireland, 1899.*]

The importation of honey at the port of Hamburg in 1899 amounted to nearly 48,000,000 lbs., of which more than half came from Chili and Peru. The trade was considered favourable to importers and dealers, although the failure of the honey crop in North America and partly also in Mexico caused a slow but steady rise in prices until towards the close of the year, when reports of better prospects for the coming season resulted in a corresponding fall in quotations. There were many complaints regarding the continually increasing competition of artificial honey, but it is hoped that the measures taken in Germany by the producers of the genuine article will result in obtaining the prohibition of the sale under the name of honey of products which are merely imitations. Business in wax continues to develop at Hamburg, which is rapidly becoming the leading market for this product. A further increase of 10 per cent. took place last year in the importation, which reached a total of nearly 30,000,000 lbs. Beeswax is imported principally from the West Indies, South America, Morocco, and Madagascar. The Hamburg market closed firm, owing to unfavourable reports of the crop from Brazil. Transactions in Japanese wax were limited and trade became depressed on account of the unsatisfactory quality of the year's supplies.

[*Foreign Office Reports, Annual Series. No. 2,431.*]

The importation into Russia of preserved vegetables containing salts of copper, and the preparation and sale of such preserved vegetables within the limits of the Russian Empire, are prohibited by regulations which came into force on

**Importation of
Preserved
Vegetables into
Russia.**

May 14th last.

A Foreign Office Report on the Trade of Paraguay states that cattle breeding offers one of the few sound and paying investments for foreign capital in Paraguay. The minimum capital required for starting this business would be from £1,500 to £2,000, which should, if competently managed, pay 20 to 30 per cent. after three years. One league of good grazing land (4,692 acres) is calculated to be sufficient to feed from 1,000 to 1,200 head of cattle. The best grazing land is found in the north of Paraguay, in Misiones and Concepcion; good land is also to be found in the Paraguayan Chaco. Some land was lately sold in the North at £200 per league. Really good pasturage is, however, not to be found everywhere, and it must be remembered that the cattle farmer has two serious difficulties to contend with in drought and locusts. The prices of fat cattle in 1899 were—for steers and oxen £2 5s. to £3 5s., and for cows from £1 12s. 6d. to £2 15s. The cattle in Paraguay are stated to number about 2,500,000, whilst there are also 200,000 sheep, and 300,000 horses.

[Foreign Office Report, Annual Series, No. 2,426 Price 1d.]

In Hungary bee-keeping has made considerable progress, and comparatively large quantities of honey and wax are exported. In the autumn of 1897, the latest year for which statistics are available, the number of swarms of bees enumerated in the country was 641,127, of

**Bee-Keeping
in Hungary.**

which 197,382 occupied hives with movable frames, and 443,745 were housed in ordinary straw hives. The quantity of honey produced in 1897 was estimated at 68,000 cwts., and of wax 4,400 cwts.; the exports of honey in the same year from Hungary amounted to 30,000 cwts.

A striking feature of the co-operative movement in the rural districts of Germany has been the rapid growth in the number of co-operative loan and credit associations, or agricultural banks. In 1890 these numbered only 1,729, but on February 1st, 1900, there were 9,428 banks of this character in operation in the Empire. Most of the agricultural banking associations are worked on the Raiffeisen system; and a few are organised upon what is known as the Schulze Delitzsch system, but these are not so popular as the former in the purely rural districts. A description of both systems was given in this Journal in September, 1895. (*Deutsche Landwirtschaftliche Presse.*)

The Board have received through the Colonial Office a copy of an Act, dated 9th October, 1899, for the eradication of contagious diseases among bees in Western Australia. This Act requires every person who may have in his possession or under his care any colony, hive, or swarm of bees affected with foul brood or other contagious disease to forthwith report the same to the Department of Agriculture, and to take such steps for the eradication of such diseases as the Department may direct. It also empowers the Governor to appoint one or more bee experts to carry out the duties necessary for the administration of the Act.

**Diseases
of Bees in
Western
Australia.**

The number of creameries and cheese factories in Nova Scotia in 1899 was 21, and the production of cheese amounted to 287,998 lbs., and of butter to 298,519 lbs. The greater portion of the produce is consumed locally, but a few of the creameries do an export trade. The average quantity of milk required to make a pound of cheese is 9·84 lbs., or a little less than one gallon, whilst the milk used for a pound of butter is about 2½ gallons. The price fetched by the cheese was, on the average, 4½d. per lb., whilst the butter sold for 9½d. a pound.

According to a statement made by Professor Liljhagen at a meeting of the Swedish Agricultural Academy, there are now 1,550 dairies established by co-operative associations and joint stock companies in Sweden. The number of co-operative dairies is 450, of which 300 manufacture butter only, 100 manufacture cheese only, and the remaining 50 produce both butter and cheese. Of the 1,100 dairies run by joint stock companies, 800 are engaged solely in the production of butter. In addition to the foregoing establishments there are about 200 estate dairies and a large number of smaller private dairies. —*Ugeskrift for Landmandet*.

The total export of live stock from the Argentine Republic during the year 1899 comprised 108,000 cattle and 521,000 sheep, as compared with 140,000 cattle and 562,000 sheep exported in the preceding year. Of the cattle, 89,000 were sent to Great Britain, whilst 14,000 went to Brazil and 3,000 to the Cape. Of the sheep about 407,000 were sent to this country, 96,000 to the Continent of Europe over 7,000 to the Cape, and 4,000 to Brazil. In addition, frozen carcasses of sheep to the number of 1,960,000 were exported almost exclusively to the United Kingdom.

Agricultural enterprise in Costa Rica is devoted mainly to the cultivation of coffee, while another important product is the banana. Wheat was formerly grown in sufficient quantities to meet the home requirements, but the rise in the price of coffee and the competition of the flour imported from the United States and Chili have almost driven out the native wheat. Among other crops produced in the country, the principal are maize, rice, beans, cacao, and sugar cane, the last-named being largely used for fodder as well as for other purposes.

The live stock of Costa Rica is considered to be in general superior to that of the rest of Central America, but the number of animals is not yet sufficient to supply the local demand. There has been an improvement recently in the breeding of cattle and horses, though high grade animals, which could be easily introduced into a country of so many natural advantages, are still lacking. The existence of vast pasture lands makes the country splendidly adapted to the rearing of cattle. At the census of 1892, the number of cattle was 345,665, horses numbered 77,013, and swine 62,328, while of sheep there were only 2,765.

The Right Hon. W. H. Long, M.P., President of the Board of Agriculture, has appointed a Departmental Committee on Scotch Agricultural Prices to enquire into the existing methods by which the prices of agricultural products are collected and recorded in Scotland, and to report as to the measures, if any, which can with advantage be taken for their improvement. The Committee consists of the following members, viz., the Earl of Mansfield, Chairman; Sir John Cheyne, Q.C., Sir A. E. Bateman, K.C.M.G., Controller-General of the Commercial, Labour, and Statistical Department of the Board of Trade; Major P. G. Craigie, Assistant Secretary, Board of Agriculture, and Mr. Alexander Glendinning, Newmains, Kirkliston. Mr. R. Henry Rew, of the Board of Agriculture, acts as Secretary.

to the Committee. The first meeting of the Committee was held on April 30th, and the sittings of the Committee to take evidence began on June 5th at Edinburgh, in the rooms of the Highland and Agricultural Society of Scotland.

The exports of butter, bacon, and eggs from Denmark in 1899 showed in each case an increase on the figures for the preceding year. Of butter 158,070,000 lbs. were exported, all but 27,500,000 lbs. being of Danish production; of bacon and hams the exports amounted to 164,230,000 lbs., 158,510,000 being home produce; and eggs were exported to the number of 304,000,000. The United Kingdom was Denmark's principal customer for all these articles, the consignments to British ports having accounted for 153,780,000 lbs. of butter, 155,870,000 lbs. of bacon and hams, and 286,000,000 eggs out of the gross exports of these products.

In the annual Foreign Office Report on the trade of Servia in 1899 mention is made of an institution known as the "Zemlyorad-nichka Zadrouga" or Farmers' Union, which has been in existence for about five years, and whose object is, by co-operation, to furnish Servian farmers with loans for the purchase of materials and farm implements, and to provide them with the means of disposing of their produce and acquiring knowledge of improved agricultural methods. At the end of 1899, the Union had increased the number of its branches to 200, and had obtained assistance from the Government, who, had placed means at its disposal to enable advances to be made to members, and exempted the Union from payment of all postal taxes. The Union is expected to prove a valuable agency for the agricultural development of Servia.

[Foreign Office Report, Annual Series, No. 2,383. Price 1½d.]

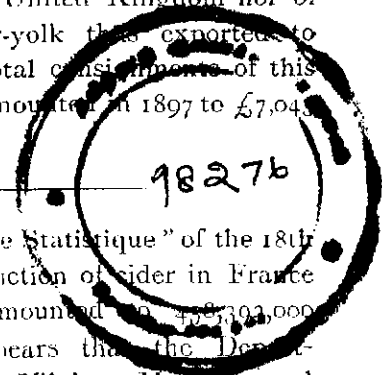
In a publication issued by the Italian Foreign Office dealing with the internal trade and resources of that country, it is stated in connection with the export trade in eggs that a system which is now adopted to some extent is to get rid of the shell and pack the interior of the egg—white and yolk together—in air-tight vessels or drums containing each 1,000 eggs. Great care is taken to ensure the eggs being fresh and to exclude the air, as one bad egg spoils all the remainder and renders the consignment unsaleable. The new system has the advantage of removing the risk of breakage, and is also preferred by the pastry-cooks for whose use they are intended. At present these eggs are sent in the first instance to egg merchants, who resell them; but attention is directed to the advantages of sending them direct to the buyer, and thus dispensing with the services of the middleman.

Neither the trade returns of the United Kingdom nor of Italy specify the quantity of egg-yolk thus exported to this country, but the value of the total consignments of this article received here from abroad amounted in 1897 to £7,043 and in 1898 to £11,732.

According to the French "Revue de Statistique" of the 18th March the production of cider in France during 1899 amounted to 458,302,000 gallons. It appears that the Departments of Ille-et-Vilaine, Manche, and Côtes-du-Nord furnished respectively 20·3 per cent., 13·4 per cent., and 10·8 per cent. of the total, the next Departments in order of importance were Eure, Sarthe, and Orne, which each furnished over five per cent.

The Agent-General for Queensland, 1, Victoria Street, S.W., states that enquiries are frequently received by the Queensland Department of Agriculture, from farmers and others, for the names of the leading agricultural implement and

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machinery makers in Great Britain, and also for the prices of various kinds of machinery, such as rice milling, &c. The Department also desires to be kept informed of any new machinery placed on the market. The Agent-General for South Australia (1, Crosby Square, Bishopsgate Street Within, E.C.) also states that he will be glad to hear of any new inventions in connection with agricultural machinery or processes, which he would communicate to the South Australian Department of Agriculture, and which would be brought to the knowledge of the farming community should the Department deem them of sufficient importance.

REPORTS ON FOREIGN CROPS.

CROPS IN THE UNITED STATES.

The Statistician of the United States Department of Agriculture issued on the 11th inst. a report on the condition of the grain crops on the 1st June. The summary, which has been published in the *Times*, states that the condition of the winter wheat, 82.7 per cent., showed an increase of 15.4 per cent. compared with last year. A reduction is indicated in the acreage of spring wheat amounting to 567,000 acres, or 2.9 per cent compared with last year. The average condition of the crop is returned at 87.3, against 91.4 last year, and 100.9 in 1898.

The acreage sown to oats is reported to be 3.9 per cent greater than last year, and the condition of the crop is represented by the figure 91.7, compared with 88.7 in 1899 and 98 two years ago. The barley acreage is 0.6 per cent. larger than the area harvested last year, and the condition is returned as 86.2 per cent. against 91.1 and 73.8 respectively in the preceding seasons. Rye occupies an area reduced by 4.1 per cent., and the condition of the crop was 87.6 compared with 84.5 in 1899 and 97.1 in 1898.

RUSSIAN HARVEST OF 1899.

Particulars of the preliminary estimates of the results of the harvest of 1899 in Russia and Poland have already been published in the issues of this Journal for December and March last. The Central Statistical Committee have since published complete details of the yields of the principal crops in the seventy-two governments of the Empire. According

to these returns the acreage and production of the chief cereals and of potatoes in 1899 is estimated to have been as under:—

Acreage, 1899.

Governments.	Wheat.	Rye.	Barley.	Oats.	Potatoes.
	Acres.	Acres.	Acres.	Acres.	Acres.
50 European Governments	38,340,400	62,312,700	17,492,300	29,110,100	6,503,500
10 Polish Governments	1,305,300	4,811,300	1,063,500	2,500,000	2,001,000
4 Caucasian Governments	5,999,250	615,500	1,489,800	636,000	197,700
4 Siberian Governments	3,172,950	2,325,300	329,800	2,491,400	163,400
4 Asiatic Governments	1,215,700	56,800	141,100	392,900	19,000
Total	40,755,000	71,220,100	20,436,500	44,140,900	10,005,600

Production, 1899.

Governments.	Wheat.	Rye.	Barley.	Oats.	Potatoes.
	Qrs.	Qrs.	Qrs.	Qrs.	Tons.
50 European Governments	39,076,700	63,630,300	21,514,700	35,247,000	17,482,100
10 Polish Governments	11,534,600	7,859,600	2,401,200	5,773,000	5,296,100
4 Caucasian Governments	7,141,300	838,300	2,170,400	1,232,200	495,700
4 Siberian Governments	5,666,400	3,339,900	712,400	7,857,800	451,900
4 Asiatic Governments	1,864,400	79,800	343,300	1,000,400	30,300
Total	54,993,900	75,608,000	27,144,000	51,764,000	24,776,100

The quality of the grain was generally reported to be better than that harvested in 1898, but the conditions at harvest time were not everywhere favourable. Except in the greater part of the Black Soil region frequent rains at the end of the summer considerably interfered with the harvest, and caused injury to the grain, which germinated on the ground and in the sheaf. The results of the harvest, which are partly based on experimental threshings, had been communicated to the Central Statistical Committee before this fact was known, and the figures given in the above table should, therefore, it is stated, be regarded as a little above the actual yield.

For purposes of comparison it may be useful to reproduce the estimates of the acreage and yields of these crops in the Russian Empire in 1898. These were returned by the Central Statistical Committee as follows:—

Acreage, 1898.

Governments.	Wheat.	Rye.	Barley.	Oats.	Potatoes.
	Acres.	Acres.	Acres.	Acres.	Acres.
50 European Governments	35,111,500	62,294,300	17,591,800	35,662,500	6,571,700
10 Polish Governments	1,207,100	4,512,900	1,047,100	2,512,200	1,930,250
4 Caucasian Governments	6,263,750	554,500	1,444,600	649,500	124,500
4 Siberian Governments	2,377,250	2,354,000	375,400	2,555,200	146,150
4 Asiatic Governments	1,139,150	73,800	144,400	317,700	12,850
Total	47,003,750	70,082,100	20,567,300	41,597,700	9,846,250

Production, 1898.

Governments.	Wheat.	Rye.	Barley.	Oats.	Potatoes.
	Qrs.	Qrs.	Qrs.	Qrs.	Tons.
50 European Governments	45,650,000	74,024,700	30,468,300	57,018,400	16,671,800
10 Polish Governments	8,700,000	6,177,000	2,148,300	5,673,100	6,180,000
4 Caucasian Governments	6,511,000	613,000	3,003,500	1,060,500	363,200
4 Siberian Governments	4,805,500	2,634,500	586,600	5,000,000	320,900
4 Asiatic Governments	1,802,100	13,800	305,400	264,200	29,500
Total	72,471,600	85,022,200	36,713,600	70,006,700	24,571,500

CROPS IN INDIA.

The second general memorandum on the wheat crop of India for the season 1899-1900 was published in March last, and stated that Bengal was the only province in which an average yield of wheat was expected. In the North-Western Provinces and Oudh the conditions were not so good as in Bengal, and the yield was not expected to be more than three-fourths to four-fifths of the average. In the Panjab the adverse conditions of the season have been more severely

felt, and not quite a two-thirds crop was expected from irrigated land.

In the other wheat-growing regions the season has been disastrous. In the Central Provinces, the Nizam's territory, Berar, and Bombay there will be over extensive areas hardly any crop to take off the land, and the general outcome will be perhaps not more than a fourth or fifth of the average, perhaps less.

In the Panjab the area sown with wheat to the end of November, 1899, was estimated at approximately five million acres, being 36 per cent. below the area finally ascertained last year, but it was hoped sowings would continue into December. That month was practically rainless, but the situation was improved by general rain over the greater part of the province in the third week of January, and extensive sowings of wheat and barley were then made in many districts. These late sowings have sprung up, and with further rain they were expected to yield a light crop about one-half the normal yield on unirrigated land. The area of the wheat crop was estimated at 5,469,000 acres, which was 544,000 acres, or 11 per cent., above the estimate first made, but 29 per cent. below the area harvested last year.

In the North-Western Provinces and Oudh the rain considerably improved the prospects of the crop, and a yield of 75 to 80 per cent. of a normal crop was expected, except in the Benares and Gorakhpur divisions, where the estimated yield amounted to 60 and 70 per cent. of the normal respectively.

In Bengal, on the whole, the season has not been unfavourable to wheat in the principal wheat-growing districts. The area sown was estimated at 1,536,700 acres, against 1,592,400 acres sown in 1898-99, and a normal area of 1,578,100 acres. The decrease is due to unfavourable conditions at the time of sowing the crop, but it is anticipated that the yield will fall little short of the normal.

In the Central Provinces the area reported to have been sown was 1,439,000 acres, or some 58 per cent. less than the average area of the past ten years, this remarkable contraction following on the conditions of the season. The total failure of the autumn rains, preceded by a most unusual

deficiency in the rainfall of the monsoon, left much of the ground unfit for sowing, and the prospects were so discouraging that there was but little inducement to sow. To this general rule some of the northern districts, in which there was a heavier monsoon rainfall, were a partial exception. On the whole, it was estimated that the wheat crop would be about 45 per cent. of a normal yield on an area 40 per cent. of the average, or less than a fifth of the normal yield on a normal area.

In Bombay (including Sind) the area sown was 1,597,000 acres, or 41 per cent. below last year's and the average. The decrease was most marked in Gujarat and the Deccan where the late rains entirely failed. On this contracted area the crop has done badly on the whole, except in Sind, where it was in fair condition. On two-fifths of the area sown in British districts the crop was reported to have perished, and the surviving crop, so far as it was not irrigated, was in very poor condition, and will give but a nominal yield. The irrigated crop was somewhat better, but will yield moderately owing to the deficiency of the water-supply.

In Berar there was hardly a semblance of a crop. The area sown was estimated at only 17,411 acres, which was 96 per cent. less than the area reported at the corresponding period of last year.

In the Nizam's territory, also, the destruction of the crop was about as complete as in Berar. The area sown was less than that of last year by 783,924 acres, and the yield was estimated at only 16 per cent. of an average crop.

THE FRENCH WHEAT CROP.

An official report on the condition of the French crops on the 10th May, 1900, was published in the *Journal Officiel* of the 27th of that month.

The appearance of winter wheat crops was stated to be "very good" in two departments, "good" in 22, "fairly

good" in 45, "passable" in 17, and "indifferent" in the remaining department. The area sown was of the same extent as in 1899 in 34 departments, in 6 it was larger, and in 47 smaller, than last year's acreage. Spring wheat had been sown in 51 departments only, and on a reduced area in 12 of them. The condition was reported "very good," in 5 cases, "good" in 23, "fairly good" in 20, and "passable" in 3 departments.

THE AUSTRIAN HARVEST OF 1899.

The Ministry of Agriculture at Vienna has published the annual statistics relating to the principal grain crops in Austria during the past year. The figures, together with those for 1898, are given in the following table:—

Crops.	Area.		Yield.	
	1899.	1898.	1899.	1898.
	Acres.	Acres.	Bushels.	Bushels.
Wheat	2,648,100	2,608,200	49,937,500	45,893,000
Rye	4,547,900	4,511,700	84,968,500	79,097,200
Barley	2,937,900	2,884,800	66,567,000	58,187,200
Oats	4,615,200	4,695,900	121,604,200	110,660,200
Maize	830,700	836,700	14,132,300	15,475,800

The total area under these five cereals, which had been declining for some years, shows an increase of 42,500 acres over 1898, though the acreage sown with oats was again less, and was nearly 200,000 acres smaller than in 1895. The yield per acre except in the case of maize was good and above both the yield of 1898 and the average of the last ten years. The total yield of all cereals was about 337,210,000 bushels as compared with 309,313,000 bushels in 1898.

VICTORIAN HARVEST OF 1899-1900.

According to the preliminary returns prepared by the Assistant Government Statist relating to the wheat harvest

in Victoria in 1899-1900, the total area from which wheat was harvested was 2,162,800 acres, and the produce is estimated to have amounted to 15,205,000 bushels, or an average yield of 7.03 bushels per acre. In the previous year, the area was returned at 2,154,200 acres, and the produce at 19,581,300 bushels, or a little over 9 bushels per acre. The yield this year is expected to leave about 6½ million bushels available for export.

The principal crop other than wheat in Victoria is oats, and the area devoted to this cereal was 271,100 acres in the current season, the production amounting to 6,111,000 bushels, or an average of 22½ bushels per acre. Barley was sown on about 80,000 acres, of which 66,000 acres yielded 1,197,000 bushels, available for malting purposes.

SOUTH AUSTRALIAN WHEAT HARVEST OF 1899-1900.

The Government Statist of South Australia has recently issued a return showing the acreage and yield of wheat in that Colony in the current season 1899-1900. The area sown for grain amounted to 1,821,100 acres, or about 32,300 acres more than last year; the production, however, was less, only averaging 4.64 bushels per acre as compared with 4.91 bushels in 1898-99, thus giving a total yield of 8,453,100 bushels for the present year against 8,778,900 bushels last year. In addition there were also 311,400 acres of wheat cut green for hay.

CROPS AND LIVE STOCK IN NEW SOUTH WALES.

The Government Statist of New South Wales has published the preliminary tables of the agricultural and live stock statistics of that Colony for the year ended March, 1900, from which it appears that the total area under crops was 2,439,000 acres. About 58 per cent. of this area was devoted to wheat, which occupied 1,422,000 acres and produced 13,586,300 bushels at 9½ bushels per acre. This was in addition to 114,660 acres of wheat cut for hay. Maize occupied 214,350 acres and is estimated to have produced 6,248,100 bushels. The total grain area under oats, barley, rye and millet was

only about 41,000 acres, but about 105,400 acres of oats were cut for hay, and lucerne and other green crops also occupied about the same area. The remainder of the cultivated land was devoted to potatoes, tobacco, sugar cane, vines, oranges and other fruit.

With regard to the live stock returns, the number of horses is put at 480,665, as compared with 491,553 in 1898. Cattle, sheep and swine have also declined, cattle from 2,029,516 to 1,883,461; sheep from 41,241,004 to 36,313,514, a drop of nearly 5 millions; and swine from 247,061 to 230,837. There are now, it is stated, nearly 343,000 cattle and over 12 million sheep less in the Colony than at the end of the year 1896.

THE WHEAT HARVEST OF AUSTRALASIA IN 1898-1899.

The estimates of the acreage and yield of the land under wheat in the various colonies of Australasia in 1898-99 are shown in the following table, together with similar details for the previous season.

	Area.		Produce.	
	1898-99	1897-98	1898-99	1897-98
	Acres.	Acres.	Bushels.	Bushels.
Victoria - - -	2,154,200	1,657,400	19,581,300	10,580,200
New South Wales - -	1,519,500	993,300	9,276,200	10,560,100
South Australia - -	1,788,800	1,522,700	8,778,900	4,014,900
Queensland - - -	46,200	57,800	607,000	1,009,300
Western Australia - -	-	38,700	-	108,000
Tasmania - - -	85,300	85,900	2,403,500	1,668,300
New Zealand - - -	399,000	315,800	13,073,400	5,670,000

The area under wheat, as will be seen from the above table, showed a considerable increase in the year 1898-1899 so far as regards the three principal wheat-growing colonies of Victoria, New South Wales, and South Australia. The yield, however, of New South Wales declined in spite of the considerably increased acreage, the return per acre being only 7 bushels as compared with 10.6 in the previous year and an average of 10.4 during the past 10 years. The yield of wheat in South Australia improved to nearly five bushels per acre against a

little over 2½ bushels in 1897-1898, whilst the yield in New Zealand was no less than 33 bushels, in Tasmania 27 bushels, in Queensland 13 bushels, and in Victoria 9 bushels per acre

CROPS IN HUNGARY.

The Commercial Attaché to H.M. Embassy at Vienna reports that the weather experienced throughout Hungary during the spring of this year was of the most changeable description; heat and cold followed each other with remarkable rapidity, and frost and violent hail storms were reported as late as the middle of May. Owing to these climatic conditions, the crops show somewhat irregular stages of development, and it is at present difficult to foretell with any degree of certainty what this year's harvest in Hungary will produce.

From some thousand different reports which reached the Ministry of Agriculture at Buda-Pesth up to the end of May the general agricultural outlook is considered to be encouraging. There is, however, a general complaint as to the condition of rye, which is said to have greatly suffered from the frosts of last month, and further to be in a bad way from the presence of blight.

Wheat in general is reported to promise an average harvest, but the spring-sown crop is in many places disappointing. Weeding is still proceeding in the mountain districts. Rye suffered greatly from the cold snaps of weather experienced in May, but improvement in its condition is now reported. The rye-sown area is smaller than usual this year, as, owing to the poor condition of the crop in spring, large tracts were ploughed up and utilised for other purposes. Barley prospects are described as good medium, although the spring-sown crop is said to have suffered much from the late frosts. Oats also suffered from the cold spring, but nevertheless promised an excellent yield. Rapeseed is not expected to yield a large crop, but the quality of the grain is reported to be very fine. Maize is backward and its colour is not good. In many districts supplementary sowings have been made. Sugar beet is generally reported to be in a satisfactory condition. Fruit and garden produce promise good yields.

PARLIAMENTARY PUBLICATIONS.

Board of Agriculture.—Agricultural Returns for Great Britain, 1899. [Cd.—166.] Price 1s. 4d.

This annual volume, comprising 118 tables, together with an explanatory report, brings together, and in certain particulars extends, the information already published by instalments, either separately or in this Journal, as to the acreage and produce of crops, and the numbers of live stock in Great Britain last year. The incidental statistics include similar data for Ireland, the Isle of Man, and the Channel Islands, and summaries for the whole of the United Kingdom. Various analytical tables and comparative statements covering the period since 1871 are given for each division of the United Kingdom. Other tables supply detailed information of the trade in live stock with Ireland, the supply of meat and produce at the London markets, the prices of corn and meat, and the quantities and values of the imports and exports of agricultural produce. The volume closes with a series of summaries embodying the available statistics of agriculture in the colonies and in foreign countries.

The information as to crops and live stock in Great Britain was abstracted from 518,088 schedules, representing the holdings of all persons occupying more than one acre and 12,550 schedules from owners of stock who either occupied no land or whose holdings did not exceed one acre. The extent to which estimates have still to be resorted to in consequence of the non-return of the schedules by the occupiers is now reported to be reduced to 3 per cent. of the whole number.

Of the total area of land and water in Great Britain, which is given as 56,776,000 acres, 32,457,000 acres are accounted

for in detail under the various headings which make up the category of cultivated land for the purposes of these returns. Of the remaining area 12,884,000 acres, of which about three-fourths occur in Scotland, are estimated to consist of rough grazings of mountain or heath land, while, according to the special returns last collected in 1895, woods and plantations cover a further area of 2,726,000 acres.

Major Craigie, in his prefatory report, notes again a further slight reduction of the land under the plough, and points out that the changes in this direction have been nearly continuous since 1872 in the English counties; the loss of arable land in the past year it will be remembered followed on a year when there was a marked increase in the area of the wheat crop.

The returns of the produce of crops, which were briefly summarised in the last number of this Journal, are now shown in full detail for each county, and the yield of the crops of the past season and of each of the last ten years is compared with the estimated average yield over the ten-year period 1889-98 by a table which directs attention to the bountiful character of last year's harvest. The local variations in the estimated yield of crops during 1899 are discussed in the report, which notes also the leading meteorological conditions of the past year. The figures point to the general productiveness of the season in the majority of the eleven crops reported on, although the results do not rival those of the abundant season of 1898. Turnips alone showed a very marked deficiency in yield, this crop falling 31 per cent. below average.

The returns of live stock were on the whole satisfactory—cattle, sheep, and pigs all showing a distinct increase, and the total of horses only falling 330 below the figures of the previous year, while the youngest section of the horses returned had again begun to show an increase.

The prices of corn and meat in the past year are compared in the report with the corresponding data for previous seasons, the level of the grain prices being noted as below the record of the previous year in both barley and oats, and materially below the somewhat exceptional wheat prices of 1898. As regards meat, on the contrary, a higher level of values prevailed

both for beef and mutton than in the preceding twelve months, the data furnished by the newer system of live weight prices for cattle, which have been available since 1893, being specially quoted as furnishing a better measure of the level of prices than is in any other form available.

The report refers also in detail to the numerous tables of imports of agricultural produce which find a place for convenient reference in the annual volume. In the case of grain supplies attention is particularly drawn to the changes in the origin of our imports of wheat and flour, the leading features of the past year being the restriction of the Russian exports and the return of the Argentine total to the level of 1895, which had the effect of placing that Republic as second only to the United States as an exporter of wheat to the United Kingdom.

As in recent years, special attention is drawn in the report to the additions and improvements effected in the tabular summary of colonial and foreign agricultural statistics which are offered for such comparison as may be possible with those of our own country. Fuller tables of the crop area and production of New South Wales, Queensland, South Australia, Victoria, West Australia, New Zealand, and Tasmania have been again supplied, with such figures as are available for the two provinces of Canada, Ontario and Manitoba, which alone supply annual information as to their agricultural position. Among the tables relating to foreign countries it is noted that the quinquennial enquiry of 1898 in Denmark has permitted a useful extension of the information previously at hand as to the numbers and classes of the live stock of that country. The statistics for Argentina and for Spain have also been carried further in the present volume.

The report concludes with a notice of the drift of the recent changes in areas and production, and in the number of live stock, enumerated in those foreign countries whence official information has been received in time to be summarised in the final tables of the volume of Agricultural Returns. In this connection the form of the tables previously employed has been to some extent recast, so as to present, in the

cases where official reports of the 1899 harvest have been made, some comparison with the recent averages of grain production. The difficulties attending comparisons with live stock statistics of countries where the data are only obtained at somewhat wide and varying dates are emphasised by Major Craigie in his comments on the tables; but the following figures showing the relative movements in the live stock of four very typical countries, with herds of cattle which in each case exceed ten million head, from which annual statistics coming down to 1898, may be reproduced here.

Period.	United Kingdom.	France.	United States.	Australasia.
	No.	No.	No.	No.
Average of 1886-95	10,600,000	13,400,000	51,300,000	17,000,000
Single year 1896	10,970,000	13,300,000	46,300,000	12,700,000
Single year 1897	11,000,000	13,500,000	45,300,000	12,200,000
Single year 1898	11,100,000	13,400,000	44,000,000	11,600,000

Compared with the mean number of stock maintained over the whole preceding decade 1886-95, the figures for the last three years show the herds of the United Kingdom, to have been well maintained. The cattle of this country, it is also pointed out, are now more numerous in proportion to area than any in Europe, the much smaller total herds of Holland, Belgium, and Denmark only excepted.

For every 1,000 acres of measured surface in the United Kingdom 144 head of cattle are shown, a proportion which is greater by 23 per cent. than was recorded thirty years before. In Holland and in Belgium 197 and 195 head of stock per 1,000 acres are returned; but the increase in a similar period has been less rapid than our own, or from 13 to 14 per cent. In Denmark, on the other hand, the stock of cattle has been augmented by over 40 per cent. since 1870, and now works out to 186 per 1,000 acres.

A similar table for the sheep of the same four States serves to emphasise the relative predominance which sheep farming still holds in the agriculture of the United Kingdom, and the

totals show an increase not indicated elsewhere on the ten years average of 1886-95.

Period.	United Kingdom.	France.	United States.	Australasia.
	No.	No.	No.	No.
Average of 1886-95	30,700,000	21,800,000	45,700,000	109,200,000
Single year 1896	30,900,000	21,200,000	36,800,000	110,500,000
Single year 1897	30,600,000	21,400,000	37,700,000	103,500,000
Single year 1898	31,100,000	21,300,000	39,100,000	100,500,000

It appears that as many as 400 sheep per 1,000 acres of total surface are still maintained here, while in the east of Europe, according to the last returns, Bulgaria and Servia follow with flocks of 290 and 250 respectively, on a similar area. France, however, has only 164, Roumania 155, Denmark 115, Spain 107, and Hungary 102 per 1,000 acres of surface, and other European States fall below these ratios.

Moreover, so far as it is possible to compare the position of matters in European States with what it was five-and-twenty or thirty years ago, Major Craigie concludes that the flocks of the United Kingdom would seem to have suffered far less depletion than others, since they have only declined by $7\frac{1}{2}$ per cent., while those of Belgium are fewer by 60 per cent., those of Germany by 57 per cent., those of Hungary by 46 per cent., and those of Denmark by 42 per cent. over this lengthened period.

Board of Agriculture.—Annual Report of Proceedings under the Tithe and other Acts administered in the Land Division for the year 1899. [Cd. 106. Price 2½d.]

The total number of applications to the Board of Agriculture for tithe redemption showed a further increase in 1899, the number being 1,134 as compared with 1,034 in 1898, and 853 in 1897. In connection with those applications which are effected under the compulsory powers contained in the Tithe Acts, the existing method has recently been under consideration, and it has been found that although under the

present system a large amount of redemption money has been collected with fair success, considerable difficulties have been encountered. As careful observation has led to the conclusion that many of these difficulties and some degree of friction might be avoided if the work were more directly carried out by the Board by means of their own officers, an experimental trial has recently been made with the sanction of the Treasury, whereby the necessary survey of the land and collection of information as to present ownerships have been undertaken by the Ordnance Survey Department, while the apportionment and collection of the redemption moneys have been effected by the Tithe Branch. About fifteen compulsory redemptions were in 1899 completed in this manner and the results are, in the view of the Board, so encouraging, both as regards the time occupied and the saving of expense to the landowners concerned, that it is proposed to further extend the system in future as occasion offers.

The number of enfranchisements of copyhold land confirmed by the Board in the year 1899 was 378, which, though not showing an advance upon the numbers for 1898, is yet higher than the numbers recorded in any year from 1889 to 1897. Under the law of Commons Amendment Act, 1893, the consent of the Board was given to the enclosure of a small part of Southborough Common, for the enlargement of the churchyard, until arrangements for acquiring a new cemetery are completed; and of part of Waun Isaf Common, Pembrokeshire, in exchange for other land equal in value and better suited for pasturage. Under the Universities and College Estates Acts 149 applications were received in 1899, and the consent of the Board was given to transactions amounting in the aggregate to £352,955. Eighty-five applications were made by incumbents during the year 1899 for the Board's approval of the sale of glebe lands involving 1,205 acres. The sales actually completed in the year were 81 in number, comprising 1,214 acres. The purchase money paid in respect of these was £107,413, which, after payment of necessary expenses, has been invested for the benefit of the respective incumbents. Under the Drainage and Improvement of Land Acts 181 applications to the value of £139,487 were made, and the

actual expenditure on works for which charges on estates have been created was £113,721.

The promoters of the Abergavenny and Monmouth Light Railway, in Monmouthshire, being desirous of obtaining a special advance from the Treasury, made application to the Board for a certificate as required by section 5 (1) of the Light Railways Act. The Board after due inquiry were satisfied that such a railway would benefit agriculture in the district, but that owing to the exceptional circumstances it would not be constructed without special assistance from the State, and they gave their certificate accordingly.

Prices of Irish Agricultural Produce. Return for the year 1881 to 1899 inclusive. [Cd. 113. Price 1s. 11½d.]

This publication gives tables of prices of various agricultural products grown, bred, fattened, produced, or manufactured in Ireland, together with various diagrams. The following table gives the prices for the past three years:—

Commodities.	1897.	1898.	1899.
	£ s. d.	£ s. d.	£ s. d.
Wheat per cwt.	0 7 3½	0 6 4½	0 6 4½
Oats "	0 5 3½	0 5 2½	0 5 2½
Barley "	0 6 5½	0 7 1	0 6 7½
Hay "	0 2 7½	0 2 1½	0 2 3½
Potatoes "	0 3 0½	0 3 5½	0 2 9½
Butter "	4 5 1½	4 8 1½	4 13 4
Pork "	2 2 0	2 1 8½	2 17 5½
Flax per 14 lb.	0 5 2	0 3 10½	0 6 5½
Wool per lb.	0 0 8½	0 0 7½	0 0 6½
Eggs per 120.	0 6 1	0 6 5½	0 6 7½
Beef per cwt.	2 13 0½	2 10 10½	2 15 1½
Mutton "	3 1 5½	2 18 0½	2 19 6
Cattle, one year old . . . per head.	6 3 3	6 8 8	6 14 0
Two " "	9 1 0	8 14 10	9 2 1
Three " "	11 5 1	11 1 7	11 9 4
Springers "	12 16 1	12 10 0	12 17 2
Lambs "	1 4 4	1 3 10	1 4 4
Sheep, over 12 and under 24 months old . .	1 14 4	1 13 2	1 13 3
" Two years old and over . .	1 15 3	1 14 5	1 15 2

These prices are compiled from weekly returns of prices supplied to the Irish Land Commission by the Inland Revenue officers at eight of the principal market towns in Ireland, whilst as regards flax and grass seeds, returns are obtained during a portion of the year from four other market towns.

Local Authorities in Scotland (Technical Education), Return for 1898-99 [H.C. 176]. Price 7d.

This return shows the extent to which, and the manner in which, local authorities in Scotland have allocated and applied funds to the purposes of technical education in the year ended 15th day of May, 1899, under the following Acts:—Local Taxation (Customs and Excise) Act, 1890; Education and Local Taxation Account (Scotland) Act, 1892; Technical Instruction Amendment (Scotland) Act, 1892; Technical Schools (Scotland) Act, 1887; and Public Libraries Acts.

The total amount of the residue paid to the county councils, town councils of burghs, and commissioners of police burghs in respect of the year 1897-98 was £58,793, of which £45,230 was allocated for purposes of technical education, and £13,563 was devoted to relief of rates. Out of the 33 county councils 27 applied the whole of the residue to technical education, and five a part of it, while one applied it wholly to relief of rates. Of the 205 burghs and police burghs, 60 applied the whole, and 65 a part, of the residue to technical education; and 80 applied the whole to relief of rates. Nothing was applied to the building or maintenance of science and art schools, art galleries, or museums out of the local rate under the Public Libraries Acts. The total amount expended on technical education during the year 1898-99, including balance in hand and contributions under section 2 (5) (c) of the Education and Local Taxation Account (Scotland) Act, 1892, was £46,119. The amount handed over to secondary education committees was £12,640.

Ireland.—Return in pursuance of the provisions of the 50th section of the Diseases of Animals Act, 1894, for the year ended the 31st December, 1899. [Cd. 118. Price 1s.]

This report states that the only contagious cattle disease which appeared among Irish herds during 1899 was anthrax, two cases of which occurred in Antrim. With regard to Swine Fever, the low level of outbreaks reached in 1898 was practically maintained in 1899, 321 outbreaks being confirmed against 319 in the previous year, and this notwithstanding the fact that in the latter year the stock of swine kept in the country was greater than in the former by almost 110,000 head, the numbers being 1,253,912 in 1898 and 1,363,311 in 1899. The very infectious nature of swine fever renders the work of suppressing the disease specially difficult, and there is, it is considered, definite encouragement in finding that it is now so far held in check that for the past two years the outbreaks recorded throughout Ireland have averaged less than one per day among a pig population of more than a million and a quarter. The outbreaks of rabies were 92, being a decrease of 40 cases as compared with the year 1898. Only nine outbreaks of glanders occurred during 1899, five of which were in Belfast.

The number of animals exported to Great Britain was 2,381,338, of which 772,272 were cattle, 871,953 sheep, 688,553 swine, and 42,087 horses.

Judicial Statistics.—England and Wales, 1898. [Cd. 123. Price 2s. 8d.]

Statistics relating to various non-indictable offences tried in Courts of Summary Jurisdiction are given in this publication, and amongst these offences it may be noted that proceedings were taken against 3,006 persons in 1898 in connection with the adulteration of food and drugs, and in 2,537 cases a fine was imposed. The number of prosecutions for offences of this character has steadily increased during the past twenty years. Thus in the five years 1879-83 the

average annual number was 1,371; in 1884-88 it was 1,646; in 1889-93, after the passing of the Margarine Act, it rose to 2,421, whilst during the five years 1894-98 it averaged 3,023 per annum. The figure for 1898, it will be observed, practically coincides with this average.

The cases in 1898 were distributed all over England and Wales. The only counties in which no prosecutions took place were Suffolk, Montgomery, and Radnor; though in 16 counties the number of prosecutions was less than 10. In London the prosecutions numbered 1,076, whilst Lancashire took the second place with 337, and Stafford, Warwick, York, West Riding, and Middlesex had each over 100.

Among other cases it may be observed that there were 5,715 prosecutions for offences against the Diseases of Animals Acts, in 4,651 of which fines were imposed, whilst two cases were punished by imprisonment. This number was considerably in excess of any previous year, the average for the five years 1894-98 being only 2,846. The prosecution for offences relating to dogs are shown separately, and amounted to no less than 43,210; fines were imposed in 39,070 of these cases, 10,180 of which were tried in London. The highest number of prosecutions in any previous year was 34,434 in 1895, the five-year average being only a little over 28,000.

Agricultural Statistics of Ireland, with detailed Report on Agriculture, for the year 1899 [Cd. 143]. Price 10½d.

The first instalment of the Agricultural Statistics of Ireland for 1899 were noticed in the last number of the *Journal*. The figures show a decrease in the area under crops (including grass for hay) of 77,000 acres, the total last year amounting to 4,627,545 acres. The area under pasture, however, increased, by nearly 105,000 acres, to 10,575,012

acres. The area and production of the principal crops were in 1899 and 1898, as follows:—

	Area.		Production.	
	1899.	1898.	1899.	1898.
Wheat - - - -	Acres. 51,866	Acres. 52,798	Cwts. 927,452	Cwts. 994,513
Oats - - - -	1,135,536	1,165,359	17,895,880	18,684,258
Barley - - - -	169,469	158,012	3,040,083	2,979,610
Potatoes - - -	662,914	664,865	Tons. 2,760,287	Tons. 2,942,263
Turnips - - -	301,449	306,929	4,309,053	5,162,886
Mangolds and Beet -	62,714	55,955	1,065,961	1,009,573
Flax - - - -	34,989	34,469	Stones. 1,145,261	Stones. 1,075,857
Hay: Clover and Rotation grasses - - -	624,163	652,040	Tons. 1,362,569	Tons. 1,527,630
Hay: Permanent pasture	1,494,744	1,522,430	3,513,226	3,749,993

The live stock in 1899 comprised 580,286 horses, 4,507,457 cattle, 4,364,507 sheep, 1,363,310 pigs, and 18,233,520 poultry. All these, except horses, show an increase over 1898. The number of milch cows included in the above cattle were 1,443,855.

PRICES OF LIVE STOCK.

RETURNED UNDER THE WEIGHING OF CATTLE ACT.

The Returns furnished to the Board of Agriculture under the Markets and Fairs (Weighing of Cattle) Act, 1891, show that during the first quarter of the current year the numbers both of cattle and sheep entering the scheduled markets, were less than in the corresponding quarter of either 1899 or 1898. The number of cattle exposed for sale was 271,000 in these months of 1900 as compared with 283,000 and 276,000 respectively in the earlier seasons, while sheep numbered only 732,000 against 746,000 in 1899 and 759,000 in 1898.

Animals.	1st Quarter, 1900.	1st Quarter, 1899.
CATTLE:	No.	No.
Entering markets - - - -	271,069	282,696
Weighed - - - -	36,934	33,067
Prices returned - - - -	32,668	29,690
Prices returned with quality dis- tinguished - - - -	27,743	25,020
SHEEP:		
Entering markets - - - -	732,312	746,113
Weighed - - - -	9,665	9,699
Prices returned with quality dis- tinguished - - - -	8,643	8,707
SWINE:		
Entering markets - - - -	124,639	110,244
Weighed - - - -	420	325
Prices returned with quality dis- tinguished - - - -	348	325

On the other hand, the number of swine appearing at these markets was larger than in the first quarter of any year since these returns have been collected.

The number of cattle weighed exhibits a distinct advance, more than 13 per cent. of the aggregate number entering the markets having passed over the weighbridge. As appears in the accompanying table, information as to price is not forthcoming for all of these, but the proportion of those weighed and priced exceeded 10 per cent. of the whole. These

proportions are no doubt still small, but it is satisfactory that they exceed any yet recorded, and indicate a gradual, but it may fairly be hoped a persistent, tendency in the direction of what is generally admitted to be the more systematic and satisfactory mode of conducting business. The figures in the case of sheep and pigs continue to be, so far as the use of the weighbridge is concerned, insignificant.

It must be admitted, however, that the tendency above referred to is not without exception. The weighbridge seems to have been entirely idle throughout the three months at Bristol and York; and at four other places—viz., Ashford, Birmingham, Norwich, and Salford—although some cattle were weighed, no information is forthcoming as to their value. At Leicester, although the numbers are not large, particulars both of weight and price have been regularly furnished for several years, and it is therefore now included in the list of places from which returns are taken into account for the purpose of price comparisons. The usual table, which follows, accordingly contains figures relating to seven English and six Scottish markets, showing the number and average price per stone and per cwt. of fat cattle of each class weighed and priced.

PLACES.	INFERIOR or Third Quality.			GOOD or Second Quality.			PRIME or First Quality.		
	Number.	Price per Stone.	Price per Cwt.	Number.	Price per Stone.	Price per Cwt.	Number.	Price per Stone.	Price per Cwt.
Carlisle	596	3 5	27 4	706	3 10 1/2	31 0	2,044	4 4 1/2	35 0
Leicester	—	—	—	29	3 9	30 0	122	4 3 1/2	34 2
Leeds	13	3 6	28 0	66	3 8	29 4	247	4 2	33 4
Liverpool	168	3 4 1/2	27 0	476	3 10 1/2	30 10	1,967	4 6 1/2	36 0
London	2	3 4 1/2	26 10	258	4 5 1/2	35 6	930	5 0	40 0
Newcastle	—	—	—	276	4 7 1/2	36 10	437	4 2 1/2	37 10
Shrewsbury	149	3 7	28 8	204	4 1	32 8	267	4 6	36 0
Aberdeen	1,373	3 4	26 8	2,554	4 3 1/2	34 2	2,222	4 3 1/2	37 10
Dundee	494	3 4	26 8	1,122	4 3 1/2	34 2	767	4 7 1/2	36 10
Edinburgh	2	3 5 1/2	27 8	3,003	4 6 1/2	36 2	300	4 8 1/2	37 10
Falkirk	75	3 10	30 8	509	4 3 1/2	34 2	428	4 6 1/2	36 6
Glasgow	237	4 0 1/2	32 4	654	4 2	33 4	2,553	4 5 1/2	35 10
Perth	7	4 5 1/2	35 10	149	4 5 1/2	35 6	122	4 8 1/2	37 8

Except in one or two of the Northern markets, the number of animals of the third quality was, it would appear, very small. The prices recorded for first quality animals reach a high level, particularly in the case of London, where the average for the quarter is 40s. per cwt. (5s. per stone). The nearest approach to this is 37s. 10d., which was the average realised at three places, viz., Newcastle, Aberdeen and Edinburgh, while Perth follows with 37s. 8d. Leeds stands lowest in this grade with an average quotation of 33s. 4d. per cwt. For second quality beasts the average prices range from 36s. 10d. per cwt. at Newcastle to 30s. at Leicester.

The comparison of the prices realised at each of these thirteen places during the first quarter of 1900 and 1899 respectively, which is made in the following table, indicates that on the whole a considerably higher level of value has prevailed during the current year.

PLACES.	INFERIOR or Third Quality.		GOOD or Second Quality.		PRIME or First Quality.	
	1900.	1899.	1900.	1899.	1900.	1899.
	Per Cwt. s. d.	Per Cwt. s. d.	Per Cwt. s. d.	Per Cwt. s. d.	Per Cwt. s. d.	Per Cwt. s. d.
Carlisle	27 4	26 8	31 0	30 4	35 0	34 0
Leicester	—	28 4	30 0	32 0	34 2	35 0
Leeds	26 0	25 2	29 4	28 10	33 4	32 0
Liverpool	27 0	24 4	30 10	29 0	36 2	35 4
London	26 10	20 4	35 6	34 4	40 0	38 0
Newcastle	—	28 4	36 10	30 4	37 10	34 10
Shrewsbury	28 0	29 0	34 8	32 10	36 2	34 8
Aberdeen	26 8	25 0	34 2	32 4	37 10	36 2
Dundee	26 8	27 4	—	32 2	36 10	34 4
Edinburgh	27 8	—	30 2	31 10	37 10	34 10
Falkirk	30 0	29 4	34 4	34 8	36 6	35 10
Glasgow	32 4	31 4	33 4	32 8	35 10	34 10
Perth	35 10	30 8	35 6	32 2	37 8	34 4

By averaging the returns for fat cattle of first and second quality at all the above places, in each of the three months separately, an approximate indication of the general course of prices in the country may be fairly obtained. The higher prices of this year as compared with 1899 are clearly shown; but, on the other hand, a slight gradual fall from month

to month in 1900 contrasts with an opposite tendency in the same months of last year.

Months.	Good, or Second Quality. per cwt.		Prime, or First Quality. per cwt.	
	1900.	1899.	1900.	1899.
	s. d.	s. d.	s. d.	s. d.
January . . .	34 8	32 6	37 2	34 6
February . . .	34 6	32 6	36 8	34 8
March . . .	34 2	32 10	36 0	34 10

The number of fat cattle which were reported as actually sold by live weight—*i.e.*, at a rate per stone or per cwt. previously agreed upon—continues to be comparatively small and at only eight of the 21 scheduled places were transactions of this nature recorded. The prices calculated from these sales alone show a range of from 39s. 2d. per cwt. to 33s. 8d. per cwt. for first quality, and from 35s. 10d. to 29s. 4d. for second quality, the highest being in each case in London and the lowest at Wakefield.

Shrewsbury still retains an almost solitary position in the practice of weighing store cattle in any numbers, but a few instances are, as usual, recorded at Edinburgh and Glasgow, while a score of first quality stores were also reported as weighed at Leicester.

The usual table giving details for each of the scheduled places is appended.

Cattle, Sheep, and Swine, entering the Markets and Marts of the undermentioned Places, with the Number Weighed, as received from the Market Authorities in the **First Quarter** of 1900 under the Markets and Fairs (Weighing of Cattle) Act, 1891 (54 & 55 Vict. c. 70).

PLACES.	Cattle.			Sheep.			Swine.		
	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.
ENGLAND.									
Ashford . . .	2,622	58	—	12,432	—	—	6,272	—	—
Birmingham . . .	7,594	19	—	3,980	—	—	64,850	—	—
Bristol . . .	9,686	—	—	16,060	—	—	7	—	—
Carlisle . . .	10,574	3,336	3,336	47,298	—	—	5,402	—	—
Leicester . . .	11,873	209	171	11,651	—	—	2,266	—	—
Leeds . . .	8,340	296	296	30,202	996	996	969	29	—
Lincoln . . .	1,843	13	10	18,951	—	—	3730	63	43
Liverpool . . .	15,588	2,671	2,611	52,342	302	302	—	—	—
London . . .	18,770	2,669	1,190	112,339	799	—	475	—	—
Newcastle-upon-Tyne	24,721	713	713	68,710	2	2	13,266	221	221
Notwich . . .	10,490	33	—	12,721	—	—	3,724	—	—
Salford . . .	33,308	1,000	—	103,337	—	—	1,169	—	—
Shrewsbury . . .	11,625	2,524	2,547	7,202	—	—	2,293	—	—
Wakefield . . .	17,024	225	212	44,546	—	—	1,790	13	—
York . . .	12,074	—	—	14,337	—	—	762	—	—
SCOTLAND.									
Aberdeen . . .	14,158	6,149	6,149	19,035	5,466	5,466	3,530	—	—
Dundee . . .	4,586	2,323	2,383	6,793	1,548	1,548	812	—	—
Edinburgh . . .	15,636	6,536	*3,367	44,370	—	—	2,261	—	—
Falkirk . . .	2,088	1,012	1,012	1,510	—	—	20	—	—
Glasgow . . .	23,172	3,481	3,468	74,577	257	28	1,489	2	—
Perth . . .	16,295	2,040	*273	37,649	307	307	3,100	52	82
TOTAL for ENGLAND	202,204	14,431	11,086	551,484	2,099	7,300	113,409	336	264
TOTAL for SCOTLAND	68,665	21,603	*16,637	120,828	7,566	7,343	11,230	64	84
Total	270,869	36,034	*27,723	672,312	9,665	14,643	124,639	400	348

* Prices for 3,163 cattle in addition to the above were quoted from Edinburgh and for 1,762 cattle from Perth, but without distinguishing the quality.

PRICES OF MEAT, CORN AND DAIRY PRODUCE.

AVERAGE PRICES OF DEAD MEAT, per Stone of 8 lbs., at the LONDON CENTRAL MEAT MARKET, during the First Quarter of 1900, and during the Months of March, April, and May, 1900.

(Compiled from the prices quoted weekly in the "Meat Trades Journal.")

DESCRIPTION.	1st Quarter, 1900.	March, 1900.	April, 1900.	May, 1900.
	s. d. s. d.	s. d. s. d.	s. d. s. d.	s. d. s. d.
BEEF:—				
Scotch, short sides	4 3 10 4 0	4 1 10 4 5	4 1 10 4 4	4 1 10 4 7
" long sides	4 0 11 4 2	3 11 11 4 1	3 10 11 4 0	4 0 11 4 2
English	3 10 11 4 1	4 0 11 3 11	3 8 11 3 11	3 10 11 4 1
Cows and Bulls	2 2 11 3 1	2 2 11 3 0	2 0 11 3 0	2 2 11 3 3
American, forehead killed	3 8 11 3 10	3 7 11 3 9	3 7 11 3 9	3 10 11 4 0
" Deptford killed	3 8 11 3 11	3 7 11 3 9	3 6 11 3 9	3 10 11 4 0
Argentine	3 3 11 3 7	3 2 11 3 5	3 0 11 3 4	2 9 11 3 2
American Refrigerated hind-quarters	3 10 11 4 1	3 9 11 4 0	3 7 11 3 9	3 10 11 4 1
" fore-quarters	2 8 11 2 10	2 6 11 2 9	2 6 11 2 8	2 8 11 2 10
Australian, Frozen hind-quarters	2 2 11 2 4	2 2 11 2 4	2 1 11 2 4	2 3 11 2 5
" fore-quarters	2 1 11 2 2	2 1 11 2 2	2 0 11 2 2	2 1 11 2 0
New Zealand, Frozen hind-quarters	2 5 11 2 7	2 5 11 2 7	2 4 11 2 6	2 5 11 2 7
" fore-quarters	2 2 11 2 3	2 2 11 2 3	2 1 11 2 3	2 0 11 2 1
MUTTON:—				
Scotch, Prime	4 5 11 4 9	4 10 11 5 2	4 10 11 5 3	3 5 11 5 11
English, Prime	4 3 11 4 7	4 8 11 5 0	4 10 11 5 0	5 2 11 5 2
Ewes	3 2 11 3 7	3 9 11 4 1	3 9 11 4 2	4 11 11 4 3
Continental	3 9 11 4 4	— 11 4 7	4 2 11 4 7	4 7 11 5 11
River Plate, Town killed	3 4 11 3 7	3 10 11 3 1	3 7 11 3 11	3 11 11 4 2
New Zealand, Frozen	3 11 11 3 3	2 1 11 2 5	2 1 11 3 0	2 9 11 3 2
Australian, Frozen	3 11 11 2 0	2 2 11 2 3	2 4 11 2 5	2 5 11 2 10
River Plate, Frozen	3 11 11 2 1	2 1 11 2 3	2 5 11 2 4	2 5 11 2 10
LAMB:—				
English	6 3 11 7 2	6 8 11 7 4	6 7 11 7 11	6 4 11 7 5
New Zealand, Frozen	3 1 11 3 3	3 1 11 3 5	3 2 11 3 5	2 4 11 3 5
VEAL:—				
English	4 4 11 4 9	4 5 11 4 10	4 6 11 4 11	4 6 11 4 10
Foreign	3 10 11 4 2	4 0 11 4 4	4 11 11 4 5	3 10 11 4 4
PORK:—				
English, best	3 5 11 3 10	3 3 11 3 9	3 11 11 3 1	3 11 11 4 3
" secondary	3 0 11 3 4	3 2 11 3 5	3 5 11 3 9	3 5 11 3 10
Foreign	3 0 11 3 4	3 2 11 3 5	3 5 11 3 9	3 5 11 3 10

AVERAGE WHOLESALE PRICES of CATTLE and SHEEP, per Stone of 8 lbs., sinking the offal, at the METROPOLITAN CATTLE MARKET, during the under-mentioned Quarters of 1899 and 1900.

PERIOD.	CATTLE.			SHEEP.		
	Inferior.	Second.	First.	Inferior.	Second.	First.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1st Quarter, 1899	2 6	3 11	4 6	3 5	4 11	5 8
2nd Quarter, "	2 7	3 11	4 6	3 4	5 1	5 9
3rd Quarter, "	2 4	3 11	4 7	3 3	4 11	5 8
4th Quarter, "	2 7	3 11	4 9	3 4	5 0	5 8
1st Quarter, 1900	2 11	4 1	4 9	3 5	5 1	5 10

AVERAGE WHOLESALE PRICES OF BEEF and MUTTON, per Stone of 8 lbs., by the Carcase, at LIVERPOOL and GLASGOW, during the under-mentioned Quarters of 1899 and 1900.

PERIOD.	LIVERPOOL.*				GLASGOW.†			
	BEEF.		MUTTON.		BEEF.		MUTTON.	
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1st Quarter, 1899	2 6 10	3 9	4 2 10	4 10	2 10 10	3 8	3 8 10	4 4
2nd Quarter, "	2 4 11	3 8	4 0 11	5 4	3 0 11	4 2	4 4 11	5 4
3rd Quarter, "	2 4 11	3 8	3 0 11	5 0	2 4 11	3 8	3 4 11	4 4
4th Quarter, "	2 6 11	4 0	3 0 11	4 8	2 8 11	3 8	3 4 11	4 4
1st Quarter, 1900	2 6 11	4 0	4 0 11	5 6	3 2 11	4 2	4 4 11	5 4

* Compiled from information furnished by the Medical Officer of Health, Liverpool. The prices quoted are for Carcases of Animals slaughtered at the Liverpool Abattoir, and do not apply to Imported Meat.

† Compiled from information furnished by the Principal of the Veterinary College, Glasgow.

BERLIN MARKET.

AVERAGE PRICES of CATTLE and SHEEP (First Quality Dead Weight) in the BERLIN CATTLE MARKET in the under-mentioned Months of 1900.

MONTHS.	CATTLE.		SHEEP.	
	Per Cwt.		Per Cwt.	
1900.	s. d.	s. d.	s. d.	s. d.
March - - - - -	62 4	10 66 2	61 1	to 64 2
April - - - - -	62 5	„ 66 2	59 1	„ 62 1
May - - - - -	61 1	„ 64 8	59 7	„ 62 7

NOTE.—The above prices have been compiled from the weekly returns published in the *Deutsche Landwirtschaftliche Presse*.

PARIS MARKET.

AVERAGE PRICES of CATTLE, SHEEP, and SWINE (Medium Quality) in the PARIS CATTLE MARKET in the under-mentioned Months of 1900.

MONTHS.	OXEN.	CALVES.	SHEEP.	PIGS.
	Per Cwt.	Per Cwt.	Per Cwt.	Per Cwt.
LIVE WEIGHT.				
1900.	s. d.	s. d.	s. d.	s. d.
March - - - - -	27 0	41 6	35 0	40 11
April - - - - -	27 6	41 9	34 11	40 1
May - - - - -	28 10	43 4	34 11	41 1
DEAD WEIGHT.				
1900.	s. d.	s. d.	s. d.	s. d.
March - - - - -	45 5	71 1	68 11	58 7
April - - - - -	46 9	69 9	70 7	57 6
May - - - - -	47 9	70 10	69 11	58 11

NOTE.—The above prices have been compiled from the weekly returns published in the *Journal d'Agriculture Pratique*.

CHICAGO

PRICES of CATTLE at CHICAGO per Cwt. (Live Weight) in the under-mentioned Months of 1900.

Months.	Good Dressed Beef and Shipping Steers.		Export Cattle.		Extra Prime Cattle.	
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1900.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
March - - - - -	22 7	to 25 8	23 0	to 26 10	27 10	to 28 7
April - - - - -	23 0	„ 25 7	23 3	„ 25 11	27 0	„ 27 11
May - - - - -	23 0	„ 24 9	22 10	„ 25 8	25 10	„ 27 1

Compiled from the Live Stock Reports issued by Messrs. Clay, Robinson, and Co. of the Union Stock Yards, Chicago, Illinois.

AVERAGE VALUES, per Cwt., of various Kinds of DEAD MEAT Imported into the United Kingdom from FOREIGN COUNTRIES and BRITISH POSSESSIONS in the under-mentioned Quarters of 1899 and 1900.

(Computed from the Trade and Navigation Accounts.)

PERIOD.	BEEF.		MUTTON.	PORK.		BACON.	HAMS.
	Fresh.	Salted.		Fresh.	Salted.		
1st Quarter, 1899 -	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
2nd Quarter „ -	39 4	26 1	30 6	40 10	24 5	34 3	38 7
3rd Quarter „ -	39 6	20 0	32 6	41 9	20 2	35 4	38 9
4th Quarter „ -	38 0	24 2	31 3	42 9	19 6	36 3	43 2
1st Quarter, 1900 -	37 11	27 2	31 10	42 10	21 11	37 9	45 2
2nd Quarter „ -	39 6	27 11	31 4	42 10	24 9	37 1	45 0

AVERAGE PRICES of **British Corn** per Quarter of 8 imperial bushels,* computed from the Weekly Averages of Corn Returns from the 196 Returning Markets of ENGLAND AND WALES, pursuant to the Corn Returns Act, 1882, together with the QUANTITIES returned as sold at such Markets, in the under-noted periods of the Years 1900, 1899, and 1898.

QUARTER ENDED	PRICES.			QUANTITIES.		
	1900.	1899.	1898.	1900.	1899.	1898.
Wheat.						
	s. d.	s. d.	s. d.	Quarters.	Quarters.	Quarters.
Lady Day	25 11	26 3	35 7	863,373	868,579	699,657
Midsummer	—	25 1	41 5	—	991,293	557,504
Michaelmas	—	25 2	32 6	—	754,667	308,479
Christmas	—	26 4	27 0	—	913,421	1,016,975
Barley.						
	s. d.	s. d.	s. d.	Quarters.	Quarters.	Quarters.
Lady Day	25 1	27 1	27 9	888,949	830,398	902,452
Midsummer	—	24 6	26 10	—	92,648	47,621
Michaelmas	—	24 4	25 10	—	237,935	99,743
Christmas	—	26 6	28 2	—	2,135,762	9,603,842
Oats.						
	s. d.	s. d.	s. d.	Quarters.	Quarters.	Quarters.
Lady Day	16 7	16 11	17 5	246,910	251,841	226,150
Midsummer	—	17 6	19 10	—	157,034	93,475
Michaelmas	—	17 3	19 7	—	147,002	78,787
Christmas	—	16 4	16 11	—	232,783	229,651

* Section 5 of the Corn Returns Act, 1882, provides that where returns of purchases of British Corn are made to the local inspector of Corn Returns in any other measure than the imperial bushel, or by weight or by a weighed measure, that officer shall convert such returns into the imperial bushel, and in the case of weight or weighed measure the conversion is to be made at the rate of 60 imperial pounds for every bushel of wheat, 50 imperial pounds for every bushel of barley, and 39 imperial pounds for every bushel of oats.

AVERAGE PRICES of **British Corn** per Quarter of 8 imperial bushels, computed from the Returns received under the Corn Returns Act, 1882, in each of the under-mentioned Weeks in 1900, and in the corresponding Weeks in 1899 and 1898.

Weeks ended (in 1900).	Wheat.			Barley.			Oats.		
	1900.	1899.	1898.	1900.	1899.	1898.	1900.	1899.	1898.
Jan. 6	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
" 13	25 9	27 0	34 11	25 7	28 3	27 9	16 2	17 0	16 10
" 20	25 11	27 2	35 0	25 5	28 2	27 8	16 3	17 1	17 4
" 27	26 0	27 0	34 11	25 8	27 11	27 10	16 2	17 1	17 5
Feb. 3	25 10	26 7	34 6	25 9	27 9	27 8	16 4	17 0	17 2
" 10	25 8	26 6	34 10	25 4	27 2	28 0	16 6	17 0	17 6
" 17	25 10	26 8	35 1	25 3	27 2	27 8	16 5	17 0	17 5
" 24	26 1	26 0	35 0	24 11	26 10	27 11	16 8	16 11	17 8
Mar. 3	26 3	25 7	35 5	25 1	26 7	27 6	16 9	16 11	17 10
" 10	26 4	25 8	35 10	24 6	26 7	28 0	16 10	17 0	17 11
" 17	25 11	25 10	35 8	24 8	26 7	27 10	16 11	16 11	17 9
" 24	25 11	25 4	35 4	25 0	26 8	28 6	17 1	17 0	17 8
" 31	25 10	24 11	35 3	24 11	26 2	27 11	17 2	16 11	17 10
Apr. 7	25 10	24 7	35 2	24 10	25 1	27 0	17 2	16 11	17 11
" 14	25 11	24 6	35 3	24 5	25 7	28 0	17 8	16 10	18 2
" 21	26 0	24 8	36 1	24 9	25 2	28 3	17 3	17 1	18 4
" 28	26 0	25 0	38 4	25 2	25 10	27 10	17 11	17 5	18 11
May 5	25 11	25 3	42 4	25 3	24 5	27 8	18 0	17 6	20 4
" 12	25 11	25 4	45 11	24 10	23 11	27 1	17 11	17 9	21 1
" 19	25 7	25 3	48 1	24 5	23 11	26 0	18 5	17 10	21 3
" 26	25 5	25 2	47 9	23 11	23 8	26 5	18 2	17 8	21 5
June 2	25 5	25 4	46 3	24 4	24 4	26 10	18 6	18 1	21 0
" 9	25 3	25 6	45 4	23 8	21 10	25 8	18 8	18 2	20 11
" 16	25 6	25 7	42 4	23 8	23 1	26 1	18 11	17 10	20 5
" 23	—	25 7	40 8	—	26 2	24 3	—	17 11	20 7
" 30	—	25 7	38 3	—	24 2	23 4	—	18 0	20 8
July 7	—	25 7	36 10	—	21 9	25 0	—	18 1	20 5
" 14	—	25 5	37 1	—	20 4	24 1	—	17 11	20 10
" 21	—	25 5	38 1	—	21 10	25 0	—	18 0	20 10
" 28	—	25 2	36 11	—	22 5	24 2	—	18 2	20 11
Aug. 4	—	24 10	35 7	—	20 9	26 11	—	18 0	20 7
" 11	—	24 8	33 8	—	22 6	27 5	—	17 9	20 9
" 18	—	24 7	32 7	—	26 11	24 4	—	17 4	19 11
" 25	—	24 7	30 7	—	26 5	27 6	—	17 1	19 3
Sept. 1	—	25 0	28 1	—	25 10	27 8	—	16 7	18 11
" 8	—	25 5	26 10	—	26 5	27 9	—	16 6	17 10
" 15	—	25 4	25 7	—	27 1	26 10	—	16 2	16 10
" 22	—	25 4	25 5	—	27 4	26 9	—	16 1	17 1
" 29	—	25 6	25 9	—	26 11	27 0	—	16 5	16 7
Oct. 6	—	26 0	26 6	—	28 0	27 5	—	16 5	16 7
" 13	—	27 3	26 6	—	27 9	27 11	—	16 5	16 6
" 20	—	28 2	26 8	—	27 6	28 1	—	16 10	16 6
" 27	—	28 1	27 4	—	27 4	28 8	—	16 3	16 8
Nov. 3	—	27 2	28 4	—	27 2	28 6	—	16 7	17 2
" 10	—	26 7	28 4	—	26 9	28 7	—	16 5	17 5
" 17	—	26 1	28 1	—	26 4	28 5	—	16 7	17 2
" 24	—	25 8	27 9	—	26 2	28 4	—	16 7	17 1
Dec. 1	—	25 7	27 7	—	25 10	28 6	—	16 6	17 1
" 8	—	25 7	27 6	—	25 10	28 6	—	16 5	17 3
" 15	—	25 4	27 2	—	25 7	28 5	—	16 1	17 0
" 22	—	25 6	26 9	—	25 10	28 6	—	16 0	17 0
" 29	—	25 9	26 11	—	25 5	28 4	—	16 2	17 0

AVERAGE PRICES of WHEAT, BARLEY, and OATS per IMPERIAL QUARTER in BELGIUM in the under-mentioned Months of 1900.

Month.	Wheat.	Barley.	Oats.
1900.	s. d.	s. d.	s. d.
February - - - -	27 7	24 0	18 8
March - - - -	27 9	24 3	19 1
April - - - -	27 10	24 5	19 8

The above prices have been compiled from the official monthly averages published in the *Moniteur Belge*.

AVERAGE PRICES of WHEAT, BARLEY, and OATS per IMPERIAL QUARTER in FRANCE, and ENGLAND and WALES in the under-mentioned Months of 1900.

MONTH.	FRANCE.	ENGLAND.
WHEAT.		
1900.	Per Qr.	Per Qr.
March - - - -	s. d. 32 8	s. d. 25 11
April - - - -	32 9	25 11
May - - - -	32 10	25 8
BARLEY.		
1900.	Per Qr.	Per Qr.
March - - - -	s. d. 23 3	s. d. 24 8
April - - - -	23 4	24 9
May - - - -	23 4	24 7
OATS.		
1900.	Per Qr.	Per Qr.
March - - - -	s. d. 19 1	s. d. 16 11
April - - - -	19 1	17 6
May - - - -	19 4	18 1

Note.—The prices of French grain have been compiled from the official weekly averages published in the *Journal d'Agriculture Pratique*. The prices of British grain are official averages based on the weekly returns furnished under the Corn Returns Act, 1882.

AVERAGE PRICES of WHEAT, BARLEY, and OATS per IMPERIAL QUARTER at the under-mentioned Markets in the under-mentioned Months of 1900.

Month.	London.	Paris.	Breslau.
WHEAT.			
1900.	Per Qr.	Per Qr.	Per Qr.
March - - - -	s. d. 26 9	s. d. 34 3	s. d. s. d. 28 9 to 32 5
April - - - -	26 10	34 8	28 6 „ 32 3
May - - - -	26 4	34 3	29 1 „ 32 11
BARLEY.			
1900.	Per Qr.	Per Qr.	Per Qr.
March - - - -	s. d. 23 10	s. d. 24 5	s. d. s. d. 22 4 to 26 0
April - - - -	23 2	24 8	22 5 „ 26 1
May - - - -	24 3	24 0	22 7 „ 26 2
OATS.			
1900.	Per Qr.	Per Qr.	Per Qr.
March - - - -	s. d. 17 8	s. d. 20 1	s. d. s. d. 16 6 to 17 6
April - - - -	18 10	19 5	17 0 „ 17 10
May - - - -	19 0	20 1	18 2 „ 19 0

Note.—The London quotation represents the price of British corn as returned under the Corn Returns Act, 1882; the price of grain in Paris is the official average price of French grain in that city; the quotations shown for Breslau represent the prices of grain of good merchantable quality.

PRICES OF WOOL.

PRICES OF ENGLISH WOOL, per pack of 240 lbs., in the under-mentioned Months of 1900.

(Compiled from the *Economist*.)

DESCRIPTION.	March, 1900.	April, 1900.	May, 1900.
South Down - - -	£ s. £ s. 8 0 10 13 0	£ s. £ s. 8 0 10 12 13	£ s. £ s. 8 0 10 11 15
Half-breds - - -	7 4 „ 9 4	7 0 „ 8 16	6 13 „ 8 11
Leicester - - -	6 14 „ 7 18	6 3 „ 7 3	6 0 „ 7 0
Kent Fleeces - - -	6 14 „ 8 4	6 3 „ 7 13	6 0 „ 7 6

MEAN WHOLESALE PRICES of BUTTER, MARGARINE, and
CHEESE in the under-mentioned Months of 1900.

(Compiled from the Grocer.)

DESCRIPTION.	March, 1900.		April, 1900.		May, 1900.	
	Per Cwt.		Per Cwt.		Per Cwt.	
	s.	d.	s.	d.	s.	d.
BUTTER :						
Cork, 1sts	106	0	97	0	85	0
" 2nds	93	0	81	0	79	6
" 3rds	80	0	72	6	77	0
" 4ths	—	—	69	0	70	0
Friesland	93	6 to 98	89	0 to 92	89	0 to 92
Dutch Factories	93	6,, 97	88	6,, 93	90	0,, 94
French Baskets	102	0,, 112	102	0,, 108	94	6,, 98
" Crocks and Firkins	92	0,, 100	92	0,, 100	87	0,, 92
" 2nds and 3rds	86	0,, 90	86	0,, 90	78	0,, 84
Danish and Swedish	103	6,, 106	103	0,, 105	100	6,, 104
Finnish	94	0,, 100	88	6,, 99	84	0,, 94
Russian	87	0,, 95	81	0,, 94	76	0,, 90
Canadian and States	—	—	80	0,, 92	—	—
Argentine	81	6,, 95	78	0,, 90	—	—
Colonial, fine-	87	6,, 98	84	0,, 96	86	0,, 96
" good and inferior	67	6,, 84	69	0,, 80	66	0,, 80
Fresh Rolls (Foreign) per doz	9	6,, 15	9	6,, 14	9	6,, 13
MARGARINE :						
Margarine	38	0,, 60	38	0,, 61	38	0,, 62
CHEESE :						
Cheddar	62	0,, 84	62	0,, 83	63	6,, 80
" Loaf	72	0,, 76	72	6,, 76	74	0,, 76
Cheshire	76	0,, 83	76	0,, 80	76	0,, 80
Wiltshire	68	0,, 72	68	0,, 72	68	0,, 72
Double Gloucester	—	—	70	0,, 74	70	0,, 74

WEEKLY PRICES (WHOLESALE) of VEGETABLES and FRUIT
at COVENT GARDEN MARKET.

(Compiled from the Gardeners' Chronicle.)

	Week ending							
	3rd May.		10th May.		17th May.		24th May.	
	s.	d.	s.	d.	s.	d.	s.	d.
VEGETABLES—								
Artichokes, Globe, per doz.	2	0 to	—	—	2	9 to 3	0	2
Asparagus, Spruce, per bundle	0	6	—	—	0	4 to 0	8	0
" English, natural	5	0	—	—	1	6 to 1	4	0
" Giant, per bundle	4	0 to 5	0	3	6 to 5	0	6	0
Beans, Channel Islands, per lb.	0	8 to 0	9	0	8 to 0	9	0	9
" English Dwarf, per lb.	0	8 to 0	9	0	8 to 0	9	0	10
Beetroot, per bushel	2	0	—	—	2	0	—	—
Broccoli, per crate	8	0 to 10	0	3	0 to 10	0	7	0
Cabbage, per tally	7	0 to 8	0	6	0 to 7	0	4	0
" per doz.	1	6	—	—	1	6	—	—
Carrots, English, per doz. bunches	3	0 to 4	0	3	0 to 4	0	2	0
in cwt. bags	4	0 to 5	0	4	0 to 5	0	3	0
Cauliflowers, per doz.	1	0 to 2	0	1	0 to 3	0	3	0
Cress, per doz. punnets	1	6	—	—	1	6	—	—
Cucumbers, per doz.	3	0 to 4	0	2	0 to 4	0	2	0
Endive, new French, per doz.	1	6	—	—	1	6	—	—
Garlic, per lb.	0	3	—	—	0	3	—	—
Horseradish, English, per bundle	1	0 to 2	0	1	0 to 2	0	2	0
Leeks, per doz. bunches	2	0	—	—	1	6 to 2	0	1
Lettuce, French, Cabbage, per doz.	1	3	—	—	1	3	—	—
Mint, new, per dozen bunches	4	0	—	—	2	0 to 3	0	2
Mushrooms, House, per lb.	0	10 to 0	8	0	10 to 0	8	0	10
Onions, picklers, per sieve	4	0	—	—	4	0	—	—
" Egyptian, per c. t.	6	6	—	—	6	6	—	—
Parsley, per doz. bunches	2	0 to 3	0	1	6 to 2	0	1	6
per sieve	1	0 to 1	0	1	0 to 1	0	0	9
Peas, French, per flat	4	0 to 4	6	4	0 to 5	0	3	6
" Jersey, forward, per lb.	0	4 to 0	9	0	10 to 0	9	0	10
Potatoes, New Channel Islands, frames, per lb.	0	4 to 0	3	0	0 to 2	0	0	3
" Tenerife, in boxes, per cwt.	14	0 to 16	0	17	0 to 20	0	14	0
French Kidneys, per cwt.	18	0 to 20	0	17	0 to 20	0	14	0
Radishes, Long, per dozen bunches	0	5 to 0	9	0	6 to 0	10	0	4
round per dozen bunches	0	3 to 0	0	10 to 0	1	3	0	0
Salad, small, punnets, per doz.	1	3	—	—	1	3	—	—
Spinach, Spring, per bushel	—	—	—	—	2	6 to 3	0	1
Tomatoes, Canary, drops	2	0 to 4	0	2	0 to 4	0	2	6
" English, new, per lb.	1	0 to 1	3	0	10 to 1	2	0	7
Turnips, per dozen bunches	2	0 to 2	6	2	0 to 3	0	2	0
Watercress, per dozen bunches	0	4 to 0	0	0	4 to 0	8	0	4
FRUIT—								
Apples, Nova Scotia and American, per barrel	16	0 to 22	0	16	0 to 20	0	16	0
" Tasmanian, various sorts, per case	10	0 to 14	0	6	0 to 12	0	10	0
" Victorian, in cases	12	6 to 18	0	10	0 to 15	0	11	0
Cherries, per box	1	6	—	—	1	3 to 1	6	1
Gooseberries, in pecks	—	—	—	—	3	6 to 4	0	2
Grapes, Hamburgh, new, per lb.	4	0 to 5	0	3	9 to 4	0	2	9
" Muscats, new, per lb.	10	0 to 11	0	6	0 to 8	0	4	0
Peaches, Class A, per doz.	18	0 to 24	0	12	0 to 24	0	24	0
" Class B, per doz.	36	0	—	6	0 to 12	0	8	0
Strawberries, Class A, per lb.	4	0	—	3	0	—	3	0
" Class B, per lb.	2	0	—	2	0	—	1	0

DISEASES OF ANIMALS IN GREAT BRITAIN.

NUMBER of OUTBREAKS of **Foot-and-Mouth Disease** and of **Swine-Fever**, with the Number of CATTLE and SWINE Slaughtered by order of the Board of Agriculture, in GREAT BRITAIN in each of the under-mentioned periods.

QUARTER ENDED	Foot-and-Mouth Disease.		Swine-Fever.	
	OUTBREAKS Confirmed.	ANIMALS ATTACKED.	OUTBREAKS Confirmed.	SWINE Slaughtered as Diseased, or as having been exposed to Infection.
	No.	No.	No.	No.
December, 1898 -	—	—	507	8,921
March, 1899 -	—	—	594	8,077
June, 1899 -	—	—	917	10,799
September, 1899 -	—	—	453	6,645
December, 1899 -	—	—	358	5,276
March, 1900 -	7	99	438	4,980

NUMBER of OUTBREAKS reported as having taken place, and Number of ANIMALS returned as having been ATTACKED by **Anthrax** and **Glanders** in GREAT BRITAIN in each of the under-mentioned periods.

QUARTER ENDED	Anthrax.		Glanders (including Farcy).	
	OUTBREAKS Reported.	ANIMALS ATTACKED.	OUTBREAKS Reported.	ANIMALS ATTACKED.
	No.	No.	No.	No.
December, 1898 -	139	223	168	306
March, 1899 -	135	247	176	328
June, 1899 -	153	315	175	263
September, 1899 -	113	222	261	526
December, 1899 -	133	202	241	355
March, 1900 -	140	213	259	486

NUMBER OF CASES of **Rabies** in DOGS in GREAT BRITAIN during each of the under-mentioned periods.

THREE MONTHS ENDED	Number of Cases.
31st December, 1898 -	2
31st March, 1899 -	1
30th June, 1899 -	—
30th September, 1899 -	6
31st December, 1899 -	2
31st March, 1900 -	—

DISEASES OF ANIMALS IN IRELAND.

NUMBER of OUTBREAKS of **Pleuro-Pneumonia** and of **Swine-Fever**, with the Number of CATTLE and SWINE Slaughtered by order of the Lord Lieutenant and Privy Council in IRELAND, in each of the under-mentioned periods.

QUARTER ENDED	Pleuro-Pneumonia.			Swine-Fever.	
	OUT-BREAKS Confirmed.	CATTLE found Diseased.	CATTLE Slaughtered as having been exposed to Infection.	OUT-BREAKS Confirmed.	SWINE Slaughtered as Diseased, or as having been exposed to Infection.
	No.	No.	No.	No.	No.
December, 1898 -	—	—	—	42	496
March, 1899 -	—	—	—	80	1,356
June, 1899 -	—	—	—	95	1,541
September, 1899 -	—	—	—	119	2,463
December, 1899 -	—	—	—	28	495
March, 1900 -	—	—	—	40	702

NUMBER of OUTBREAKS reported as having taken place, and Number of ANIMALS returned as having been ATTACKED by **Anthrax**, **Glanders**, and **Rabies** in Ireland in each of the under-mentioned periods.

QUARTER ENDED	Anthrax.		Glanders (including Farcy).		Rabies.	
	OUT-BREAKS REPORTED.	ANIMALS ATTACKED.	OUT-BREAKS REPORTED.	ANIMALS ATTACKED.	CASES REPORTED.	
					Dogs.	OTHER ANIMALS.
	No.	No.	No.	No.	No.	No.
Dec., 1898 -	—	—	3	3	30	5
March, 1899 -	1	1	—	—	20	5
June, 1899 -	—	—	4	6	22	3
September, 1899 -	1	3	2	4	30	5
December, 1899 -	—	—	3	4	7	1
March, 1900 -	1	6	4	5	7	—

THE "LABOUR GAZETTE."

The "Labour Gazette," the Journal of the Labour Department of the Board of Trade, contains an article each month on the state of employment among agricultural labourers in the various parts of the United Kingdom. Special articles also appear therein from time to time on the rates of wages paid to agricultural labourers, the Hiring Fairs in Great Britain, and on migratory Irish agricultural labourers. The "Labour Gazette" is issued on the 15th of each month, and may be obtained direct from the Publishers, Messrs. Horace Marshall & Son, Temple House, Temple Avenue, London, E.C., at the rate of 2s. per annum, post free. Copies may also be ordered through any newsagent, price 1d. each.

ORDNANCE SURVEY MAPS OF GREAT BRITAIN AND IRELAND.

The Ordnance Survey are issuing a new series of folding pocket maps for England and Wales on the scale of one inch to the mile. The maps are printed in colours on sheets 18 by 12 inches, mounted on canvas, in a cover or flat, price 1s. each. The one-inch scale map can also be procured at the same price in black and white, showing outline and contours; or in outline, with hills printed either in black or brown: the outline map has recently been revised. These maps are not only useful for general topographical purposes, but should also prove serviceable to cyclists and pedestrians, since they show all roads, indicating their character and whether metalled or not, footpaths, hills, rivers, towns, villages, railway stations, and local boundaries.

There are agents for the sale of Ordnance Survey Maps in most of the chief towns, and maps can be ordered and indexes, etc., seen at many Head Post Offices, in places where there are no agents. They can also be ordered, through any bookseller or railway bookstall, from the Director-General, Ordnance Survey Office, Southampton; or in the case of Ireland, from the Officer in Charge, Ordnance Survey, Dublin.

POST OFFICE SAVINGS BANKS, WITH GOVERNMENT SECURITY.

ADVANTAGES OFFERED FOR OLD AGE PENSIONS.

Provision for old age can be made by buying Savings Bank Deferred Annuities from £1 to £100 to begin at any age selected.

RETURN OF PURCHASE MONEY. The Premiums for Deferred Annuities can be returned on application, or on Death before the Annuity begins, if the Contract is taken out on these conditions.

IMMEDIATE PENSIONS. Annuities to begin at once, of any amount from £1 to £100 a year, can be bought through the Post Office Savings Bank. The Purchase Money is payable in a lump sum which is not returnable, and the Pensions are payable half-yearly.

Savings Banks Annuities are payable by half-yearly instalments on the 5th January and the 5th July, or the 5th April and 10th October, according to the date of purchase.

PROCEDURE. A simple form of Proposal, and a form for statement of age, can be obtained at any Post Office Savings Bank. When filled up the forms will be forwarded by the local Postmaster to the Chief Office, London, and a Contract will be issued when the first premium has been paid. Annuity Premiums are payable in the same way as Insurance Premiums, namely, by transfers from Savings Bank accounts.

OLD AGE PENSIONS.—IMMEDIATE LIFE ANNUITIES.

This Table shows the cost of an Immediate Life Annuity of £1, and an Annuity of a larger amount costs a larger sum in exact proportion. For instance, a Pension of £10 a year would cost ten times the amount given below.

AGE at time of Purchase.	Males.		Females.	AGE at time of Purchase.	Males.		Females.
	Cost of an Immediate Annuity of £1.	Cost of an Immediate Annuity of £1.			Cost of an Immediate Annuity of £1.	Cost of an Immediate Annuity of £1.	
5 and under 6	£ s. d.	£ s. d.		44 and under 45	£ s. d.	£ s. d.	
6 " 7	25 19 0	27 12 6		45 " 46	16 15 8	18 13 3	
7 " 8	25 11 1	27 9 1		46 " 47	16 9 11	18 6 9	
8 " 9	25 7 0	27 2 2		47 " 48	16 4 2	18 0 0	
9 " 10	25 2 11	26 18 8		48 " 49	15 18 3	17 13 2	
10 " 11	24 18 10	26 15 1		49 " 50	15 12 3	17 6 1	
11 " 12	24 14 9	26 11 6		50 " 51	15 6 1	16 18 11	
12 " 13	24 10 6	26 7 10		51 " 52	14 19 11	16 11 9	
13 " 14	24 6 4	26 4 1		52 " 53	14 13 6	16 4 7	
14 " 15	24 2 1	26 0 4		53 " 54	14 7 1	15 17 4	
15 " 16	23 17 10	25 16 6		54 " 55	14 0 5	15 9 11	
16 " 17	23 13 6	25 12 7		55 " 56	13 13 8	15 2 4	
17 " 18	23 9 1	25 8 8		56 " 57	13 6 9	14 14 9	
18 " 19	23 4 9	25 4 8		57 " 58	12 19 8	14 6 11	
19 " 20	23 0 4	25 0 8		58 " 59	12 12 5	13 19 0	
20 " 21	22 15 10	24 16 6		59 " 60	12 4 11	13 11 1	
21 " 22	22 11 4	24 12 4		60 " 61	11 17 4	13 3 1	
22 " 23	22 6 9	24 8 1		61 " 62	11 9 8	12 15 1	
23 " 24	22 2 3	24 3 10		62 " 63	11 2 2	12 7 0	
24 " 25	21 17 7	23 19 5		63 " 64	10 14 11	11 19 0	
25 " 26	21 12 11	23 15 0		64 " 65	10 7 8	11 11 0	
26 " 27	21 8 3	23 10 6		65 " 66	10 0 6	11 2 11	
27 " 28	21 3 6	23 5 11		66 " 67	9 13 4	10 14 7	
28 " 29	20 18 9	22 1 3		67 " 68	9 6 4	10 6 4	
29 " 30	20 13 11	22 16 6		68 " 69	8 19 7	9 18 1	
30 " 31	20 9 1	22 11 8		69 " 70	8 12 10	9 9 10	
31 " 32	20 4 2	22 6 9		70 " 71	8 6 2	9 1 10	
32 " 33	19 19 2	22 1 9		71 " 72	7 19 5	8 14 2	
33 " 34	19 14 2	21 10 7		72 " 73	7 12 10	8 6 10	
34 " 35	19 9 2	21 11 5		73 " 74	7 6 4	7 19 10	
35 " 36	19 4 1	21 6 2		74 " 75	7 0 1	7 13 0	
36 " 37	18 18 11	21 0 9		75 " 76	6 14 1	7 6 4	
37 " 38	18 13 9	20 15 3		76 " 77	6 8 4	6 19 10	
38 " 39	18 8 6	20 9 7		77 " 78	6 2 8	6 13 7	
39 " 40	18 3 2	20 3 11		78 " 79	5 17 4	6 7 5	
40 " 41	17 17 10	19 18 0		79 " 80	5 12 3	6 1 6	
41 " 42	17 12 4	19 12 1		80 or any greater age.	5 7 2	5 15 9	
42 " 43	17 6 10	19 5 11			5 2 4	5 10 3	
43 " 44	17 1 4	18 19 8					

OLD AGE PENSIONS.—DEFERRED LIFE ANNUITIES.

The Annuity Tables below give the cost of an Annuity of £1, and an Annuity of a larger amount costs a larger sum in exact proportion. For instance, a Pension of £10 a year would cost ten times the amount given below. In this class of Annuities the Purchase Money will be returned on application, or on the death of the nominee, if an instalment of the Annuity shall not have become due. These Pensions can be Deferred any number of years from 10 to 50, and any cost not given below will be furnished on application to the Controller, Post Office Savings Bank, London.

Purchase Money Returnable Scale.

Age at time of Purchase.	Cost of an Annuity of £1 payable after the expiration of 10 YEARS.				Cost of an Annuity of £1 payable after the expiration of 20 YEARS.			
	Males.		Females.		Males.		Females.	
	In 11 Yearly Sums of	In one Sum at time of Purchase.	In 11 Yearly Sums of	In one Sum at time of Purchase.	In 21 Yearly Sums of	In one Sum at time of Purchase.	In 21 Yearly Sums of	In one Sum at time of Purchase.
21 and under 22	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
22 " 23	1 12 5	15 15 9	1 15 10	17 9 0	0 13 0	10 15 1	0 14 6	11 19 3
23 " 24	1 11 7	15 7 11	1 15 5	17 5 1	0 12 10	10 11 8	0 14 3	11 15 0
24 " 25	1 11 3	15 4 0	1 15 0	17 1 1	0 12 7	10 8 4	0 14 0	11 11 9
25 " 26	1 10 10	15 0 0	1 14 7	16 17 0	0 12 5	10 4 10	0 13 9	11 7 10
26 " 27	1 10 5	14 16 0	1 14 2	16 12 11	0 12 2	10 1 4	0 13 6	11 3 10
27 " 28	1 10 0	14 11 11	1 13 9	16 8 8	0 12 0	9 17 10	0 13 3	10 19 9
28 " 29	1 9 7	14 7 10	1 13 4	16 4 4	0 11 9	9 13 3	0 13 0	10 15 6
29 " 30	1 9 2	14 3 9	1 12 10	16 0 0	0 11 6	9 9 7	0 12 9	10 11 3
30 " 31	1 8 8	13 19 6	1 12 5	15 15 6	0 11 4	9 6 10	0 12 6	10 6 10
31 " 32	1 8 3	13 15 3	1 11 11	15 10 11	0 11 1	9 3 1	0 12 3	10 2 6
32 " 33	1 7 10	13 11 0	1 11 5	15 6 3	0 10 10	8 19 2	0 12 0	9 18 1
33 " 34	1 7 5	13 6 8	1 10 11	15 1 6	0 10 7	8 15 2	0 11 9	9 13 8
34 " 35	1 6 11	13 2 5	1 10 5	14 16 7	0 10 4	8 11 2	0 11 5	9 9 2
35 " 36	1 6 6	12 17 9	1 9 11	14 11 7	0 10 1	8 7 0	0 11 2	9 4 6
36 " 37	1 6 0	12 13 3	1 9 5	14 6 0	0 9 10	8 2 10	0 10 11	8 19 11
37 " 38	1 5 6	12 8 7	1 8 11	14 1 3	0 9 7	7 18 6	0 10 7	8 15 2
38 " 39	1 5 1	12 3 11	1 8 4	13 15 10	0 9 4	7 14 1	0 10 4	8 10 4
39 " 40	1 4 7	11 19 2	1 7 9	13 10 4	0 9 1	7 9 6	0 10 0	8 5 5
40 " 41	1 4 1	11 14 4	1 7 2	13 4 10	0 8 6	7 4 10	0 9 9	8 0 7
41 " 42	1 3 7	11 9 4	1 6 7	12 19 2	0 8 0	7 0 2	0 9 5	7 15 8
42 " 43	1 3 3	11 4 3	1 6 0	12 13 7	0 7 11	6 15 7	0 8 2	7 10 9
43 " 44	1 2 6	10 19 1	1 5 6	12 7 11	0 7 7	6 11 2	0 8 0	7 5 10
44 " 45	1 2 0	10 13 9	1 4 10	12 2 1	0 7 4	6 6 9	0 7 8	7 1 0
45 " 46	1 1 5	10 8 4	1 4 3	11 16 3	0 7 5	6 2 4	0 7 5	6 16 0
			1 3 8	11 10 3	0 7 2	5 18 0	0 7 11	6 11 0

Purchase Money not Returnable Scale.

21 and under 22	1 10 3	14 3 4	1 14 0	16 1 5	0 11 0	8 5 11	0 10 11	9 19 0
22 " 23	1 9 10	13 16 1	1 13 7	15 17 3	0 10 10	8 2 2	0 12 5	9 15 4
23 " 24	1 9 5	13 11 6	1 13 2	15 13 1	0 10 7	7 19 3	0 12 5	9 11 5
24 " 25	1 8 11	13 0 4	1 12 9	15 8 10	0 10 4	7 14 7	0 12 2	9 7 0
25 " 26	1 8 6	12 14 1	1 12 4	15 4 6	0 10 2	7 10 9	0 12 0	9 3 6
26 " 27	1 8 1	12 9 5	1 11 10	15 0 1	0 9 11	7 6 11	0 11 8	8 19 5
27 " 28	1 7 8	12 4 11	1 11 5	14 15 7	0 9 8	7 3 1	0 11 5	8 15 3
28 " 29	1 7 2	12 0 11	1 10 11	14 11 1	0 9 5	6 19 2	0 11 2	8 11 0
29 " 30	1 6 9	11 16 3	1 10 6	14 6 5	0 9 3	6 15 4	0 10 10	8 6 9
30 " 31	1 6 3	11 11 0	1 10 0	14 1 9	0 9 0	6 11 4	0 10 8	8 2 5
31 " 32	1 5 10	11 17 8	1 9 6	13 16 11	0 8 9	6 7 5	0 10 5	7 27 11
32 " 33	1 5 4	11 13 0	1 9 0	13 12 1	0 8 6	6 3 6	0 10 1	7 13 5
33 " 34	1 4 11	11 8 4	1 8 6	13 7 2	0 8 3	5 19 6	0 9 10	7 8 10
34 " 35	1 4 5	11 3 6	1 8 0	13 2 1	0 8 0	5 15 6	0 9 6	7 4 2
35 " 36	1 3 11	10 18 9	1 7 6	12 16 11	0 7 0	5 11 5	0 9 3	6 19 5
36 " 37	1 3 5	10 13 11	1 6 11	12 11 8	0 7 6	5 7 5	0 8 11	6 14 8
37 " 38	1 3 0	10 8 1	1 6 5	12 6 4	0 7 3	5 3 4	0 8 8	6 9 10
38 " 39	1 2 6	10 0 2	1 5 10	12 0 10	0 7 0	4 19 2	0 8 4	6 4 11
39 " 40	1 2 0	9 19 2	1 5 3	11 15 3	0 6 6	4 15 1	0 8 0	6 0 0
40 " 41	1 1 6	9 14 2	1 4 8	11 9 7	0 6 6	4 10 10	0 7 9	5 14 11
41 " 42	1 0 11	9 9 1	1 4 1	11 3 9	0 6 2	4 6 8	0 7 5	5 9 10
42 " 43	1 0 5	9 4 0	1 3 5	10 17 9	0 5 11	4 2 5	0 7 1	5 4 9
43 " 44	0 19 12	8 18 10	1 2 10	10 11 9	0 5 8	3 18 1	0 6 9	4 19 7
44 " 45	0 19 4	8 13 7	1 2 2	10 5 6	0 5 4	3 13 9	0 6 5	4 14 4
45 " 46	0 18 10	8 8 3	1 1 6	9 19 3	0 5 1	3 9 5	0 6 1	4 9 1

LIST OF LEAFLETS ISSUED BY THE BOARD OF AGRICULTURE.

Number.	Title.
Leaflet No. 1	Mites on Currant and Nut Trees.
" " 2	Vine and Raspberry Weevils.
" " 3	The Turnip Fly or Flea.
" " 4	Caterpillars on Fruit Trees.
" " 5	The Mangel Wurzel Fly.
" " 6	The Field Vole.
" " 7	<i>Out of Print.</i>
" " 8	Farmers and Assessments to Local Rates.
" " 9	Ensilage.
" " 10	Wireworms.
" " 11	The Daddy Longlegs or Crane Fly.
" " 12	The Gooseberry Saw-Fly.
" " 13	Acorn Poisoning.
" " 14	The Raspberry Moth.
" " 15	The Apple Blossom Weevil.
" " 16	The Apple Sucker.
" " 17	<i>Out of Print.</i>
" " 18	Fertilisers and Feeding Stuffs Act.
" " 19	Pea and Bean Weevil.
" " 20	The Magpie Moth.
" " 21	The Warble Fly.
" " 22	The Diamond Back Moth.
" " 23	Potato Disease.
" " 24	The Ribbon Footed Corn-Fly.
" " 25	The Cockchafer.
" " 26	Farmers and the Income Tax.
" " 27	Remission of Tithe Rentcharge.
" " 28	Anthrax.
" " 29	Swine Fever.
" " 30	The Codlin Moth.
" " 31	The Onion Fly.
" " 32	Foul Brood or Bee Pest.
" " 33	Surface Caterpillars.
" " 34	The Woolly Aphis or American Blight.
" " 35	The Celery Fly.
" " 36	Cultivation of Osiers.
" " 37	Rabies.
" " 38	The Carrot Fly.
" " 39	Assessments to Land Tax.
" " 40	The Kestrel or Windhover.
" " 41	The Red Spider or Spinning Mite.
" " 42	The Short-eared Owl.
" " 43	Titmice.
" " 44	The Common Lapwing or Plover.
" " 45	The Starling.
" " 46	The Stem Eelworm.
" " 47	The Asparagus Beetle.
" " 48	The Pea Thrips.
" " 49	The Fruit Tree Beetle.
" " 50	Water Wagtails or " Dishwashers.
" " 51	The White or Barn Owl.
" " 52	Gooseberry Blight.
" " 53	The Pear Midge.
" " 54	The Spotted Flycatcher.
" " 55	The Swallow.
" " 56	The Canker Fungus.
" " 57	External Parasites of Poultry.
" " 58	Internal Parasites of Poultry.
" " 59	Improvement of Land Act.
" " 60	The Wood Leopard Moth.
" " 61	Sheep Scab.
" " 62	The Pear and Cherry Sawfly.
" " 63	Destruction of Charlock.

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A CONTRIBUTION TO OUR KNOWLEDGE OF THE INFLUENCE OF MANURES ON THE BOTANICAL COMPOSITION OF THE HERBAGE OF PERMANENT GRASS-LAND.

In carrying out experiments on the improvement of permanent grass-land one cannot but feel that it is, on the whole, unsatisfactory to rest content with the mere weighing of the produce. In passing the crop of a series of plots over the weigh-bridge one is often conscious, from various indications, that the quality or feeding property of the different lots is very varied, and one wants to lay hold of some scale that may be utilised as a test of quality. Variation in quality of the mixed herbage of a meadow may be indicated by many signs. Weight, aroma, and colour all tell something; and such laboratory tests as chemical analysis and digestive determinations are not without their value. Given a sufficient number of animals and other satisfactory conditions, the quality of herbage can be best determined by a series of feeding experiments. These, however, are much too tedious and expensive for general adoption. Finally, there is the method of botanical analysis, which consists in separating carefully selected samples of the herbage into the constituent plants that collectively form the mass.

Few forms of investigation of a simple type are more interesting than the study of the increase or disappearance of plant-species in grass-land under the influence of definite manures. It is a line of research that the investigators at

Rothamsted have rendered classic, and one follows their account of "The Battle of the Meadow" with all the interest that a life-and-death struggle can evoke.

While a knowledge of the botanical composition of herbage is most interesting, its practical importance may easily be exaggerated. Thus, for instance, while a large increase in the percentage of cocksfoot may accompany pasture improvement in one district, it does not by any means follow that corresponding improvement in another district will be associated with an increase in the relative abundance of this plant. Or, to take the case of another plant—Yorkshire fog—it may safely be asserted that whereas this species is generally indicative of unsatisfactory conditions, there are circumstances where its presence is a sign of improved fertility. In the case of some plants, however—notably white clover—an increase in their relative abundance is a reliable general index of improvement in the quality of the herbage.

The subject, in fact, is one that admits of being looked at from many different points of view. Thus, a plant that is very abundant in a light crop of hay may be very deficient when the yield is large. Then, again, a mere statement of the percentage abundance of a plant leaves much that is important out of account. Suppose, for instance, that one has three plots, one unmanured, one treated with basic slag, and the third treated with kainit, and that a botanical analysis gives the following figures:—

	Treatment.	Cwt. of Hay.	Per cent. of Clover.	Cwt. of Clover.
Plot 1	No manure	20	20	4
Plot 2	Basic slag	25	20	5
Plot 3	Kainit	25	16	4

The percentage of clover is the same in the case of Plots 1 and 2, but this is no indication of the effectiveness of this manure to influence clover, for when the yield is taken into account it is seen that Plot 2 has produced 5 cwt. of this plant as against 4 cwt. on Plot 1. With the same relative abundance we have thus an increase of 25 per cent. in the absolute

quantity. And, similarly, it would be erroneous to conclude that, because there is only 16 per cent. of clover in the yield of Plot 3, the kainit has had a repressing influence on this plant. When the weight of hay is taken into account it is seen that there is as great a weight of clover produced on Plot 3 as on Plot 1, in other words, the increase in the aggregate yield induced by the use of kainit has taken the form of an increase in the abundance of plants other than clover.

In connection with the educational work of the Department of Agriculture of the Durham College of Science, eight stations, each comprising 16 plots of $\frac{1}{16}$ acre, were laid down on old grass land in the county of Cumberland in the winter of 1894-95. In the case of four of these stations (called Set 1) certain manures have been annually applied to the five crops of 1895 to 1899. In the first year the standard in the case of superphosphate and kainit was fixed at $3\frac{1}{2}$ cwt. of each per acre, but in the second and subsequent years only $2\frac{1}{2}$ cwt. of each of these manures was used. With the exception of this slight modification no change has been made in the system of manuring.

In the case of the four stations constituting Set 2, the manurial dressings were applied in 1895, 1897, and 1898, while nothing was used in 1896 and 1899.

The value of a botanical analysis depends entirely on the method of sampling, and on the accuracy of the subsequent separation of the species. The most exhaustive examination of the various systems of sampling, and their influence on the results, was probably that undertaken by Dr. A. Voigt, and described in vol. xxiii. of "Die Landwirtschaftliche Jahrbücher." The essential principles of his system have been observed in all the work of hay or grass sampling undertaken by the Durham College of Science. In the case of the Cumberland plots under review the method of procedure was as follows: In July, 1899—when the crop of the various stations was ripe—Mr. W. T. Lawrence, the Superintendent of the Farm School at Newton Rigg, and Mr. F. Wakerley, of the Agricultural Department of the College, visited each place, the work of cutting the crop commencing after their arrival. Mr. Lawrence concerned himself entirely with the weighing

of the herbage, while Mr. Wakerley gave his undivided attention to the sampling. From each swath, at intervals of five paces, a handful of grass was lifted and placed in a bag, and in this way about a stone of herbage was collected from each plot. A piece of ground was then raked clean, and on it the herbage so collected was evenly spread out, care being taken to separate any tangled or matted portions. It was then raked together and re-spread three times, when small handfuls were taken from six points of the area. This final sample, weighing about two pounds, was placed in a paper bag previously labelled, and when the sixteen samples from any station were thus collected they were at once despatched to the College, where they arrived on the following morning. There they were spread out in a greenhouse to dry, and in a few days they were fit to return to their respective bags, to be put aside till the analysis could be undertaken.

Preparation for the actual separation of the species was made by mounting on sheets specimens of all the plants likely to be met with. These specimens served for purposes of reference in cases of difficulty, and were quite indispensable. Most of the work of separation was done, under supervision, by two fourth-year students, Mr. L. Abram, B.Sc., and Mr. T. Hacking, Gold Medallist of the R.A.S.E. The mere separation of the plants of a half-pound sample of dried herbage—apart from weighings and calculations—was found to occupy the time of a worker for about six hours, the 128 samples taking practically two months to deal with.

The soil at the eight stations may be thus described:—

T 1.					SET 2.				
Blencow, clay loam.					Brampton, deep sandy loam.				
Castle Carrock, gravelly loam.					Gosforth, gravelly loam.				
Eskdale, moderate loam.					Kirkhampton, deep moist loam.				
Glasson, deep peat.					Wigton, clay loam.				

The number of plants met with in the course of the analysis was about fifty, though only about half a dozen were of sufficient abundance to be of first-rate importance. It will probably be most convenient to deal with these important plants *seriatim*; the influence of nitrate of soda, sulphate of ammonia, superphosphate, basic slag, kainit, and lime being

duly noted. At the stations of Set 1, twelve plots are concerned with these substances, while in the case of Set 2, ten plots are similarly occupied, the points dealt with by the remainder of the plots at each station being for the present left out of account, except as regards Plot 16 of Set 2, which received lime.

In order that there may be no misapprehension it may be specifically stated that in the following pages the yield of hay, and relative and absolute abundance of the various plants, refer to the crop of 1899 only. That was the fifth year of the experiments, and by that time the manures may be supposed to have had time to produce most of the effects of which they are capable. The weights of hay and manure always refer to an acre.

AGROSTIS (TABLES I. AND II.).

This genus of grass was usually the most abundant constituent of the herbage, though at Gosforth it never exceeded 12 per cent., while at Wigton it was always under 75 per cent. *Agrostis*, under its different species and varieties of Bent Grass, Black Bent, Water Grass, Poor-land Twitch, &c., is generally regarded as one of our poorest grasses: and it may safely be concluded that any treatment that reduces its abundance is, to that extent at least, advantageous.

Table I.—Effects of Manures on *Agrostis* (Set 1).

Plot.	Manures per acre.					Blencow.			Castle Carrock.			Eskdale.			Glasson.		
	Name of Soil.	Sulph. of Ammon.	Super.	Slag.	Kainit.	Yield of Hay.	Yield of Agrostis.		Yield of Hay.	Yield of Agrostis.		Yield of Hay.	Yield of Agrostis.		Yield of Hay.	Yield of Agrostis.	
							lbs.	%		lbs.	%		lbs.	%		lbs.	%
1	1	—	—	—	—	23½	74.7	1,066	22	23.7	583	27	23.8	719	11	44.0	542
2	110	—	—	—	—	22½	71.7	9,288	22½	32.0	1,030	33	21.3	727	11½	51.6	650
3	—	—	—	280	—	35½	75.0	2,961	22	23.8	586	26½	17.7	525	22	46.3	1,140
4	—	—	—	—	208	33½	70.0	2,046	21½	17.0	436	21½	17.5	421	16½	44.5	834
5	—	—	—	—	280	30½	62.8	2,303	22	18.3	450	24½	15.7	426	17½	50.3	900
6	112	—	—	280	—	31½	68.8	2,362	23	18.8	484	31½	21.8	846	21	15.1	825
7	112	—	—	—	280	28½	63.0	2,010	25½	23.2	639	37½	17.2	722	22½	59.1	1,220
8	—	—	—	280	—	25½	62.8	1,793	25½	17.3	480	37	16.0	606	20	18.0	871
9	110	—	—	280	—	29½	47.3	1,549	26½	13.0	391	38½	23.0	991	20½	25.7	582
10	112	—	—	208	280	20	33.7	1,094	25½	17.5	504	38	16.8	715	24½	25.6	709
11	112	—	140	104	280	20½	41.1	1,346	27½	18.2	560	35	20.8	893	23½	26.2	689
12	—	86	—	—	208	24½	36.0	997	30½	21.9	748	30½	25.4	860	19½	27.2	586

The influence on Agrostis of Nitrate of Soda when used alone.—On the whole this manure, when used by itself, has not had any very conspicuous influence on Agrostis. Table I. shows that Plot 2, receiving nitrate of soda, has at two places produced a greater, and at two places a less, percentage of Agrostis than Plot 1, which was wholly untreated. The weight of Agrostis is, however, always greater on Plot 2—notably so at Castle Carrock—but so also is the weight of general herbage, except on the peaty soil of Glasson, where the nitrate has had but little effect.

The influence on Agrostis of Nitrate of Soda when added to Superphosphate.—To ascertain this we compare Plot 3, Table I. (super alone), with Plot 6 (super and nitrate). At two of the stations (Blencow and Glasson) the addition of the nitrate has not increased the general yield, while at Castle Carrock and Eskdale this treatment has produced an increase, though only of a single cwt. at the former station. As regards Agrostis it will be seen that the percentage and actual yield have been rather markedly reduced at all the stations except Eskdale.

The influence on Agrostis of Nitrate of Soda when added to Kainit.—Comparison of Plots 5 and 7, Table I., will show that at all the stations the nitrate, when added to kainit, has increased the percentage of Agrostis.

The influence on Agrostis of Nitrate of Soda when added to both Super and Kainit (compare Plots 8 and 9, Table I.).—With the single exception of Eskdale, the addition of nitrate of soda to these mineral manures has very markedly reduced both the percentage and actual weight of Agrostis.

The influence on Agrostis of a double and triple dose of Nitrate of Soda.—This was tested on Plots 2, 7, and 8 at the stations of Set 2 (see Table II.). The plots concerned received equal quantities of minerals, but Plot 7 got $\frac{1}{2}$ cwt. of nitrate, Plot 2 received 1 cwt., and Plot 8 $1\frac{1}{2}$ cwt. of that manure. Gosforth may be left out of account, as at that station there was no appreciable quantity of Agrostis on any of the plots. At two of the other stations the largest dressing of nitrate—where single and triple doses are compared—produced the smallest

percentage and yield of Agrostis, and the same is true where a single dose of nitrate is compared with a double.

Table II.—Effects of Manures on Agrostis (Set 2).

Plots.	Manures per Acre.				Brampton.			Kirkbaunton.			Wigton.		
	Nitrate of Soda.	Super.	Slag.	Kainit.	Yield of Hay.	Yield of Agrostis.		Yield of Hay.	Yield of Agrostis.		Yield of Hay.	Yield of Agrostis.	
						cwt.	%		cwt.	%		cwt.	%
1	—	—	—	—	27 $\frac{1}{2}$	24.2	738	29	34.5	1,120	26 $\frac{1}{2}$	1.4	100
2	112	392	—	392	25	29.1	814	26 $\frac{1}{2}$	27.8	926	27	6.8	205
3	112	196	—	392	21 $\frac{1}{2}$	31.3	762	31 $\frac{1}{2}$	28.0	905	24	7.4	108
4	112	588	—	392	20 $\frac{1}{2}$	30.7	713	27 $\frac{1}{2}$	36.0	1,118	29 $\frac{1}{2}$	2.8	91
5	112	392	—	196	22 $\frac{1}{2}$	39.4	1,003	26 $\frac{1}{2}$	38.0	1,117	30 $\frac{1}{2}$	2.7	92
6	112	392	—	588	23 $\frac{1}{2}$	36.8	1,040	30	41.2	1,384	33 $\frac{1}{2}$	3.2	110
7	56	392	—	392	30 $\frac{1}{2}$	37.0	1,253	30 $\frac{1}{2}$	39.3	1,353	29	5.1	165
8	168	392	—	392	29 $\frac{1}{2}$	32.3	1,076	34	42.4	1,614	34 $\frac{1}{2}$	2.8	108
9	56	—	320	392	29 $\frac{1}{2}$	29.8	984	35 $\frac{1}{2}$	38.5	1,519	34	1.2	45
10	56	—	480	392	29 $\frac{1}{2}$	34.3	1,142	33 $\frac{1}{2}$	37.2	1,385	38 $\frac{1}{2}$	5.1	218

Summary of the results on Agrostis obtained with Nitrate of Soda.—Where the nitrate of soda is used in a manner that general experience has shown to be bad—that is, alone, or in conjunction with kainit only—it has, on the whole, markedly encouraged the growth of Agrostis; but where used in a more rational manner as an addition to super, or to super combined with kainit, it has only twice in eight times failed to diminish the percentage of this undesirable grass.

The influence on Agrostis of Nitrate of Soda as compared with Sulphate of Ammonia.—Plots 10 and 12 of the stations of Set 1 (Table I.) have always received similar dressings of minerals, the only difference in the treatment consisting in the nitrogen of Plot 10 being derived from nitrate of soda, whereas on Plot 12 it was supplied by sulphate of ammonia. Without an exception the sulphate of ammonia has always produced a larger percentage of Agrostis. This result is in conformity with that obtained at Rothamsted, and is precisely what our knowledge of soil physics would have led us to expect. Sulphate of ammonia is retained by the surface layers of the soil to a much greater extent than is the case

with nitrate of soda, and, as a consequence, the former manure is especially adapted to stimulate and encourage the growth of a shallow-rooted plant like *Agrostis*.

The Influence on Agrostis of Superphosphate when used alone (compare Plots 1 and 3, Table I.).—At three of the four stations *Agrostis* has been increased. At Glasston, where this manure doubled the crop of hay, it more than doubled the weight of *Agrostis*.

The Influence on Agrostis of Superphosphate when added to Nitrate of Soda (Compare Plots 2 and 6, Table I.).—Here the percentage of *Agrostis* has been reduced at three of the four stations, but, in spite of this, the actual weight of *Agrostis* produced has, on three occasions, been greater where super. was applied.

The Influence on Agrostis of Superphosphate when added to Kainit (compare Plots 5 and 8, Table I.).—The tendency has here been in the direction of reduction of *Agrostis*. Only on one occasion has super. produced an increase.

The Influence on Agrostis of Superphosphate when added to both Nitrate of Soda and Kainit (compare Plots 7 and 9, Table I.).—With the exception of Eskdale, the super., when used as above, has effected a marked reduction in the amount of *Agrostis*.

The influence on Agrostis of a double and triple dose of Superphosphate (compare Plots 2, 3, and 4, Table II.).—At each of the three stations, where *Agrostis* was fairly abundant, the double dressing of super. invariably diminished the percentage yield of this grass, while the triple dressing had a similar effect in two cases out of three.

Summary of the results on Agrostis obtained with Superphosphate.—Ten times in sixteen the super. has either diminished, or at least failed to increase, the percentage of *Agrostis*, and the tendency, where increasing quantities of this manure have been used, has been strongly in the direction of suppressing the growth of this plant.

The influence on Agrostis of Superphosphate in comparison with Basic Slag.—This was tested twice at each of the stations of Set 1, and once at each of the stations of Set 2. In every case the comparison was between equal amounts of phosphoric acid.

When the comparison was between the two forms of phosphate, unaccompanied by any other manure (Plots 3 and 4, Table I.), the super. invariably produced the larger amount of *Agrostis*. When the comparison was between the two forms of phosphate in the presence of nitrate of soda and kainit (Plots 9 and 10, Table I.; and 7 and 9, Table II.) a similar result was obtained at three of the four stations of Set 1, and at all the stations of Set 2. As the result, therefore, of eleven tests, super. was found to surpass basic slag in its stimulating influence on *Agrostis* no less than ten times. As in the great majority of cases the aggregate yield by super was larger than that produced by slag, *Agrostis* is even more encouraged by the former than the percentage figures would indicate.

In further proof of this influence of superphosphate we may compare Plots 10 and 11, Table I. The former plot received all its phosphate as slag, while the latter received half from slag and half from super. The introduction of super. has, without an exception, increased the percentage of *Agrostis*.

The influence on Agrostis of Kainit when used alone (Plots 1 and 5, Table I.).—At three of the four stations kainit reduced the percentage of *Agrostis*, the exception being found on the peaty soil of Glasston.

The influence on Agrostis of Kainit when added to Nitrate of Soda (Plots 2 and 7, Table I.). A precisely similar result was got in this case, the only exception being again at Glasston.

The influence on Agrostis of Kainit when added to Superphosphate (Plots 3 and 8, Table I.).—In this case there is no exception to the repressing action of kainit on *Agrostis*.

The influence on Agrostis of Kainit when added to both Nitrate of Soda and Superphosphate (Plots 6 and 9, Table I.).—Here also kainit has never failed to reduce the percentage of *Agrostis*.

The influence on Agrostis of a double and triple dose of Kainit.—Plots 2, 5, and 6, Table II.). On the whole there is but little difference in the percentage of *Agrostis* produced by varying amounts of kainit.

Summary of the Results on Agrostis obtained with Kainit.—

Of the sixteen separate tests carried out on the four stations of Set 1, fourteen showed that kainit has a repressing influence on the growth of *Agrostis*. The two exceptions were met with on the peat of Glasson, the one occurring where kainit was used alone, and the other where it was added to nitrate of soda—both irrational methods of application. Used, as it should be, along with phosphate—either with or without nitrogen—there is no exception to the tendency of kainit to reduce the percentage of *Agrostis*.

The influence on Agrostis of Lime.—At each of the stations of Set 2 two plots (Nos. 15 and 16)* received precisely similar amounts of a mixture of artificials, the only difference in the treatment of these plots consisting in the application of 5 cwt. per acre of pulverised lime to Plot 16 for each of the crops of 1895, 1897, 1898. The influence of the lime was very slight, so far as the aggregate yield of hay is concerned, but its effect on *Agrostis* was striking and conclusive, for in no case did it fail to reduce both the percentage and weight of this plant.

COCKSFOOT (TABLES III. AND IV.).

This grass was fairly abundant at five of the eight stations,

Table III.—Effects of Manures on Cocksfoot (Set 1).

Plots.	Manures per acre.					Blensow.			Castle Carrock.			Eskdale.		
	Nitrate of Soda.	Sulph. of Ammon.	Super.	Slag.	Kainit.	Yield of Hay.	Yield of Cocksfoot.		Yield of Hay.	Yield of Cocksfoot.		Yield of Hay.	Yield of Cocksfoot.	
	lbs.	lbs.	lbs.	lbs.	lbs.	cwt.	%	lbs.	cwt.	%	lbs.	cwt.	%	lbs.
1	—	—	—	—	—	23½	3'0	102	22	15'6	38½	27	10'2	368
2	112	—	—	—	—	28½	2'4	76	28½	6'6	212	33	13'4	495
3	—	—	280	—	—	35½	6'9	35	22	5'2	128	26½	11'2	339
4	—	—	—	208	—	33½	5'2	190	21½	7'5	182	21½	8'2	197
5	—	—	—	—	280	32½	3'7	138	22	10'3	253	44½	15'5	420
6	112	—	280	—	—	33½	7'2	268	23	5'1	131	31½	9'2	327
7	112	—	—	—	280	28½	1'1	35	25½	6'7	191	37½	14'7	621
8	—	—	280	—	280	25½	1'3	42	25½	4'2	118	37	13'2	547
9	112	—	280	—	280	29½	6'0	196	26½	7'0	207	38½	6'2	267
10	112	—	—	208	280	29	14'2	461	25½	8'6	248	38	8'6	366
11	112	—	140	104	280	29½	11'7	383	27½	3'6	110	35	11'7	458
12	—	86	—	208	280	24½	11'8	327	30½	7'8	265	30½	10'9	369

* To save space details are not shown here.

the exceptions being Glasson, Brampton, and Kirkbampton, where it was either very scarce or altogether absent. Table III, which deals with the behaviour of cocksfoot at the stations constituting Set 1, therefore, contains details of three places, while Table IV. shows the figures for two stations only—namely, Gosforth and Wigton.

The Influence on Cocksfoot of Nitrate of Soda.—While the relationship of cocksfoot and subsequent plants to this and other manures might be examined in as much detail as in the case of *Agrostis*, it will probably be sufficient if the results are stated somewhat more generally.

Neither alone nor in combination has nitrate of soda had any very conspicuous influence on this plant.

At the two stations of Set 2, referred to in Table IV., nitrate of soda, where used in varying quantities, has to a slight extent increased the percentage of cocksfoot (compare Plots 2, 7, 8).

The Influence on Cocksfoot of Nitrate of Soda as compared with Sulphate of Ammonia (Plots 10 and 12, Table III).—The results obtained here show that nitrate of soda has produced the larger percentage of cocksfoot twice out of three times. This is in conformity with general experience, the result being due to the fact that nitrate of soda sinks more quickly and deeply into the soil than sulphate of ammonia, and is thus brought more thoroughly into contact with the roots of deep-rooted plants, such as cocksfoot.

The Influence on Cocksfoot of Superphosphate.—When used alone, or when added to kainit, super. never failed to diminish the percentage of cocksfoot. Under other circumstances the action of this manure is not so pronounced, but, on the aggregate of twelve tests at the three stations of Set 1, super. has reduced the percentage of cocksfoot nine times.

Varying amounts of superphosphate (Plots 2, 3, 4, Table IV.) have not had much effect on the relative abundance of cocksfoot.

The Influence on Cocksfoot of Superphosphate in Comparison with Basic Slag.—At the five stations concerned a given amount of phosphoric acid has seven times out of eight produced a greater percentage and weight of cocksfoot when in

the form of slag than when applied as super. At the two stations where varying amounts of slag were tried, the percentage of cocksfoot was lower with a large than with a small amount of slag.

Table IV.—Effects of Manures on Cocksfoot (Set 2).

Plots.	Manures per Acre.				Gosforth.			Wigton.		
	Nitrate of Soda.	Super.	Slag.	Kainit.	Yield of Hay.	Yield of Cocksfoot.		Yield of Hay.	Yield of Cocksfoot.	
	lbs.	lbs.	lbs.	lbs.	cwt.	%	lbs.	cwt.	%	lbs.
1	—	—	—	—	27½	14.7	452	26½	4.8	242
2	112	392	—	392	25	17.5	476	27	6.6	199
3	112	196	—	392	21	16.5	388	24	14.0	375
4	112	588	—	392	23½	17.6	468	29½	9.3	304
5	112	392	—	196	23	9.5	218	30½	14.5	195
6	112	392	—	588	23½	15.4	401	33½	13.1	487
7	56	392	—	392	23½	17.6	463	20	6.6	214
8	168	392	—	392	24½	22.6	626	31½	7.9	278
9	56	—	320	392	23½	18.8	489	34	16.1	613
10	56	—	480	392	21½	12.2	297	38½	12.2	522

The Influence on Cocksfoot of Kainit and Lime.—Apparently neither of these two manures has had any particular effect on this plant.

CRESTED DOGSTAIL (TABLES V. AND VI.).

This plant was generally present in moderate quantity at the four stations of Set 1, and at three of the stations of Set 2.

The Influence on Crested Dogstail of Nitrate of Soda.—The action of this manure on crested dogstail is very peculiar and yet perfectly consistent. In every case where nitrate of soda is used alone, or as an addition to kainit, it has reduced the percentage of this grass; while, equally invariably, it has increased the percentage of crested dogstail when used (a) with superphosphate or (b) with both super. and kainit. This result is the converse of the action of nitrate of soda on *Agrostis* (see page 151), and doubtless admits of explanation. For the present, however, it need only be said that the two cases furnish instances of a poor plant (*Agrostis*) being repressed and a good plant (crested dogstail) being encouraged by the judicious use of nitrate of soda, whereas the opposite is the case when the same manure is applied in an irrational manner.

Table V.—Effects of Manures on Crested Dogstail (Set 1).

Plots.	Manures per acre.					Blencow.		Castle Carrock.		Eskdale.		Glasgow.	
	Nitrate of Soda.	Sulph. of Amm.	Super.	Slag.	Kainit.	Yield of Hay.	Yield of Dogstail.	Yield of Hay.	Yield of Dogstail.	Yield of Hay.	Yield of Dogstail.	Yield of Hay.	Yield of Dogstail.
	lbs.	lbs.	lbs.	lbs.	lbs.	cwt.	%	cwt.	%	cwt.	%	cwt.	%
1	—	—	—	—	—	23½	4.1	107	22	5.8	142	11	0.2
2	112	—	—	—	—	28½	2.4	76	28½	4.1	132	33	2.7
3	—	—	280	—	—	35½	3.2	126	22	7.4	182	26½	5.8
4	—	—	—	208	—	34½	3.3	132	21½	10.0	265	21½	4.1
5	—	—	—	—	280	32½	3.1	113	22	7.5	184	24½	2.8
6	112	—	280	—	—	33½	1.8	67	23	7.2	185	21½	5.1
7	112	—	—	—	280	28½	4.7	150	25½	7.7	219	32½	6.3
8	—	—	280	—	—	280	2.5	7.4	21½	3.7	104	37	3.8
9	112	—	280	—	280	29½	10.1	359	26½	3.9	115	28½	4.0
10	112	—	—	208	280	29	7.2	233	25½	6.2	178	38	3.1
11	112	—	140	104	280	29½	5.5	180	27½	7.9	243	35	5.5
12	—	86	—	208	280	27½	11.2	310	30½	7.4	252	30½	2.5

The influence on Crested Dogstail of Nitrate of Soda, as compared with Sulphate of Ammonia (Plots 10 and 12, Table V.).—With only one exception (Eskdale) the latter manure has produced a larger percentage of crested dogstail, a result that is doubtless associated with the shallow-rooted character of the plant.

Table VI.—Effects of Manures on Crested Dogstail (Set 2).

Plots.	Manures per Acre.				Brampton.		Gosforth.		Kirkbampton.	
	Nitrate of Soda.	Super.	Slag.	Kainit.	Yield of Hay.	Yield of Dogstail.	Yield of Hay.	Yield of Dogstail.	Yield of Hay.	Yield of Dogstail.
	lbs.	lbs.	lbs.	lbs.	cwt.	%	cwt.	%	cwt.	%
1	—	—	—	—	27½	6.4	27½	12.8	29	2.9
2	112	392	—	392	25	1.3	25	8.6	29½	2.9
3	112	196	—	392	21½	2.4	21	10.1	31½	5.0
4	112	588	—	392	20½	1.8	23½	11.4	27½	4.0
5	112	392	—	196	22½	2.1	23	14.0	26½	2.3
6	112	392	—	588	25½	1.9	23½	14.0	30	2.0
7	56	392	—	392	30½	1.3	23½	15.6	30½	3.8
8	168	392	—	392	29½	6.0	24½	11.1	34	2.2
9	56	—	320	392	29½	5.3	23½	10.2	35½	3.0
10	56	—	480	392	29½	3.0	21½	23.8	33½	3.7

The influence on Crested Dogtail of Superphosphate, Kainit, and Lime.—On the whole, the tendency of each of these manures has been in the direction of increasing crested dogtail, though it cannot be said that the influence has been very marked. Varying quantities of super. and kainit made but little difference to the percentage of this plant, and the same is true with regard to basic slag, which, in respect to its general influence, did not differ much from super.

YORKSHIRE FOG (TABLES VII. AND VIII.).

This is a grass which is generally considered of inferior quality, though, at the same time, it is often abundant in high-class meadows and pastures. It often accompanies improvement of grass land, though it is probably an indication rather

Table VII.—Effects of Manures on Yorkshire Fog (Set 1).

Plots.	Manures per acre.					Blencow.			Castle Carrock.			Eskdale.			Glasson.		
	Nitrate of Soda.	Sul. of Ammonia.	Super.	Slag.	Kainit.	Yield of Hay.	Yield of Y. Fog.	lbs.	Yield of Hay.	Yield of Y. Fog.	lbs.	Yield of Hay.	Yield of Y. Fog.	lbs.	Yield of Hay.	Yield of Y. Fog.	lbs.
	lbs.	lbs.	lbs.	lbs.	lbs.	cwt.	%	lbs.	cwt.	%	lbs.	cwt.	%	lbs.	cwt.	%	lbs.
1	—	—	—	—	—	23½	6.0	157	22	13.8	340	27	6.9	208	11	1.9	23
2	112	—	—	—	—	28½	8.2	261	28½	18.2	586	33	7.7	284	11½	3.8	47
3	—	—	280	—	—	35½	6.9	272	27	12.7	312	26½	8.7	230	22	4.9	120
4	—	—	—	208	—	33½	3.1	117	23½	25.7	382	21½	7.2	173	16½	7.4	138
5	—	—	—	—	280	32½	7.2	264	22	12.7	312	24½	4.3	116	17½	5.1	101
6	112	—	280	—	—	32½	8.5	326	23	12.9	332	21½	14.5	315	21	11.0	299
7	112	—	—	—	280	28½	10.0	305	25½	14.1	345	37½	10.8	342	18½	9.3	69
8	—	—	280	—	280	25½	10.8	308	25½	5.8	164	37	0.8	4.6	20	9.0	215
9	112	—	280	—	280	20½	11.5	326	26½	13.0	365	38½	24.0	1034	20½	11.7	265
10	112	—	—	208	280	29	18.4	397	25½	13.5	389	38	14.2	604	24½	6.7	185
11	112	—	140	104	280	29½	19.1	625	27½	13.7	422	35	9.1	356	23½	6.6	173
12	—	86	—	208	280	22½	25.4	704	30½	10.9	440	30½	11.9	493	19½	12.7	273

than the cause of such improvement. It was present in considerable quantity on all the stations under review.

The Influence on Yorkshire Fog of Nitrate of Soda.—Those who have observed how well Yorkshire fog flourishes on old manure heaps, and other situations where nitrogen is

abundant, will not be surprised to learn that nitrate of soda, with two unimportant exceptions, has increased the percentage and yield of this plant. In many cases its yield has been more than doubled by 1 cwt. per acre per annum of this manure. Although this is the case, it has not been found that an increase in the amount of nitrate of soda, from ½ cwt. to 1 and 1½ cwt. per acre, has been accompanied by any increase in the percentage of Yorkshire Fog. No doubt this is due to the fact that, being a plant of only moderate size, its development is much interfered with by the accompanying herbage which large dressings of nitrate of soda force to luxuriant growth.

No consistent difference could be traced in the relative effect on Yorkshire fog of nitrate of soda and sulphate of ammonia.

Table VIII.—Effects of Manures on Yorkshire Fog (Set 2).

Plots.	Manures per Acre.					Brampton.			Gosforth.			Kirkhampton.			Wigton.		
	Nitrate of Soda.	Super.	Slag.	Kainit.	Yield of Hay.	Yield of Y. Fog.	cwt.	%	lbs.	cwt.	%	lbs.	cwt.	%	lbs.	cwt.	%
	lbs.	lbs.	lbs.	lbs.	cwt.	%	lbs.	cwt.	%	lbs.	cwt.	%	lbs.	cwt.	%	lbs.	cwt.
1	—	—	—	—	27½	14.5	442	27½	9.0	277	29	13.4	435	26½	11.3	335	
2	112	392	—	392	25	13.4	375	25	13.3	372	29½	18.4	613	27	18.4	556	
3	112	196	—	392	27½	11.5	280	27	16.3	383	31½	13.2	469	24	9.7	260	
4	112	583	—	392	20½	17.5	406	23½	10.6	281	27½	7.6	236	20½	23.6	773	
5	112	392	—	106	29½	10.7	425	23	13.2	337	26½	8.7	255	30½	8.1	276	
6	112	392	—	583	25½	19.3	515	23½	12.1	315	30	13.3	446	33½	14.5	530	
7	56	392	—	392	30½	18.0	609	23½	10.4	275	30½	21.0	725	29	24.5	705	
8	168	392	—	392	29½	14.0	493	24½	11.0	321	34	15.0	600	34½	20.0	705	
9	56	—	100	392	20½	12.7	410	23½	12.0	406	35½	10.4	410	34	21.7	806	
10	56	—	480	392	20½	15.4	513	27½	10.4	253	33½	8.1	301	38½	21.9	938	

The Influence on Yorkshire Fog of Superphosphate.—In the four tests conducted at each of three stations—Blencow, Eskdale, Glasson—there is no exception to the result that the percentage of Yorkshire fog is increased by the use of superphosphate, whether alone or in combination with other manures. At Castle Carrock, on the other hand, the opposite is the case three times in four. Evidently, therefore,

local conditions have much to do with determining the effects of the influence of super. on Yorkshire fog, and, in any case, it is more than likely that phosphatic manure encourages this species only indirectly, through the nitrogen which is stored up in the soil by the leguminous vegetation that usually follows the application of such a manure.

At two of the four stations of Set 2 an increase in the percentage of Yorkshire fog kept pace with an increase in the dressing of super. At the other two stations this result is not observable.

There is no consistent difference in the influence of super. and slag on this plant.

The Influence on Yorkshire Fog of Kainit.—At Blencow kainit has always increased the percentage of Yorkshire fog, while at Castle Carrock the reverse has almost as invariably happened. At the other two stations of Set 1 no consistent influence in this respect can be traced, though the tendency is towards an increase. The same is true where varying amounts of kainit were used at the four stations of Set 2, in three cases a considerably larger amount of Yorkshire Fog being produced by the largest than by the smallest dose of kainit.

The Influence on Yorkshire Fog of Lime.—Three times in four lime reduced the percentage of this plant.

LEGUMINOSÆ (TABLES IX. AND X.).

The members of this family of plants that were chiefly met with were White and Red Clover, Birds' Foot Trefoil, Meadow Vetchling, *Vicia sepium*, and *V. cracca*. All were separately determined, but here they may be regarded collectively.

The influence on Leguminosæ of Nitrate of Soda.—Eleven times in sixteen tests (Set 1) these plants were reduced in amount by the use of nitrate, the diminution in quantity being often very large. Where this manure was increased from a half to one and a half cwt. per acre (Plots 7 and 8, Table X.) the Leguminosæ were invariably reduced, sometimes almost to the point of total disappearance. With but

one exception a larger percentage of Leguminosæ was got under the influence of nitrate of soda than where sulphate of ammonia was used (Plots 10 and 12, Table IX.). This result was also obtained at Rothamsted, and has been observed elsewhere.

Table IX.—Effects of Manures on Leguminosæ (Set 1).

Plots.	Manures per Acre.					Blencow.		Castle Carrock.		Eskdale.		Glasson.	
	Nitrate of Soda.	Sul. of Am.	Super.	Slag.	Kainit.	Yield of Hay.	Yield of Legu. minosæ.	Yield of Hay.	Yield of Legu. minosæ.	Yield of Hay.	Yield of Legu. minosæ.	Yield of Hay.	Yield of Legu. minosæ.
	lbs.	lbs.	lbs.	lbs.	lbs.	cwt.	lbs.	cwt.	lbs.	cwt.	lbs.	cwt.	lbs.
1	—	—	—	—	—	23½	2'3	60	22	5'1	125	27	7'6
2	112	—	—	—	—	28½	1'5	47	28½	2'0	64	31	5'3
3	—	—	280	—	—	351	5'2	205	22	1'4	34	26½	9'0
4	—	—	—	208	—	138	5'2	166	21½	2'3	56	21½	4'6
5	—	—	—	—	280	32½	3'1	113	22	5'2	128	24½	20'4
6	112	—	240	—	—	33½	—	—	23	1'8	46	31½	1'9
7	112	—	—	—	280	28½	8'2	261	25½	5'3	151	37½	13'6
8	—	—	280	—	280	25½	8'3	237	25½	18'4	520	37	16'2
9	112	—	280	—	280	29½	8'4	275	26½	14'3	424	59½	9'9
10	112	—	—	208	280	29	8'4	272	25½	17'8	513	38	13'9
11	112	—	140	104	280	29½	3'1	101	27½	13'4	412	35	8'5
12	—	86	—	208	280	24½	1'5	41	30½	9'2	314	30½	17'2

The influence on Leguminosæ of Superphosphate.—At Blencow and Glasson this family of plants has been increased at each station three times in four tests, but at the other two stations the tendency has been rather in the opposite direction. This illustrates the well-known fact that phosphatic manures sometimes fail absolutely to encourage the increased growth of clovers and similar plants. Where, in the second set of stations, super. is increased from 196 lbs. (Plot 3) to 392 lbs. (Plot 2) and finally to 588 lbs. (Plot 4) there is in no case any perceptible increase in the Leguminosæ; in fact, with but one exception (Kirkbampton), a higher percentage of these plants is got with the smallest than with the largest dose of super.

So far as the relative effects of super and slag on Leguminosæ are concerned, little if any difference is observable.

Slag always equalled or excelled super. where applied along with nitrate of soda and kainit to the stations of Set 1, but this result is not borne out in the second set of stations. Probably the popular idea that it is largely a question of soil is the right one.

Table X.—Effects of Manures on Leguminosæ (Set 2).

Plots.	Manures per Acre.				Brampton.		Gosforth.		Kirkhampton.		Wigton.	
					Yield of Hay.	Yield of Legu- minosæ.	Yield of Hay.	Yield of Legu- minosæ.	Yield of Hay.	Yield of Legu- minosæ.	Yield of Hay.	Yield of Legu- minosæ.
	Nitrate of Soda.	Super.	Slag.	Kainit.	cwt.	%	cwt.	%	cwt.	%	cwt.	%
1	—	—	—	—	27½	9.9	302	27½	9.4	73	29	6.6
2	112	392	—	392	25	0.0	108	25	5.2	145	29½	1.6
3	112	106	—	392	21½	8.4	204	21	3.0	70	31½	2.5
4	112	588	—	392	20½	7.7	178	23½	4.5	119	27½	0.0
5	112	392	—	392	22½	9.0	229	24	3.0	77	26½	1.4
6	112	392	—	588	25½	0.3	263	23½	4.0	104	32	3.4
7	56	392	—	392	30½	3.5	118	23½	2.4	63	30½	4.5
8	168	392	—	392	29½	2.8	93	24½	1.6	44	34	0.9
9	56	—	320	392	29½	6.4	211	23½	1.9	40	35½	1.0
10	56	—	480	392	29½	6.8	226	21½	1.5	36	33½	1.4

The influence on Leguminosæ of Kainit.—One of the most conspicuous results of the Rothamsted investigations is the demonstration of the dependence of the Leguminosæ on a plentiful supply of available potash. This result has been amply confirmed in the experiments under discussion. With a single exception—that is to say, fifteen times in sixteen—the Leguminosæ are much more abundant where kainit is applied than where it is withheld. The one exception, too, can be easily explained, being due to the fact that at Glasson Plot 3 contained an altogether abnormal amount of *V. cracca*, so that the kainit plot with which it compares—No. 8—shows a slight falling off in total Leguminosæ. Averaging the four plots that got no kainit at each of the four stations of Set 1—that is 16 plots in all—with the 16 corresponding plots that received annually 2½ cwt. of kainit per acre in 1896-

1899, and 3½ cwt. of kainit in 1895, we have the following results:—

	Average yield of Hay, 1899.	Average percentage of Leguminosæ, 1899.	Average weight per acre of Leguminosæ, 1899.
Average of Plots 1, 2, 3, 6, without Kainit.	cwt. 25	6.2	lbs. 174
Average of Plots 5, 7, 8, 9, with Kainit.	26½	13.4	401

It will be seen that although the kainit has added only 1¼ cwt. of hay to the general yield, it has more than doubled the percentage and yield of Leguminosæ, and has doubtless greatly improved the quality of the produce.

On examining the effects on the Leguminosæ of increasing doses of kainit (Table X.) it will be seen that the largest dose has at each station produced the highest percentage of these plants, the average for the four stations being—

196 lbs. kainit gave 3.7% Leguminosæ— 93 lbs per acre.
392 " " " 4.2% " = 121 " " "
538 " " " 4.7% " = 140 " " "

The increase in the percentage and weight of Leguminosæ is perhaps less than might have been expected, which would indicate that a dose of about 2 cwt. of kainit is as much as is usually necessary for annual application to old-land hay.

The influence on Leguminosæ of Lime.—The experiments have furnished no evidence to justify any definite conclusion in regard to this matter.

RIBWORT (TABLES XI. AND XII.).

As each of the eight stations showed a considerable, generally a large, amount of ribwort (*Plantago lanceolata*), it would appear desirable to examine the behaviour of manures towards this plant, which belongs to neither of the families we have already looked at—the Gramineæ and Leguminosæ. Ribwort is characterised by the possession of a well-developed tap-root, so that we should expect that it would be fairly independent of supplies of superficial nourishment.

The influence on Ribwort of Nitrate of Soda.—Twelve times

in sixteen at the stations of Set 1 the percentage of this plant has been reduced by nitrate of soda, and in many cases the reduction is very striking. This result is probably largely due to the fact that when the general herbage is forced by nitrate of soda, ribwort, being rather a small plant, is partly crowded out.

Table XI.—Effects of Manures on Ribwort (Set 1).

Plots.	Manures per acre.					Blencow.		Castle Cartock.		Eskdale.		Glasson.	
	Nitrate of Soda.	Sul. of Amm.	Super.	Slag.	Kainit.	Yield of Hay.	Yield of Ribwort.	Yield of Hay.	Yield of Ribwort.	Yield of Hay.	Yield of Ribwort.	Yield of Hay.	Yield of Ribwort.
	lbs.	lbs.	lbs.	lbs.	lbs.	cwt.	%	cwt.	%	cwt.	%	cwt.	%
1	—	—	—	—	—	23½	1.4	36	22	12.2	300	27	19.7
2	112	—	—	—	—	28½	0.8	25	28½	11.2	357	33	23.3
3	—	—	200	—	—	35½	0.1	3	22	25.2	620	26½	11.8
4	—	—	—	208	—	33½	1.3	40	21½	22.5	548	21½	11.4
5	—	—	—	—	280	32½	0.4	14	22	25.9	633	24½	10.6
6	112	—	200	—	—	33½	—	—	23	21.4	551	31½	11.4
7	112	—	—	—	280	28½	—	—	25½	14.3	408	37½	9.7
8	—	—	280	—	280	25½	0.2	5	25½	17.5	494	37	11.8
9	112	—	200	—	280	29½	0.1	3	26½	26.7	702	38½	10.0
10	112	—	—	—	208	29	0.1	3	25½	11.7	337	38	8.6
11	112	—	140	104	280	20½	0.2	6	27½	19.3	594	35	10.3
12	—	80	—	208	280	24½	0.1	2	30½	16.0	546	30½	9.0

Ribwort holds its own fairly well under the influence of increasing doses of nitrate; it is only when a triple dressing is used (Plot 8, Table XII.) that the percentage of this plant shows a tendency to decline. In respect of this, however, it may be noted that ribwort has a much greater tendency to disappear before the influence of increasing doses of nitrate at Glasson than at any of the other stations.

Sulphate of ammonia has not had such a repressing influence on this plant as nitrate of soda.

Influence on Ribwort of Super and Kainit.—At Blencow both have almost consistently reduced the percentage of this plant, but at other places no definite tendency in any direction can be traced.

With the single exception of Kirkbampton ribwort has

consistently declined in quantity before increasing dressings of super. Varying quantities of kainit, have, on the other hand, had no special influence.

Table XII.—Effects of Manures on Ribwort (Set 2).

Plots.	Manures per Acre.					Brampton.		Gosforth.		Kirkbampton.		Wigton.	
	Nitrate of Soda.	Super.	Slag.	Kainit.		Yield of Hay.	Yield of Ribwort.	Yield of Hay.	Yield of Ribwort.	Yield of Hay.	Yield of Ribwort.	Yield of Hay.	Yield of Ribwort.
	lbs.	lbs.	lbs.	lbs.		cwt.	%	lbs.	cwt.	%	lbs.	cwt.	%
1	—	—	—	—	—	27½	13.6	395	27½	9.5	292	29	27.2
2	112	392	—	392	—	25	21.5	602	25	4.4	123	29½	12.7
3	112	190	—	392	—	21½	24.2	580	21	4.6	108	31½	13.8
4	112	582	—	392	—	20½	13.6	316	23½	3.2	85	27½	25.0
5	112	392	—	190	—	22½	10.0	254	23	6.9	177	26½	24.0
6	112	392	—	582	—	25½	8.5	240	23½	6.8	177	30	10.2
7	56	392	—	392	—	30½	11.2	379	23½	3.6	94	30½	10.5
8	168	392	—	392	—	29½	10.0	533	24½	6.7	185	34	6.5
9	56	—	320	392	—	29½	18.2	601	23½	5.8	151	35½	19.4
10	56	—	480	392	—	29½	14.4	479	23½	5.8	145	34½	22.3

In their effects on this plant no definite distinction can be drawn between super. and basic slag.

In every case lime has increased the percentage of ribwort, the average for the four stations of Set 2 being:

General manure, without lime, 11.5 per cent. Ribwort = 393 lbs. per acre.
 " " with lime, 16.6 " " = 518 " "

GENERAL CONCLUSIONS.

Nitrate of soda when used with phosphate has had a markedly repressing influence on *Agrostis*. Under these circumstances it has increased the yield of crested dogtail, though when phosphate was omitted from the dressing it has diminished the relative yield of this plant. It has greatly added to the yield of Yorkshire fog, while it has been the means of curtailing the development of *Leguminosæ* and ribwort. Used alone, or only with kainit, it has tended to encourage the production of an inferior type of herbage.

Sulphate of ammonia, as compared with nitrate of soda, has

produced more *Agrostis*, crested dogtail, and ribwort, while the reverse is the case in respect of cocksfoot and Leguminosæ.

Superphosphate has generally reduced the percentage of *Agrostis* and cocksfoot, while it has failed to have any general influence on the other plants.

Superphosphate, as compared with basic slag, produced much more *Agrostis* and less cocksfoot, while there is no consistent difference in their action on the other plants.

Kainit has exhibited a powerful influence on certain plants. It has markedly increased the yield of Leguminosæ, and almost as markedly repressed the growth of *Agrostis*. On the other plants, however, its action has not been conspicuous.

Lime had but little influence on the general yield, but it has considerably affected the growth of certain plants. It has consistently increased the yield of ribwort, and has markedly reduced the percentage of *Agrostis* and Yorkshire fog. It has not, however, had much influence on the growth of cocksfoot, crested dogtail, or Leguminosæ.

WM. SOMERVILLE.

THE SMALL ERMINE MOTHS (*Hyponomeuta*).



H. padella L.

Moth, twice natural size; larvæ and web about natural size.

The genus *Hyponomeuta* contains a number of species, most of which so closely resemble each other in appearance and in mode of life as to be difficult to distinguish. They are all small moths (*Microlepidoptera*), measuring $\frac{3}{4}$ to 1 inch from tip to tip of the wings. The general colour of the fore wings is white or grey, sparsely traversed on the upper surface by irregular rows of small black spots, hence the name "Ermine Moths." The thorax, or portion of the body from which the wings spring, is usually also supplied with similar marks. The hind wings are provided with a long fringe, and they, as well as the lower surface of the fore wings, are brownish. The caterpillar is about three-quarters of an inch in length, of a greyish or yellowish colour, plentifully supplied with

black or dark brown spots, and possesses sixteen feet. It tapers markedly both before and behind. When disturbed it lowers itself to the ground by a silken thread, as shown in the Figure.

The commonest species are:—

H. padella L. (*H. variabilis* Zell.), with a wing stretch of about $\frac{1}{2}$ inch. The upper surface of the fore wings is bluish or greyish white, traversed longitudinally by three irregular rows of black spots (about 30 in all), the hind wings being greyish brown. The caterpillar has a dark head, and a body covered by wart-like tubercles from which hairs spring. This species is met with on the plum, apple, hawthorn, sloe, mountain ash, etc.

H. evonymella L. (*H. padi* Zell.) measures nearly an inch across the wings. The upper surface of the fore wings is lustrous-white in colour, and shows five rows of black spots (over 40 in all). In appearance the caterpillar closely resembles the former. This species generally feeds on bird cherry, and is the species most usually met with in the North of England.

The "Small Ermine" that frequents apple trees is generally regarded as a distinct species (*H. malinella* Zell.), but, in any case, it so closely resembles *H. padella* as to be practically indistinguishable.

Life-History.

The Ermine Moths that damage British trees have all a similar life-history. From about the middle of July till the middle of August, for the most part, they are on the wing, at which time they lay their eggs in clusters on the buds and shoots of the trees already indicated. In the course of the autumn, or in the following spring, the eggs hatch and produce caterpillars, which in the month of May spin a veil-like web, under which they live gregariously in detached colonies. At this time the caterpillars feed voraciously, so that destruction of the foliage of the food-plant proceeds rapidly. As the creatures increase in size and find it necessary to secure more food, they spread their webs over a larger and larger portion of the tree or bush on which they

live, until, in many cases, but little of the plant may remain uncovered.

When full grown the caterpillar spins for itself a tough greyish cocoon about the size and shape of a large grain of oats, and in this protective covering it pupates. This change takes place for the most part in July, the chrysalid-cocoons being situated within the common web. A fortnight later the appearance of the moth completes the life-history.

Preventive and Remedial Measures.

If the colonies of caterpillars are within easy reach, they may be destroyed by crushing by hand, the use of a glove making the process less disagreeable. If the webs are too high to be treated in this way, the branches that they envelop may be cut off and burned, or the "nests" may be burned in their original position, ignition being effected by a torch on the end of a pole.

If water under high pressure from a hose can be applied the colonies may be effectively destroyed.

Various solutions may be applied by means of a syringe or spraying machine. Of these one of the best is prepared by dissolving 7 lbs. of soft soap in 7 gallons of boiling water. To this, while still hot, half a gallon of paraffin or petroleum oil is added, with vigorous stirring, the whole being diluted with soft water to 25 gallons before use. Solutions of tobacco juice and quassia are also useful.

Whatever measure is employed, it should be put in force as soon as the webs are observed. If too long delayed, the caterpillars will have spread themselves over a wider surface, and most of the damage will already have been done.

EARNINGS OF ORDINARY AGRICULTURAL LABOURERS IN GREAT BRITAIN.

A report on the wages and earnings of agricultural labourers in the United Kingdom has been issued by the Board of Trade. The report, which has been drawn up by Mr. Wilson Fox, of the Labour Department, is based, so far as concerns the year 1898, with which it mainly deals, upon returns furnished by the Chairmen of Rural District Councils in England and Wales, and by the Local Government Board Inspectors in Ireland, supplemented by statements supplied by 1,857 employers of agricultural labourers in England, and by nearly 1,100 employers in Scotland.

The agricultural labourers in England may be divided broadly into two classes—those who are engaged in the charge of animals, and those who are not (i.e., ordinary labourers). The latter class forms in most English counties the great majority of the total number of agricultural labourers; except in Northumberland, Cumberland, Westmorland, North Lancashire, and Durham, where, owing either to special systems of farming, to particular customs, or to the small size of farms, this is frequently not the case. In Northumberland and Durham the ploughmen or hinds, who are classed in the report as ordinary labourers, are strictly men in charge of horses, but as they constitute the greater number of the farm servants in these counties their wages are treated as those of ordinary labourers. In Cumberland, Westmorland, and North Lancashire ordinary agricultural labourers, as known in other parts of England, are in a considerable minority; in these counties the greater number of the farm servants are unmarried men who lodge and board in the farmhouses and usually undertake all kinds of work whenever needed. Diffi-

culties of classification exist also in the case of the Yorkshire labourers. In all three Ridings there is a large class of hired men, chiefly unmarried horsemen, lodging and boarding in the farmhouses, but on the small farms particular spheres of work are often not allotted, the general work of the farm being carried on by all the men. So that in the case of Yorkshire as well as Cumberland, Westmorland, and North Lancashire the wages of the married men who are paid weekly have been taken as those of ordinary labourers, although such men are frequently employed to some extent in looking after animals.

Cash wages are the principal payment in nearly all agricultural districts, and for almost every class of farm servants. For labourers engaged by the week they are the wages recognised throughout a district which would be given by the employer and accepted by the ordinary labourer in the absence of any agreement. These weekly wages are, however, nearly always supplemented by additional payments for piece-work, harvesting and haymaking, and by other allowances in money or kind, all of which must be considered in order to obtain a true idea of the real reward of agricultural labour.

The statements furnished to the Labour Department show a wide divergence in the standing cash wages (exclusive of all extra earnings, and of the value of any allowances either in cash or kind) paid to ordinary labourers in various parts of England in 1898, the predominant summer rates having varied from 11s. weekly in Suffolk and Dorset to 19s. in Lancashire; and the winter rates from 10s. in Suffolk to 19s. in Lancashire. In the Northern Counties the rates were generally higher than elsewhere, the range there having been from 15s. in the East Riding of Yorkshire to 19s. in Lancashire, both in the summer and winter. In the Midland and Eastern Counties, except Derby and Chester, where the rates approached to those of the North, the range for summer was from 11s. in Suffolk, to 15s. in Nottingham, Leicester, Rutland, Stafford, and Lincolnshire; and for winter it was from 10s. in Suffolk to 15s. in Nottingham, Leicester, and Staffordshire. Similar rates were also returned from the Southern and South-Western Counties; but there the lowest scale was 11s. paid

in the summer in Dorset, and in the winter in Berkshire, Wiltshire, and Dorset. In Middlesex both summer and winter wages were returned at 16s.

The proximity of manufacturing, mining, and other industries undoubtedly exercises a considerable influence in maintaining a higher scale of wages in the northern counties, and it appears, moreover, that the number of extra payments in the north are generally fewer than elsewhere, so that the wages are more evenly distributed throughout the year. Examples of the effect of neighbouring manufacturing and populous centres on the wages of agricultural labourers are also forthcoming from some of the Midland and Home Counties. In Norfolk, Suffolk, Rutland, and Buckingham, which are almost purely rural in character, and subjected only in a small measure to the influences of large towns and important industries, the difference between the maximum and minimum rates of wages paid does not amount to more than 1s. or 2s. per week; but in the counties such as Essex, Kent, and Surrey, which abut on the metropolis, and the northern parts of Worcester and Warwick, which are affected by the proximity of Birmingham and other manufacturing centres, the difference amounts to as much as 7s. or 8s. In Kent, in the winter of 1898, the range was from 12s. in the rural districts of Cranbrook and Tenterden, which are distant from any important manufacturing centre, to 17s. and 18s. in Bromley, Hoo, and Strood, the first being a suburb of London and the other two in close proximity to Chatham.

It has already been observed that the range in the predominant rates of cash wages in England in 1898 was in winter from 10s. in Suffolk to 19s. in Lancashire, and in summer from 11s. in Suffolk and Dorset to 19s. in Lancashire. In 1892, according to the report prepared by the late Mr. W. C. Little for the Royal Commission on Labour, the range of the average weekly wages of ordinary agricultural labourers was from 10s. in Dorset and Wiltshire to 18s. in Lancashire and Cumberland.

Weekly cash wages do not, however, afford a trustworthy criterion by which the real earnings of the labourers may be

measured and compared, since it frequently happens that in districts where the weekly cash wages are comparatively low the labourer receives extra payments from piece work, harvest, and in other ways which add considerably to his wages. This important distinction between the wages and earnings of the agricultural labourer was brought out by Mr. W. C. Little in his report to the Royal Commission on Labour, in which he says:

It seems necessary at the outset of the inquiry into this subject to emphasise the distinction between *wages* and *earnings*. It will be conceded that a high rate of pay combined with irregular employment may yield smaller earnings to the worker than would be obtained by constant work at a lower rate, and that a uniform weekly payment throughout the year may be better for the labourer than payment by results (*i.e.*, by piecework).

On the other hand, a low rate of wages, regarded as a retaining fee and ensuring a man constant employment, with the opportunity, if he chooses, of adding very considerably to those wages by piecework, may place the labourer in as good a position as that of one who is apparently receiving higher wages.

The extra earnings of ordinary labourers for piece work, harvesting, and haymaking, are usually higher in amount in those arable districts where the weekly cash wages are lowest than in the grass counties and more northerly districts, where there is a higher rate of wages but fewer opportunities for extra earnings. For instance in the north, where the men are hired, piece-work is only given occasionally to casual labourers or to Irish labourers; but elsewhere, and particularly in the arable counties, piecework is frequently given for such work as hoeing, singling, and pulling roots; mowing clover or other seeds; and lifting potatoes; and where fruit and flowers are grown, a great deal of picking is done by piece-work.

Harvest earnings also represent a considerable addition to the weekly wages, especially in the chief corn-growing counties where, generally speaking, the rates of weekly cash wages are lowest. According to the returns furnished to the Labour Department, in Norfolk and Suffolk, outside the fen districts of the former county, the harvest earnings of an ordinary labourer generally amount to about £7 or £7 10s.; in addition beer is frequently given or else about three bushels of malt and three pounds of hops. So that if the harvest should be completed in four weeks the extra earnings of a

labourer whose usual wages are 12s. per week would amount to about £4 10s.

Few allowances in kind are made to ordinary agricultural labourers, though beer or cider and some food, or the value of these things, is frequently given to them during haymaking and corn harvest. In Northumberland and Durham the men are sometimes provided with free cottages and potatoes, and their coals are carted and, in some cases, given free. Northumberland farmers sometimes keep a cow for a man for about 3s. a week all the year round, but this practice is dying out as the labourers prefer to take all their wages in cash. Generally speaking where allowances form part of the earnings they may be said to consist chiefly of cottages let free or at a low rent, frequently with small gardens; rough firing or fuel carted free; milk; straw for pigs; in certain counties a daily allowance of beer or cider; and in some cases free potato grounds, though these are more frequently let to the labourer at a low rent. As regards cottages, while it is true that in the larger number of counties the ordinary agricultural labourers do not get cottages rent free, there are in every county numerous cases where they hold their cottages at low or nominal rents. The estimate of the Assistant Commissioners to the Royal Commission on Labour as to the value of a cottage and garden as an addition to wages where no rent is paid ranged from £2 12s. to £5 4s. a year, the usual sum being £4, and the information furnished to the Labour Department tends to confirm these estimates.

To obtain, therefore, an accurate idea of the earnings of the ordinary agricultural labourer in different parts of the country the extra money payments and allowances, to which reference has just been made, must be taken into account and added to the actual weekly cash wages. Returns showing the sums earned by ordinary labourers in 1898, including weekly cash wages and total earnings during the year from all sources, were obtained by the Labour Department from 887 farmers in all the counties of England except Northumberland, Durham, Cumberland, Westmorland and North Lancashire, while for the five last-named districts similar details relating to the hinds and married men, as the case may be, were obtained

from the Chairmen of Rural District Councils as well as from employers.

According to the returns furnished to the Department the average weekly rate of cash wages and the total average weekly earnings, including the value of allowances in kind, of ordinary agricultural labourers in England in 1898 were as shown below:—

County.	Average Weekly		Excess of Earnings over Cash Wages.
	Rates of Cash Wages paid throughout the Year.	Earnings(including the Value of Allowances in Kind).	
Northern Counties :			
Northumberland	s. d. 47 0*	s. d. 20 2*	s. d. 3 2
Durham	18 0*	20 9*	2 9
Cumberland and Westmorland	17 0*	18 9*	1 9
Lancashire	18 1	19 4	1 3
Yorkshire, East Riding	15 4	18 6	3 2
„ North Riding	17 0	18 8	1 8
„ West Riding	16 4	18 7	2 3
Midland and Eastern Counties :			
Derbyshire	18 2	19 11	1 9
Cheshire	16 2	18 0	1 10
Nottinghamshire	16 7	19 2	2 7
Leicestershire and Rutland	15 2	17 2	2 0
Staffordshire	13 3	17 11	2 6
Shropshire	14 1	17 5	3 4
Worcestershire	14 9	17 1	2 11
Warwickshire	14 8	16 2	1 6
Oxfordshire	12 1	14 8	2 7
Northamptonshire	14 5	16 8	2 3
Buckinghamshire	13 4	15 0	1 10
Middlesex	17 0	19 3	2 3
Hertfordshire	12 11	16 1	3 2
Bedfordshire	12 11	16 2	3 3
Huntingdonshire	12 11	15 4	2 5
Cambridgeshire	12 4	16 5	4 1
Lincolnshire	14 10	17 9	2 11
Norfolk	11 10	14 9	2 11
Suffolk	11 5	14 5	3 0
Essex	12 7	15 6	2 11

County.	Average Weekly		Excess of Earnings over Cash Wages.
	Rates of Cash Wages paid throughout the Year.	Earnings (including the Value of Allowances in Kind).	
Southern and South Western Counties :	s. d.	s. d.	s. d.
Kent - - - - -	16 4	19 10	3 6
Surrey - - - - -	15 7	19 0	5
Sussex - - - - -	14 2	17 10	3 8
Hampshire - - - - -	12 8	16 7	3 11
Berkshire - - - - -	13 1	15 7	2 0
Wiltshire - - - - -	11 9	15 0	3 3
Dorsetshire - - - - -	11 8	14 9	3 1
Somersetshire - - - - -	12 6	15 10	3 4
Herefordshire - - - - -	12 8	15 10	3 2
Monmouthshire - - - - -	14 7	15 8	2 1
Gloucestershire - - - - -	12 0	15 1	3 1
Devonshire - - - - -	12 11	16 4	3 3
Cornwall - - - - -	13 8	16 7	2 11

* The figures for Northumberland and Durham relate to hinds and for Cumberland and Westmorland to married labourers. The rates of cash wages given for these four counties are the predominant rates according to Returns from Chairmen of District Councils, while the figures as to earnings are estimated on the basis of information furnished by representative employers of labour. Spade hinds in Northumberland may be taken to frequently earn 3d. a week more than the amount quoted.

The figures for earnings include every payment, whether in cash or kind, made to the labourers: a money value has been attached to such allowances as were not in cash, and free cottages have been valued to the labourer at £1 a year throughout. It will be observed that the range in weekly earnings was from 14s. 5d. in Suffolk to 20s. 9d. in Durham. The highest average weekly earnings were obtained in the northern counties, where also the highest cash wages were paid. In all the counties north of the Humber and Mersey the earnings were upwards of 18s. per week, and also in Cheshire, Derby, Nottingham, Kent, Middlesex, and Surrey. The lower scale of earnings prevailed largely in the arable counties, but in some of the grazing counties of the west and south-west they were almost equally low. For example, in Norfolk, Oxford, Suffolk, and Dorset, which are almost exclusively agricultural, the earnings were lowest—14s., and under 15s. per week—and these rates were only exceeded by a shilling in the counties of Essex,

Huntingdonshire, Buckinghamshire, Berkshire, Somersetshire, Herefordshire, Gloucestershire and Wiltshire. On the whole, it will be seen that the average amounts earned are generally lower in the more rural counties than in counties in which there are manufacturing and mining districts or large populous urban centres.

A detailed comparison of the foregoing rates with the estimated earnings of agricultural labourers in 1892, as ascertained by the Assistant Commissioner to the Royal Commission on Labour, is rendered somewhat difficult by the fact that the inquiry of 1892 was confined to certain selected districts in each county, whereas the later figures collected by the Labour Department refer to entire counties. The broad results of an examination of the two sets of figures indicate, however, that except in the districts where the men are hired, a rise has taken place since 1892 in most counties in the earnings of agricultural labourers. This appears to have been generally the case in the midland and home counties, where the rural labour market is exposed to the competition of large manufacturing industries and populous urban centres, but the rates have also improved in the more rural grazing counties of the west and south-west. But the purely arable counties of East Anglia have not participated in this upward movement, and in Norfolk and Suffolk the rates in 1898 were slightly below those of 1892.

As regards Wales, where the wages of agricultural labourers are governed to a considerable extent by the proximity of mines and quarries, the Returns furnished to the Labour Department show a range in the averages of the predominant rates of winter and summer cash wages from 14s. in Cardiganshire to 18s. in Glamorganshire, while the weekly estimated earnings range from 14s. 9d. in the former county to 19s. 1d. in latter. These figures relate to the wages and earnings of married labourers finding their own food.

According to the information collected by the Labour Department, in Scotland nearly all the farm servants are engaged by the year or half year and given continuous employment and regular wages. They may be classified in five groups, viz., grieves or stewards, horsemen or

ploughmen, cattlemen, orramen or ordinary labourers, and shepherds.

Owing to the system of hiring there are few extra cash payments to Scotch farm servants, piecework being, as a rule, only undertaken by casual labourers, whose numbers are very small, and by Irish labourers. At haytime men on the regular staff sometimes get refreshments when working overtime; and in corn harvest food is often provided, or a cash payment of about 15s. to 25s. is made, the latter being more frequently given in the arable counties. On the other hand, the practice of giving part of the wages in allowances in kind is very common, especially in the case of food allowances, though the system of payment of wages in cash is growing. It is very generally the custom for unmarried men to lodge and board in the farmhouses or in bothies, when the farmer either boards them entirely or provides milk, oatmeal, and potatoes, and frequently an allowance of coal. In the Border counties and Lothians married men usually get free cottages and gardens with from 1,200 to 1,800 yards of planted potatoes, or an allowance of potatoes, as well as oatmeal, coals or coals carted free, and frequently food and drink during harvest. Milk, too, is often given and sometimes straw for pigs and manure for gardens. In other parts of Scotland the allowances to married men are of much the same character, but they vary considerably in amount; in some districts more is given in cash and less in kind, and in others more in kind and less in cash. Shepherds generally receive a considerable portion in some cases all, of their wages in kind, and many have a "pack flock" of sheep which they keep with those of their employers.

In estimating the value of the allowances to Scotch farm servants cottages have been valued by the Labour Department at £4 per annum, as was done in the case of England and Wales, and the equivalent money worth of board and lodgings in the farm houses has been taken at 8s. per week. The average weekly earnings, including all allowances, in 1898 in the counties for which complete returns for all classes of farm servants are forthcoming are shown to have ranged as follows:—Horsemen from 16s. 7d. in Ross and Cromarty, to

19s. 6d. in Edinburgh; cattlemen from 16s. in Nairn, to 19s. 5d. in Forfarshire; and orramen or ordinary labourers from 15s. 4d. in Nairn, to 19s. 4d. in Linlithgowshire. In the case of horsemen, which are the most representative class, the wages did not greatly differ in the majority of counties. Excluding Shetland, Orkney, and Caithness, where the lowest rates were paid, and the counties where the rates exceeded 19s. a week, viz., Renfrew, Ayr, Linlithgow, Lanark, Edinburgh, Stirling, and Dumbarton, the average weekly earnings in the other counties ranged from 16s. 7d. to 18s. 8d.

The returns furnished by the correspondents of the Labour Department as to the rates of weekly cash wages of ordinary agricultural labourers in England in 1899 and 1900 indicated that there had been an upward movement since 1898; there was also a tendency to an advance noticed in the rates of wages reported to the Department in 1899 and 1900 from Scotland in connection with the hiring fairs.

IMPORTS OF THE CEREAL YEAR.

The quantities and values of the principal articles of agricultural produce imported during the cereal year which has just expired are shown in the table on the following page, the figures in which have been compiled from the monthly accounts relating to trade and navigation.

It is noticeable that the total value of the various articles enumerated in this table adds up to some £9,000,000 more than in the previous year (£174,250,000 as compared with £167,600,000). This is due chiefly to higher values, especially of articles of animal produce, and it is probable that as regards quantity, the United Kingdom was not more dependent for these commodities upon foreign supplies in 1899-1900 than in 1898-99.

The receipts of live animals for food have been somewhat affected by the prohibition to import live animals from Argentina in consequence of the outbreak of foot-and-mouth disease in that Republic. Mainly as a consequence of this, the total number of cattle shows a decrease of 50,000 head, and sheep of nearly 240,000 head, as compared with the cereal year 1898-99. Fresh beef and mutton were received in increased quantity, particularly the former, of which we imported over half a million cwts. more than in 1898-99, two-fifths of the increase coming from the United States. As regards mutton, the changes are only slight. Salted beef and pork came in smaller amount, but there was a decided increase in the class of meat unenumerated. Both bacon and hams came in reduced quantities, but in both cases the value was increased, so that the country is estimated to have paid £1,000,000 more for about 400,000 cwts. less of these forms of pig-meat. In the case of bacon, Canada has sent over half-a-million cwts., or some 100,000 cwts. more than in 1898-99, but this was not sufficient to

counterbalance the decline from the United States and Denmark. The Canadian quota of hams similarly increased at the expense of the United States.

Dairy produce — butter, margarine, cheese, fresh and condensed milk, and eggs—all came in slightly larger

ARTICLES.	1ST SEPT., 1898, to 31ST AUG., 1899.		1ST SEPT., 1899, to 31ST AUG., 1900.	
	Quantities.	Values.	Quantities.	Values.
Horses - - - No.	40,781	1,096,275	52,800	1,357,989
Cattle - - - "	526,104	8,829,889	476,131	8,549,974
Sheep - - - "	662,173	1,013,294	424,368	672,310
Bacon - - - cwts.	5,839,107	10,372,018	5,671,064	11,175,740
Hams - - - "	2,036,286	4,068,825	1,849,000	4,249,482
Beef:				
Salted - - - "	213,501	273,604	178,988	240,709
Fresh - - - "	3,522,220	6,681,731	4,082,107	7,996,734
Meat unenumerated				
Salted or fresh - - "	441,225	845,748	519,928	964,053
Preserved, other- wise than by salting - - - "	614,698	1,832,843	781,006	2,312,986
Mutton, fresh - - "	3,449,213	5,346,298	3,514,310	5,860,660
Pork:				
Salted (not Hams) - - "	294,892	325,544	247,095	286,559
Fresh - - - "	671,853	1,386,939	663,900	1,421,145
Rabbits - - - "	329,244	583,325	430,885	686,275
Corn:				
Wheat - - - "	66,991,000	22,610,554	65,017,168	21,770,949
Wheat Meal and Flour - - - "	22,923,473	11,014,829	21,553,962	9,973,675
Barley - - - "	22,869,458	6,343,603	15,202,455	4,623,115
Oats - - - "	14,869,370	4,113,996	19,812,660	5,135,681
Maize - - - "	57,500,000	11,899,112	57,746,360	12,364,573
Butter - - - "	3,353,724	16,753,004	3,401,532	17,568,932
Margarine - - - "	920,754	2,472,883	956,199	2,563,757
Cheese - - - "	2,486,684	5,437,882	2,658,991	6,592,205
Milk, condensed or preserved - - - "	819,838	1,442,570	962,803	1,698,485
" and cream, fresh - - "	8,052	15,491	10,894	13,906
Eggs - - - gt. hundreds	15,667,457	4,847,115	16,698,692	5,253,166
Fruit:				
Apples - - - bushels	3,827,307	1,190,544	—	1,192,100
Pears - - - "	623,664	293,022	—	322,532
Hops - - - cwts.	225,996	1,064,820	146,534	566,292
Onions - - - bushels	6,709,074	829,918	7,106,905	859,055
Potatoes - - - cwts.	4,530,440	1,470,736	6,362,919	1,789,402
Tallow and Stearine - - - "	2,050,266	2,255,408	2,296,972	2,962,019
Wool - - - lbs.	663,572,417	22,843,553	596,212,549	23,990,590
Hides, wet and dry - - - cwts.	1,106,792	2,558,481	1,483,396	3,607,882
Lard - - - "	2,171,833	3,002,917	1,982,665	3,100,553
Poultry and Game - - - "	—	705,970	—	940,726
Vegetables (un- enumerated) - - - "	—	1,810,568	—	1,585,355

quantities; while the intrinsic values were also slightly higher, except in the case of fresh milk and cream, which was materially reduced. Of butter, Denmark sent very slightly less than in the earlier year—viz., 1,444,500 cwts. as against 1,469,000 cwts. The principal changes were, however, in the consignments from the more distant countries, the United States showing a considerable decline, and the Australasian Colonies as considerable a rise. United States, cheese came in larger quantities, and another growing contributor was Australasia, which doubled its quota. The cheese imported was valued at nearly 6s. per cwt. more than in 1898-99.

The total imports of wheat and wheat flour amounted in grain to 22,155,753 quarters as compared with 23,060,136 quarters last year. The largest proportion of wheat (in grain), viz., 31,530,000 cwts., or almost half the total, came from the United States, this representing, however, a decline of 6,578,000 cwts. from 1898-99, while the Argentine contribution has been 18,116,000 cwts., a rise of almost 11,000,000 cwts. on the year. Canada comes third on the list with 6,261,000 cwts., just over her contribution of 1898-99. Australasia sent 3,531,000 cwts., and Russia only 2,819,000 cwts., one-third of which, it may be noticed, came last August. From neither Roumania nor Chili has any wheat whatever been received during the past cereal year; and from India all but 9,000 cwts. out of a total of 1,545,000 came prior to 31st December last. Barley shows a considerable falling off, due to the comparative failure of the Russian consignments; the United States on this occasion occupying the premier position as a supplier of this grain. The imports of oats increased considerably, this augmentation coming from Russia, whence we derived over 9,500,000 cwts. as compared with less than 4,000,000 in 1898-99. Most of the maize, as is generally the case, came from the United States, though the shipments from the Argentine Republic exhibited a considerable advance over the previous year.

Among other imports, the only item calling for special mention is wool, the quantity of which fell by nearly 70,000,000 lbs., while its value increased by over £1,100,000.

WORKMEN'S COMPENSATION ACT, 1900.*

(63 & 64 Vict. c. 22.)

The Board of Agriculture desire to call attention to the provisions of the Workmen's Compensation Act, 1900, the object of which is to extend to workmen in agriculture the benefits of the Workmen's Compensation Act, 1897. The new Act comes into operation on 1st July, 1901; and if, on or after that date, any personal injury by accident, arising out of, and in the course of, employment in agriculture, is caused to a workman, his employer will be liable to pay him compensation, subject to certain provisions referred to below. But no employer is liable to pay compensation under the Act unless he habitually employs one or more workmen in agriculture.

The term "workman" includes every person who is engaged in agriculture, whether by way of manual labour or otherwise, and whether his agreement is one of service, or apprenticeship, or otherwise, and is expressed or implied is oral or in writing.

The expression "agriculture" includes horticulture, forestry, and the use of land for any purpose of husbandry, inclusive of the keeping or breeding of live stock, poultry, or bees, and the growth of fruit and vegetables. It should be observed that this definition is very wide in its terms, and that the Act, therefore, imposes a liability not only upon farmers and other persons engaged in agriculture, in the more limited and ordinary sense of that expression, but also upon many other persons, as, for instance, persons who habitually employ one or more gardeners or others in garden.

* Copies of this article in leaflet form may be obtained on application to the Secretary, Board of Agriculture, 4, Whitehall Place, S.W.

work, whether in the way of trade or business or otherwise, and whether the gardens are attached to houses or not.

Where a workman is employed by the same employer mainly in agriculture, but partly or occasionally in other work, the Act applies also to the employment of the workman in such other work.

The amount of compensation payable under the Act is regulated by the following provisions of the Act of 1897:—

(a) where death results from the injury—

(i) if the workman leaves any dependants wholly dependent upon his earnings at the time of his death, the amount is to be a sum equal to his earnings in the employment of the same employer during the three years next preceding the injury, or the sum of one hundred and fifty pounds, whichever of those sums is the larger, but not exceeding in any case three hundred pounds, provided that the amount of any weekly payments made shall be deducted from such sum, and if the period of the workman's employment by the said employer has been less than the said three years, then the amount of his earnings during the said three years shall be deemed to be 156 times his average weekly earnings during the period of his actual employment under the said employer;

(ii) if the workman does not leave any such dependants, but leaves any dependants in part dependent upon his earnings at the time of his death, the amount is to be such sum, not exceeding in any case the amount payable under the foregoing provisions, as may be agreed upon, or, in default of agreement, may be determined, on arbitration, to be reasonable and proportionate to the injury to the said dependants; and

(iii) if he leaves no dependants, the amount is to be the reasonable expenses of his medical attendance and burial, not exceeding ten pounds;

(b) where total or partial incapacity for work results from the injury, the compensation is to be a weekly payment during the incapacity after the second week not exceeding fifty per cent of his average weekly earnings during the previous twelve months, if he has been so long employed, but if not, then for any less period during which he has been in the employment of the same employer, such weekly payment not to exceed one pound.

In fixing the amount of the weekly payment, regard is to be had to the difference between the amount of the average weekly earnings of the workman before the accident and the average amount which he is able to earn after the accident, and to any payment not being wages which he may receive from the employer in respect of his injury during the period of his incapacity.

Any weekly payment may be reviewed at the request either of the employer or of the workman, and on such review may be ended, diminished or increased, subject to

the maximum above provided, and the amount of payment is, in default of agreement, to be settled by arbitration.

Where any weekly payment has been continued for, not less than six months, the liability therefor may, on the application by or on behalf of the employer, be redeemed by the payment of a lump sum, to be settled, in default of agreement, by arbitration, and such lump sum may be ordered by the arbitrator to be invested or otherwise applied as above mentioned.

An employer is not, however, liable to pay compensation in respect of any injury which does not disable the workman for a period of at least two weeks from earning full wages at the work at which he was employed.

If it is proved that the injury to a workman is attributable to the serious and wilful misconduct of that workman, any compensation claimed in respect of that injury will be disallowed.

To meet cases of sub-contracting the new Act specially provides that where an employer agrees for the execution of any work in agriculture by or under a sub-contractor, such employer shall be liable to pay compensation to any workman employed in the execution of the work, whether the workman is entitled to obtain it from the sub-contractor himself or not; but, if the workman takes advantage of this provision, the employer so made liable is entitled to be indemnified by any other person who would have been liable independently of this provision. Examples of such sub-contracting in agriculture are cases where work is done through a ganger, or where crops are cut for the occupier by a farmer with his own men and implements.

These enactments as to cases of sub-contracting do not apply where the sub-contractor's work is merely ancillary or incidental to, and is no part of, or process in, the trade or business carried on by the person who entrusts the work to the sub-contractor; and in cases in which the sub-contractor provides and uses machinery driven by mechanical power for the purpose of threshing, ploughing, or other agricultural work, he, and he alone, is liable to pay compensation to any workman employed by him on such work.

In cases where damages in respect of an injury are recoverable from some person other than his employer, the workman may, at his option, proceed either at law against that person to recover damages, or against his employer for compensation under the Workmen's Compensation Acts, but not against both; and if compensation be paid under the Acts, the employer is entitled to be indemnified by the said other person.

All questions as to compensation under the new Act are, in case of difference, to be settled by arbitration in accordance with the Workmen's Compensation Act, 1897.

In view of the liability attaching to farmers and others under the above-named Acts, the Board of Agriculture desire particularly to call attention to the fact that many of the leading insurance companies are now issuing farmers' insurance policies which provide for the payment of compensation on the basis of the Workmen's Compensation Act for all accidents occurring to workmen in the course of employment in agriculture, and cover, in addition, the existing liability of farmers in connection with accidents to their servants under the Employers' Liability Act, 1880. The premiums charged for these policies range from 3s. for every £100 of wages paid.

AGRICULTURAL RETURNS OF GREAT BRITAIN, 1900. PRELIMINARY STATEMENT for 1900, compiled from the Returns collected on the 4th June; and comparison with previous Years.

CROPS AND LIVE STOCK.		1900.	1899.	1898.
		Acres.	Acres.	Acres.
Wheat		1,845,042	2,000,981	2,102,206
Barley		1,990,265	1,982,108	1,903,666
Oats		3,026,008	2,959,755	2,917,760
Potatoes		561,361	547,682	524,591
Clover and Rotation Grasses	For Hay	2,201,781	2,214,883	2,381,551
	Not for Hay	2,557,377	2,593,068	2,529,799
TOTAL		4,759,158	4,807,951	4,911,350
Permanent Pasture	For Hay	4,573,099	4,339,085	4,536,315
	Not for Hay	12,355,910	12,291,662	12,043,077
TOTAL		16,929,009	16,630,747	16,579,392
Hops		51,303	51,843	49,735
		No.	No.	No.
Cows and Heifers in Milk or in Calf		2,620,901	2,671,200	2,587,100
Other Cattle :—2 Years and above		1,372,532	1,341,310	1,381,595
" 1 Year and under 2		1,460,808	1,388,511	1,345,844
" Under 1 Year		1,350,929	1,394,630	1,307,735
TOTAL OF CATTLE		6,805,170	6,795,650	6,622,274
Ewes kept for Breeding		10,350,326	10,460,837	10,137,932
Other Sheep :—1 Year and above		5,963,869	6,040,600	6,203,858
" Under 1 Year		10,276,031	10,737,317	10,401,404
TOTAL OF SHEEP		26,586,226	27,238,754	26,743,194
Sows kept for Breeding		1,332,591	375,911	362,206
Other Pigs		2,049,411	2,247,902	2,009,395
TOTAL OF PIGS		3,381,992	2,623,813	2,451,595

1900 COMPARED WITH 1899.

CROPS AND LIVE STOCK.		Increase.		Decrease.	
		Acres.	Per Cent.	Acres.	Per Cent.
Wheat		8,157	0.4	53,939	2.9
Barley		66,333	3.3	..	..
Oats		13,079	0.5	..	..
Potatoes		..	..	14,102	0.6
Clover and Rotation Grasses	For Hay	..	..	35,691	1.6
	Not for Hay	..	..	48,793	1.9
TOTAL		..	..	..	..
Permanent Pasture	For Hay	34,014	0.8	..	..
	Not for Hay	64,274	0.3	..	..
TOTAL		98,288	0.6	..	..
Hops		..	..	535	1.0
		No.	Per Cent.	No.	Per Cent.
Cows and Heifers in Milk or in Calf		32,222	0.3	50,359	1.9
Other Cattle :—2 years and above		72,207	5.2	..	..
" 1 year and under 2		..	..	43,710	3.1
" Under 1 year		..	..	..	..
TOTAL OF CATTLE		9,450	0.1	..	..
Ewes kept for Breeding		..	..	110,511	1.1
Other Sheep :—1 year and above		..	..	76,731	1.3
" Under 1 year		..	..	457,286	4.3
TOTAL OF SHEEP		..	..	646,528	2.4
Sows kept for Breeding		..	..	41,390	11.5
Other Pigs		..	..	198,491	8.8
TOTAL OF PIGS		..	..	241,881	9.2

COUNTY SUMMARY.—ACREAGE

PRELIMINARY STATEMENT of the ACREAGE under WHEAT,
compiled from the Returns collected on the 4th June,

COUNTIES.	Wheat.		Barley.		Oats.	
	1900.	1899.	1900.	1899.	1900.	1899.
	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.
TOTAL FOR GREAT BRITAIN	1,845,042	2,000,981	1,990,265	1,982,108	3,026,088	2,959,755
ENGLAND	1,744,556	1,899,827	1,645,022	1,635,634	1,860,513	1,781,649
WALES	51,654	53,898	105,048	105,978	216,447	220,233
SCOTLAND	48,832	47,256	240,195	240,496	949,128	957,873
ENGLAND.						
BEDFORD	37,149	40,528	19,473	19,484	18,779	16,748
BERKS	36,034	39,301	27,270	26,886	32,943	30,857
BUCKINGHAM	34,208	37,042	18,682	17,693	29,803	27,959
CAMBRIDGE	95,439	101,235	52,484	52,924	49,619	45,366
CHESTER	16,740	16,252	1,630	1,883	61,019	61,009
CORNWALL	28,010	30,773	32,300	31,905	64,340	62,464
CUMBERLAND	3,174	3,578	1,988	2,350	73,030	73,918
DERBY	15,560	15,656	6,133	6,152	24,543	25,038
DEVON	57,376	65,094	44,235	42,797	122,025	117,101
DORSET	21,817	25,060	29,075	27,951	28,779	26,392
DURHAM	14,114	15,131	17,492	17,114	32,750	32,723
ESSEX	113,722	126,244	84,059	86,778	62,336	55,307
GLoucester	47,379	52,717	28,237	27,376	33,553	31,008
HANTS	59,880	65,969	40,863	39,615	76,417	74,711
HEREFORD	25,356	29,078	20,246	20,061	24,808	22,819
HERTFORD	51,391	54,755	27,766	29,037	36,237	32,943
HUNTINGDON	31,161	34,028	20,957	20,606	12,842	11,744
KENT	42,993	59,757	36,748	36,546	47,413	45,315
LANCASTER	21,259	29,145	6,321	6,627	72,776	73,350
LEICESTER	24,193	24,730	13,822	13,634	24,068	25,088
LINCOLN	175,288	195,064	211,471	208,497	125,378	117,156
LONDON	94	240	66	40	124	153
MIDDLESEX	13,159	3,543	759	969	2,972	2,733
MONMOUTH	6,824	7,384	5,020	5,002	8,942	8,605
NORFOLK	126,574	140,173	200,409	198,466	63,959	54,887
NORTHAMPTON	43,187	47,633	43,676	43,697	27,714	24,673
NORTHUMBERLAND	6,776	7,581	34,837	34,093	44,342	44,386
NOTTS	39,067	41,545	38,073	38,890	34,522	32,485
OXFORD	36,180	40,082	42,016	41,783	31,912	29,616
RUTLAND	4,790	5,292	10,697	10,590	3,964	3,674
SALOP	32,219	35,998	53,848	55,438	40,969	38,011
SOMERSET	32,329	37,999	28,593	25,029	27,266	25,907
STAFFORD	22,798	24,620	16,987	17,307	37,522	36,560
SUFFOLK	105,806	115,711	136,682	139,879	42,498	35,267
SURREY	19,722	21,532	7,773	7,926	23,918	23,065
SUSSEX	52,244	56,508	11,911	10,405	61,076	59,852
WARWICK	36,927	38,311	13,383	13,696	29,558	28,493
WESTMORLAND	169	177	794	897	14,995	15,387
WILTS	53,507	57,630	40,030	39,918	46,333	44,133
WORCESTER	31,009	34,066	9,549	9,580	19,259	17,999
YORK, E. RIDING	64,254	64,562	73,623	72,483	95,231	96,993
„ N. RIDING	27,200	27,857	76,388	75,158	73,179	73,724
„ W. RIDING	47,388	48,306	58,656	58,182	75,900	75,880

OF WHEAT, BARLEY, AND OATS.

BARLEY, and OATS in the several COUNTIES of GREAT BRITAIN,
1900, with a COMPARATIVE STATEMENT for 1899.

COUNTIES (Continued).	Wheat.		Barley.		Oats.	
	1900.	1899.	1900.	1899.	1900.	1899.
	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.
WALES.						
ANGLESEY	219	278	1,615	1,649	19,778	21,354
BRECON	3,731	3,793	4,629	4,772	12,949	13,134
CARDIGAN	6,176	6,056	15,415	15,726	26,883	27,753
CARMARTHEN	8,490	8,738	14,331	14,103	29,208	29,851
CARNARVON	363	466	5,690	5,832	10,698	10,860
DENBIGH	5,787	6,280	14,180	14,792	24,691	25,105
FLINT	4,318	4,754	5,687	5,751	11,296	11,691
GLAMORGAN	5,285	5,756	8,138	7,899	11,513	11,673
MERTONETH	836	879	3,997	4,085	9,074	9,109
MONTGOMERY	10,111	10,344	8,446	8,954	21,011	21,301
PEMBROKE	3,260	3,333	19,220	18,757	27,231	26,581
RADNOR	3,078	3,221	3,760	3,658	12,115	11,821
SCOTLAND.						
ABERDEEN	17	4	29,619	29,415	182,517	184,478
ARGYLL	1	5	1,635	1,726	17,349	17,326
AYR	976	1,197	1,661	1,634	44,412	45,271
BANFF	52	24	10,158	10,504	47,367	46,874
BERWICK	1,903	2,120	21,139	21,143	33,122	33,375
BUTE	...	12	133	85	4,902	4,954
CAITHNESS	4	1	1,212	1,257	33,699	33,758
CLACKMANNAN	282	214	494	591	2,912	3,021
DUMBAKTON	1,037	978	280	246	6,704	6,842
DUMFRIES	123	142	659	831	42,732	43,370
EDINBURGH	4,104	4,158	6,098	5,804	22,799	22,812
ELGIN OR MORAY	886	1,209	14,141	14,432	20,421	20,213
FIFE	10,028	9,270	22,569	22,475	38,665	38,732
FORFAR	8,640	8,572	30,472	30,095	46,817	47,858
HADDINGTON	5,162	5,087	16,340	16,382	16,815	17,314
INVERNESS	36	5	7,526	7,502	30,048	30,051
KINCARDINE	793	692	13,958	13,520	27,189	27,517
KINROSS	14	32	482	486	6,261	6,297
KIRKCUDBRIGHT	49	104	65	106	27,310	27,255
LANARK	2,580	2,184	355	409	36,648	37,651
LINLITHGOW	1,300	1,296	3,414	3,498	9,482	9,778
NAIRN	...	1	3,489	3,447	5,462	5,491
ORKNEY	...	...	4,594	4,600	33,392	33,620
PEEBLES	24	7	436	459	8,036	8,164
PERTH	5,764	5,104	15,460	15,398	63,731	64,553
RENFREW	1,583	1,687	57	57	10,961	11,249
ROSS AND CROMARTY	789	813	12,707	12,853	29,868	29,685
ROXBURGH	488	518	13,224	13,231	28,740	29,028
SELKIRK	8	...	441	476	4,880	4,746
SHETLAND	...	...	1,746	2,003	7,526	7,292
STIRLING	1,821	1,361	3,255	3,497	17,797	17,965
SUTHERLAND	...	...	1,371	1,387	7,817	7,862
WIGTOWN	368	459	996	947	32,747	33,471

COUNTY SUMMARY.—ACREAGE OF

PRELIMINARY STATEMENT of the ACREAGE under CLOVER and
compiled from the Returns collected on the

COUNTIES.	Clover and Rotation Grasses.					
	FOR HAY.		NOT FOR HAY.		TOTAL.	
	1900.	1899.	1900.	1899.	1900.	1899.
	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>
TOTAL FOR GREAT BRITAIN	2,201,781	2,214,883	2,557,377	2,593,068	4,759,158	4,807,951
ENGLAND	1,598,566	1,622,603	1,169,472	1,184,007	2,768,038	2,806,610
WALES	196,992	198,046	199,690	196,641	396,682	394,687
SCOTLAND	406,223	394,234	1,188,215	1,212,420	1,594,438	1,606,654
ENGLAND.						
BEDFORD	18,308	18,486	8,163	7,846	26,471	26,332
BERKS	33,741	34,015	8,232	9,670	41,973	43,685
BUCKINGHAM	24,866	25,192	6,604	6,680	31,470	31,872
CAMBRIDGE	30,434	35,210	20,732	22,664	57,166	58,174
CHESTER	56,738	57,800	14,249	15,255	70,987	73,145
CORNWALL	49,720	49,042	139,593	137,378	189,313	186,420
CUMBERLAND	42,367	41,651	73,165	73,564	115,532	115,215
DERBY	17,424	18,393	7,273	7,024	24,697	25,417
DEVON	74,386	71,243	144,705	147,035	219,091	218,878
DORSET	29,703	28,691	17,230	17,655	46,933	46,346
DURHAM	38,728	39,931	13,052	13,587	51,780	53,518
ESSEX	62,411	62,837	35,132	36,527	97,543	99,364
GLOUCESTER	53,432	52,869	35,782	36,931	89,214	89,800
HANTS	83,574	83,136	29,546	29,977	113,120	113,113
HEREFORD	22,879	22,122	15,358	15,481	38,237	37,603
HERTFORD	35,227	35,599	10,440	9,775	45,667	45,374
HUNTINGDON	12,854	11,595	7,212	5,755	20,066	17,360
KENT	36,632	39,154	12,304	13,795	48,996	52,949
LANCASTER	69,253	72,528	12,121	11,630	81,374	84,158
LIMESTER	16,888	18,100	5,780	6,046	22,668	24,146
LINCOLN	81,366	88,865	105,743	104,826	187,109	193,691
LONDON	84	122	58	26	442	148
MIDDLESEX	1,336	1,991	554	526	1,800	2,517
MONMOUTH	10,280	10,637	4,979	4,253	14,308	14,890
NORFOLK	130,780	120,954	34,367	34,629	165,147	164,583
NORTHAMPTON	23,512	22,309	19,143	9,673	33,655	31,982
NORTHUMBERLAND	40,582	40,672	36,075	36,234	76,657	76,906
NOTTS	25,468	26,740	28,789	29,311	54,257	56,051
OXFORD	37,103	36,941	13,008	14,478	50,111	51,419
RUTLAND	3,114	3,288	3,135	3,517	6,249	6,805
SALOP	45,267	45,072	25,882	25,440	71,149	70,512
SOMERSET	27,285	27,323	22,854	24,554	50,139	51,877
STAFFORD	30,828	31,223	14,681	15,827	45,509	47,050
SUFFOLK	65,666	65,158	41,321	40,654	106,987	105,812
SURREY	16,873	18,132	5,335	5,173	22,208	23,305
SUSSEX	41,038	42,695	20,110	17,484	61,148	60,179
WARRICK	24,914	24,817	8,260	9,574	33,174	34,391
WESTMORLAND	7,567	6,987	9,332	9,556	16,899	16,543
WILTS	55,703	56,211	18,510	19,189	74,213	75,400
WORCESTER	17,105	17,576	11,031	10,165	28,136	27,741
YORK, E. RIDING	18,347	22,734	73,885	75,005	92,232	97,739
" N. RIDING	35,750	38,633	36,168	37,152	71,918	75,785
" W. RIDING	43,044	46,929	31,419	31,586	74,463	78,515

CLOVER AND ROTATION GRASSES.

ROTATION GRASSES in the several COUNTIES of GREAT BRITAIN,
4th June, 1900, with a COMPARATIVE STATEMENT for 1899.

COUNTIES (Continued).	Clover and Rotation Grasses.					
	FOR HAY.		NOT FOR HAY.		TOTAL.	
	1900.	1899.	1900.	1899.	1900.	1899.
	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>
WALES.						
ANGLESEY	21,695	21,203	23,026	21,475	44,721	42,678
BRECON	8,043	8,379	12,850	13,233	20,893	21,612
CARDIGAN	21,229	21,332	30,766	28,035	51,995	49,367
CARMARTHEN	19,260	19,524	14,655	14,454	33,915	33,978
CARNARVON	20,003	20,058	21,279	21,137	41,282	41,195
DENBIGH	24,463	24,747	28,005	28,881	52,468	53,628
FLINT	13,826	14,041	9,948	9,654	23,774	23,695
GLAMORGAN	14,961	15,957	6,863	7,573	21,824	23,530
MERIONETH	9,868	9,518	8,830	9,623	18,698	19,141
MONTGOMERY	16,874	17,354	14,067	14,649	30,941	32,003
PEMBROKE	19,171	18,624	20,827	19,120	39,998	37,744
RADNOR	7,599	7,399	8,574	8,807	16,173	16,116
SCOTLAND.						
ABERDEEN	46,904	45,137	235,641	238,831	282,545	283,968
ARGYLL	11,187	11,568	15,635	16,239	26,822	27,807
AYR	32,566	31,377	68,841	71,267	101,407	102,644
BANFF	9,342	9,062	58,257	58,603	67,599	67,665
BERWICK	9,984	9,217	48,483	48,965	58,467	58,182
BUTE	2,182	2,007	6,474	6,298	8,656	8,305
CAITHNESS	9,553	9,341	22,736	22,864	32,289	32,205
CLACKMANNAN	1,792	1,790	1,639	1,684	3,431	3,474
DUMBARTON	6,989	7,030	9,928	9,386	16,917	16,416
DUMFRIES	18,228	17,706	62,650	63,132	80,878	80,838
EDINBURGH	13,154	12,249	18,647	20,564	31,801	32,813
ELGIN, or MORAY	5,752	5,424	33,704	33,540	39,456	38,964
FIFE	25,991	25,812	38,350	39,755	64,341	65,567
FORFAR	20,551	19,055	65,468	67,579	86,019	86,634
HADDINGTON	10,673	10,147	17,356	17,392	28,029	27,539
INVERNESS	11,101	11,361	19,118	20,004	30,219	31,365
KINCARDINE	12,862	12,565	34,470	35,692	47,332	47,257
KINROSS	2,644	2,531	9,183	10,045	11,827	12,570
KIRKCUDBRIGHT	9,144	9,010	54,229	54,338	63,373	63,348
LANARK	34,509	34,490	58,187	67,516	92,696	102,006
LINLITHGOW	7,499	6,905	9,614	8,149	17,113	15,054
NAIRN	1,846	1,806	8,538	8,118	10,384	10,014
ORKNEY	8,471	8,872	25,709	24,933	34,180	33,805
PEEBLES	2,313	2,126	15,396	16,128	17,709	18,254
PERTH	30,368	29,351	69,550	71,020	99,918	100,371
RENFREW	14,099	13,945	11,558	10,828	25,657	24,773
ROSS and CROMARTY	13,886	13,555	30,456	29,664	44,342	43,219
ROXBURGH	8,637	7,624	43,735	45,026	52,372	52,650
SELKIRK	939	989	8,194	8,127	9,133	9,116
SHETLAND	767	706	608	539	1,375	1,245
STIRLING	12,909	12,642	18,597	18,899	31,596	31,541
SUTHERLAND	4,072	4,136	4,536	4,926	8,608	9,062
WIGTOWN	5,219	4,608	62,728	62,369	67,947	66,977

COUNTY SUMMARY.—ACREAGE

PRELIMINARY STATEMENT of the ACREAGE under Permanent
from the Returns collected on the 4th June, 1900.

COUNTIES.	Permanent Pasture.					
	FOR HAY.		NOT FOR HAY.		TOTAL.	
	1900.	1899.	1900.	1899.	1900.	1899.
	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>
TOTAL FOR GREAT BRITAIN	4,373,099	4,339,085	12,355,936	12,291,662	16,729,035	16,630,747
ENGLAND	3,776,473	3,753,867	9,615,404	9,570,293	13,391,877	13,324,160
WALES	464,870	457,173	1,464,175	1,462,437	1,929,045	1,919,610
SCOTLAND	131,756	128,045	1,276,357	1,258,932	1,408,113	1,386,977
ENGLAND.						
BEDFORD	28,215	28,552	74,579	73,218	102,794	101,770
BERKS	70,876	70,627	98,428	97,090	169,304	167,717
BUCKINGHAM	88,292	88,441	155,595	154,369	243,887	242,810
CAMBRIDGE	35,433	35,889	81,888	81,833	117,321	117,722
CHESTER	89,693	87,694	249,330	249,188	339,023	336,882
CORNWALL	32,069	32,381	206,737	208,209	238,806	240,590
CUMBERLAND	72,425	70,017	272,003	272,386	344,428	342,403
DERBY	127,300	127,315	274,530	273,700	401,830	401,015
DEVON	111,119	110,261	523,308	523,766	634,427	634,027
DORSET	89,518	89,490	209,794	208,819	299,312	298,309
DURHAM	91,185	91,512	189,005	187,338	280,190	278,850
ESSEX	94,781	99,473	177,126	166,574	271,907	266,047
GLOUCESTER	148,198	143,227	249,520	250,277	397,718	393,504
HANTS	90,010	87,297	194,093	192,777	284,103	280,074
HEREFORD	77,855	77,594	219,566	216,560	297,421	294,154
HERTFORD	53,863	55,681	66,824	63,352	120,687	119,033
HUNTINGDON	21,558	23,352	62,593	62,717	84,151	86,069
KENT	99,337	101,907	315,750	306,677	415,087	408,674
LANCASTER	198,044	195,118	376,572	380,496	576,616	575,614
LEICESTER	89,034	87,763	270,090	269,125	359,124	356,888
LINCOLN	88,430	99,723	410,773	407,412	499,203	498,135
LONDON	3,586	3,749	5,189	5,203	8,775	8,952
MIDDLESEX	45,705	48,308	27,450	27,632	73,215	73,940
MONMOUTH	65,115	64,714	131,430	130,692	196,545	195,406
NORFOLK	45,677	46,677	243,512	242,465	289,189	289,142
NORTHAMPTON	81,207	78,732	273,705	275,265	354,912	354,912
NORTHUMBERLAND	71,930	68,293	420,230	422,532	494,160	490,825
NOTTS	62,230	64,032	147,044	144,129	209,274	208,161
OXFORD	73,300	70,513	120,416	119,835	193,716	190,348
RUTLAND	10,432	10,336	40,514	41,080	50,946	51,416
SALOP	97,247	95,798	360,780	360,663	458,027	456,461
SOMERSET	234,469	226,399	420,190	426,362	654,659	652,761
STAFFORD	119,493	117,624	309,928	308,564	429,421	426,188
SUFFOLK	54,365	59,038	126,347	120,804	180,712	179,842
SURREY	71,208	71,700	84,785	84,248	155,993	155,948
SUSSEX	129,526	127,430	262,814	263,557	392,340	390,987
WARWICK	98,382	95,602	236,201	236,934	334,583	332,626
WESTMORLAND	53,802	53,199	152,558	152,706	206,360	205,905
WILTS	142,148	139,797	281,736	281,980	423,884	421,777
WORCESTER	87,365	85,960	164,640	164,927	252,005	250,887
YORK, E. RIDING	37,509	37,247	173,651	169,748	211,220	206,995
„ N. RIDING	136,844	136,988	382,128	378,672	518,972	515,660
„ W. RIDING	257,578	259,267	70,052	566,412	827,630	825,679

OF PERMANENT PASTURE.

PASTURE in the several COUNTIES of GREAT BRITAIN, compiled
with a COMPARATIVE STATEMENT for 1899

COUNTIES (Continued).	Permanent Pasture.					
	FOR HAY.		NOT FOR HAY.		TOTAL.	
	1900.	1899.	1900.	1899.	1900.	1899.
	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>
WALES.						
ANGLESEY	12,328	12,774	63,982	64,205	76,810	76,979
BRECON	35,936	35,266	117,272	115,882	153,208	151,148
CARDIGAN	35,395	35,521	121,510	122,168	156,905	157,689
CARMARTHEN	77,501	74,586	267,271	268,858	344,772	343,444
CERNARVON	38,014	38,125	77,866	77,585	115,880	115,710
DELRHIG	31,347	30,971	123,075	121,904	154,422	152,875
FLINT	17,014	17,084	55,798	54,646	72,812	71,730
GLAMORGAN	69,194	68,562	145,181	143,819	214,375	212,381
MERIONETH	34,885	34,413	81,674	81,459	116,559	115,872
MONTGOMERY	46,443	45,259	145,056	143,412	192,099	188,671
PEMBROKE	42,291	40,690	168,194	172,246	210,485	212,936
RADNOR	24,022	23,922	96,696	96,253	120,718	120,175
SCOTLAND.						
ABERDEEN	1,601	662	31,979	29,901	33,580	30,563
ARGYLL	14,814	13,498	63,920	62,639	78,734	76,137
AYR	16,166	16,344	138,462	136,159	154,628	152,503
BANFF	181	406	9,358	9,420	9,539	9,826
BERWICK	1,569	1,873	42,064	41,105	43,633	42,978
BUTE	397	364	8,907	9,043	9,304	9,407
CAITHNESS	1,476	1,710	27,444	26,728	28,920	28,438
CLACKMANNAN	656	591	5,581	5,978	6,237	6,569
DUMBERTON	1,409	1,485	20,861	20,947	22,270	22,432
DUMFRIES	18,336	18,589	91,444	92,201	111,780	110,790
EDINBURGH	2,167	1,795	45,658	45,484	47,825	47,279
ELGIN, or MORAY	242	197	7,979	8,176	8,221	8,173
FIFE	3,277	3,844	72,661	72,051	75,878	75,895
FORFAR	1,459	1,167	28,054	27,769	29,513	28,936
HADDINGTON	1,125	1,231	18,544	18,621	19,669	19,852
INVERNESS	4,835	4,891	58,475	56,849	63,310	61,740
KINCARDINE	134	60	9,353	8,682	9,487	8,742
KINKROSS	762	718	12,263	11,605	13,025	12,323
KIRKCUDBRIGHT	12,938	12,642	72,685	72,203	85,623	84,845
LANARK	10,033	8,661	93,483	85,073	103,516	93,734
LINLITHGOW	943	654	19,805	21,802	20,748	22,456
NAIK	18	30	2,057	2,057	2,087	2,087
ORKNEY	782	968	16,493	16,472	17,275	17,440
PERTH	1,277	1,344	16,632	15,325	17,909	16,669
PERTH	9,903	9,358	95,842	95,788	105,745	105,146
RENFREW	5,485	5,461	41,522	43,090	47,007	48,551
ROSS and CROMARTY	2,207	2,268	25,529	27,074	29,342	29,342
ROXBURGH	6,264	6,362	56,539	55,874	62,803	62,236
SELKIRK	1,397	1,314	11,140	11,077	12,537	12,391
SHEPHERD	1,576	1,506	42,030	42,211	43,606	43,717
STIRLING	3,376	3,292	48,550	48,725	51,926	52,017
SUTHERLAND	1,219	1,141	8,756	8,389	9,975	9,530
WIGTOWN	3,732	3,619	30,575	30,414	34,307	34,033

COUNTY SUMMARY—LIVE STOCK.

PRELIMINARY STATEMENT of the NUMBER of CATTLE, SHEEP,
from the Returns collected on the 4th June, 1900,

COUNTIES.	Cattle.		Sheep.		Pigs.	
	1900.	1899.	1900.	1899.	1900.	1899.
TOTAL FOR GREAT BRITAIN	No.	No.	No.	No.	No.	No.
ENGLAND	4,848,698	4,841,852	15,844,713	16,261,417	2,021,422	2,225,420
WALES	758,386	736,691	3,432,516	3,416,357	228,097	258,154
SCOTLAND	1,198,086	1,217,177	7,314,997	7,560,980	132,413	140,239
ENGLAND.						
BEDFORD	34,833	34,576	104,759	105,914	25,280	27,385
BERKS	45,161	44,974	184,797	184,624	22,130	25,455
BUCKINGHAM	75,183	74,830	195,567	200,008	28,098	32,445
CAMBRIDGE	57,112	56,123	208,272	214,422	46,180	48,472
CHESTER	182,633	182,231	103,456	107,173	70,126	76,627
CORNWALL	203,983	199,148	399,756	416,137	88,559	94,486
CUMBERLAND	148,339	149,313	580,618	594,820	18,816	22,781
DERBY	143,609	141,387	171,364	175,698	31,108	34,596
DEVON	279,728	275,997	840,324	882,526	95,944	109,184
DORSET	87,904	89,128	360,491	374,740	50,930	59,077
DURHAM	78,183	76,029	258,257	251,856	10,624	11,841
ESSEX	90,807	90,377	295,334	295,951	80,866	88,743
GLOUCESTER	124,708	124,807	304,785	374,041	67,438	76,681
HANTS	86,666	87,282	378,951	394,318	63,302	70,552
HEREFORD	96,503	94,802	333,270	336,095	24,286	29,689
HERTFORD	35,732	35,895	112,413	117,816	24,424	25,553
HUNTINGDON	30,746	30,432	96,459	99,972	17,443	18,768
KENT	77,662	78,572	917,237	942,645	58,361	63,133
LANCASTER	239,501	243,581	334,859	346,524	60,617	60,760
LEICESTER	141,876	140,309	321,029	334,507	24,569	26,579
LINCOLN	250,042	252,214	1,150,603	1,217,892	102,302	106,595
LONDON	5,409	5,866	4,262	5,846	2,518	2,607
MIDDLESEX	10,450	10,742	16,175	18,717	11,685	13,271
MONMOUTH	49,799	48,015	227,142	223,186	16,426	17,755
NORFOLK	134,527	139,760	547,245	541,132	100,712	103,730
NORTHAMPTON	126,341	126,539	403,434	414,484	28,340	31,198
NORTHUMBERLAND	113,724	117,424	1,065,206	1,086,725	10,250	11,650
NOTTS	86,091	83,490	196,680	208,884	28,295	31,083
OXFORD	61,851	60,695	230,325	244,431	31,032	36,595
RUTLAND	19,118	19,235	84,794	85,420	2,277	2,251
SALOP	180,113	177,456	470,577	476,108	66,594	75,140
SOMERSET	239,663	240,731	519,670	542,458	118,884	133,938
STAFFORD	164,058	162,923	236,351	251,246	50,533	56,249
SUFFOLK	78,426	79,834	433,013	432,803	149,030	157,653
SURREY	42,751	45,021	69,757	72,630	21,017	21,943
SUSSEX	115,877	115,667	434,236	440,278	38,781	42,594
WARWICK	108,592	106,884	272,189	280,556	36,405	39,666
WESTMORLAND	67,608	68,146	371,453	380,900	4,274	4,695
WILTS	115,900	116,449	520,888	531,843	60,334	67,560
WORCESTER	69,057	68,035	170,617	173,942	39,794	44,231
YORK, E. RIDING	88,860	89,940	429,856	462,128	56,074	63,400
YORK, N. RIDING	174,744	175,264	733,757	727,512	47,673	58,765
YORK, W. RIDING	271,922	275,069	676,485	693,409	89,001	98,059

and PIGS in the several COUNTIES of GREAT BRITAIN, compiled
with a COMPARATIVE STATEMENT for 1899.

COUNTIES (Continued).	Cattle.		Sheep.		Pigs.	
	1900.	1899.	1900.	1899.	1900.	1899.
WALES.	No.	No.	No.	No.	No.	No.
ANGLESEY	56,653	54,082	82,145	76,625	15,438	18,685
BRECON	41,920	41,335	489,417	496,665	8,232	9,586
CARDIGAN	72,229	69,200	274,955	263,551	22,897	24,927
CARMARTHEN	123,361	120,416	271,809	276,444	36,514	40,366
CARNARVON	57,357	56,254	269,692	257,671	19,028	21,589
DENBIGH	70,882	68,082	339,502	340,371	26,409	31,872
FLINT	38,426	36,762	86,215	84,984	18,124	20,521
GLAMORGAN	56,485	55,387	330,060	328,022	16,406	17,823
MERIONETH	39,518	38,783	433,727	434,895	8,137	9,379
MONTGOMERY	73,273	72,080	433,145	428,330	22,521	26,373
PENDROKE	93,741	90,281	138,199	140,032	29,482	31,312
RADNOR	34,538	34,029	283,590	288,767	4,909	5,721
SCOTLAND.						
ABERDEEN	175,482	175,407	228,315	232,863	11,815	12,346
ARGYLL	60,900	61,698	936,337	984,304	4,020	4,285
AYR	101,090	101,885	381,960	386,098	14,612	13,920
BANFF	44,249	44,561	70,000	71,400	2,775	2,735
BERWICK	16,787	16,832	313,162	315,958	3,503	3,796
BUTE	9,554	9,751	46,588	47,897	589	621
CAITHNESS	22,109	21,780	127,279	130,006	1,485	1,495
CLACKMANNAN	3,516	3,686	12,876	14,446	1,660	1,729
DUMBARTON	15,251	15,384	70,579	76,287	1,803	1,339
DUMFRIES	62,137	62,016	559,565	565,490	9,482	10,915
EDINBURGH	20,080	21,450	182,666	191,033	7,511	8,194
ELGIN, or MORAY	21,640	22,296	69,412	72,514	2,413	2,472
FIFE	47,673	51,020	109,780	121,539	5,511	5,519
FORFAR	50,090	51,668	162,168	167,219	6,675	6,743
HADDINGTON	8,058	10,115	120,590	131,221	1,631	2,171
INVERNESS	51,520	52,321	606,350	628,695	2,419	2,669
KINCARDINE	25,353	25,752	43,238	44,483	2,456	2,544
KINROSS	6,627	7,091	37,499	40,920	565	671
KIRKCUDBRIGHT	49,949	49,539	392,229	399,338	7,413	8,265
LANARK	73,335	75,408	245,665	259,199	6,709	7,213
LINLITHGOW	12,215	12,239	22,095	26,476	1,751	1,996
NAIRN	6,047	6,246	19,526	19,360	634	690
ORKNEY	28,056	28,428	35,789	36,836	2,307	2,586
PERTH	7,124	7,498	196,799	201,538	532	618
RENFREW	73,097	75,728	710,933	746,865	7,212	7,594
ROSS and CROMARTY	26,155	26,813	40,072	42,584	1,178	1,458
RONBURGH	43,550	43,965	307,256	326,144	4,245	4,790
SELKIRK	17,851	17,787	520,410	532,989	3,001	3,260
SHETLAND	3,075	3,223	179,040	184,957	346	373
STIRLING	18,679	18,859	110,573	110,795	2,445	2,301
SUTHERLAND	33,377	33,902	123,930	122,584	2,278	2,096
WIGTOWN	12,077	12,051	204,467	208,540	816	815
	50,483	50,778	127,939	127,032	10,621	12,020

COUNTY SUMMARY.—ACREAGE OF POTATOES.

PRELIMINARY STATEMENT of the ACREAGE under POTATOES in the several COUNTIES of GREAT BRITAIN, compiled from the Returns collected on the 4th June, 1900, with a COMPARATIVE STATEMENT for 1899.

COUNTIES.	1900.	1899.	COUNTIES. (Continued).	1900.	1899.
	<i>Acres.</i>	<i>Acres.</i>		<i>Acres.</i>	<i>Acres.</i>
TOTAL FOR GREAT BRITAIN	561,361	547,682	WALES.		
ENGLAND	396,936	387,715	ANGLESEY	2,795	2,726
WALES	33,225	32,982	BRECON	1,133	1,134
SCOTLAND	131,200	126,985	CARDIGAN	6,140	6,104
ENGLAND.			CARMARTHEN	3,856	3,797
BEDFORD	8,907	8,526	CARNARVON	4,339	4,287
BERKS	1,900	2,013	DENBIGH	3,346	3,303
BUCKINGHAM	1,586	1,626	FLINT	2,263	2,325
CAMBRIDGE	22,790	21,598	GLAMORGAN	1,998	1,983
CHESTER	25,514	26,125	MERIONETH	1,849	1,827
CORNWALL	5,601	5,649	MONTGOMERY	2,000	2,059
CUMBERLAND	8,863	9,232	PENBROKE	2,563	2,532
DERBY	2,580	2,589	RADNOR	883	905
DEVON	12,468	12,536	SCOTLAND.		
DORSET	1,961	2,026	ABERDEEN	7,373	7,446
DURHAM	9,399	8,833	ARGYLL	4,558	4,576
ESSEX	9,629	10,272	AYR	8,340	7,818
GLOUCESTER	4,048	4,313	BANFF	2,007	1,999
HANTS	5,980	6,415	BERWICK	2,379	2,413
HEREFORD	1,970	2,087	BUTE	974	959
HERTFORD	4,257	4,159	CAITHNESS	1,658	1,724
HUNTINGDON	8,687	8,471	CLACKMANNAN	407	317
KENT	13,302	13,772	DUMFRIES	2,444	2,329
LANCASTER	41,932	40,768	DUMFRIES	3,617	3,444
LEICESTER	2,222	2,180	EDINBURGH	5,458	5,213
LINCOLN	64,146	58,282	ELGIN, or MORAY	1,678	1,677
LONDON	413	445	FIFE	15,042	14,502
MIDDLESEX	2,517	2,636	FORFAR	12,606	12,159
MONMOUTH	1,470	1,574	HADDINGTON	7,750	7,405
NORFOLK	11,179	9,668	INVERNESS	6,071	5,946
NORTHAMPTON	3,216	3,172	KINCARDINE	2,554	2,427
NORTHUMBERLAND	5,041	4,646	KINROSS	618	570
NOTTS	8,007	7,966	KIRKCUDBRIGHT	1,575	1,452
OXFORD	2,483	2,587	LANARK	4,446	4,117
RUTLAND	158	170	LANLITHCOW	1,841	1,726
SALOP	6,694	6,605	NAIRN	323	317
SOMERSET	4,997	5,415	ORKNEY	2,783	2,722
STAFFORD	11,465	11,385	PEEBLES	392	371
SUFFOLK	2,577	2,734	PERTH	12,884	12,128
SURREY	5,609	6,053	RENFREW	2,994	2,964
SUSSEX	3,470	3,566	ROSS and CROMARTY	7,405	7,559
WARWICK	6,744	6,365	ROXBURGH	1,375	1,264
WESTMORLAND	1,440	1,501	SRIKIRK	197	225
WILTS	2,960	2,976	SRETAND	3,046	3,111
WORCESTER	7,458	7,575	STIRLING	3,252	2,949
YORK, E. RIDING	12,851	12,435	SUTHERLAND	1,663	1,671
„ N. RIDING	12,954	12,139	WIGTOWN	1,490	1,425
„ W. RIDING	25,491	24,580			

AGRICULTURAL AND MISCELLANEOUS NOTES.

PIG FEEDING EXPERIMENTS.

The following account of two experiments carried out by the Agricultural Department of Nottingham University College is taken from the Board's Report on the Distribution of Grants for Agricultural Education during the past year. The object of the first experiment was to settle a point on which there exists among farmers and others a great difference of opinion, viz., whether it is more profitable to feed pigs with maize-meal scalded or unscalded.

Twelve pigs of the middle white breed, all of one litter, were selected for the first experiment, and these were divided into two lots of six pigs each. The age of the pigs at the commencement of the experiment was nineteen weeks, and the difference in the total weights of the two sets of pigs was only 16 lbs. Each lot received exactly the same quantities of maize-meal and whey, the only difference being that Lot I. received its maize-meal raw, while for Lot II. the maize-meal was scalded previously to being fed.

The pigs were kept in an ordinary sty, with an inner and outer court; only the inner court was covered, and it was separated from the outer by means of a hinged door. Each lot was fed twice a day, viz., at 7 a.m. and 4 p.m. Previous to feeding the pigs were shut into the inner court; whey was then put into the trough, and in the case of Lot I. raw (dry) maize-meal was put on to the surface of the whey, while Lot II. received the same quantity of scalded maize-meal mixed with the whey in the troughs. The inner court doors were then opened, and the pigs given access to their food.

The experiment commenced on September 1st, 1899, and concluded on December 9th, when the pigs were killed. Both

lots were weighed at the beginning of the experiment and at periods of about a fortnight throughout the trial.

On Sept. 1st Lot I. weighed 696 lbs., whilst Lot II. weighed 680 lbs., and at the conclusion of the experiment Lot I. weighed 1,621 lbs., and Lot II. 1,516 lbs. So that the pigs fed with raw maize-meal gained in live weight 89 lbs. more than those fed on scalded maize-meal.

As already stated, both lots were killed on the conclusion of the trial, which was continued for 100 days, the dressed weights of Lot I. being 1,200 lbs., and of Lot II. 1,163 lbs. The percentage of carcase to live weight was in the case of Lot I. 72.7 per cent., and in the case of Lot II. 76.67 per cent. The butcher's report was to the effect that both lots were of good quality, the only perceptible difference being that the raw maize-meal lot were slightly the better in colour.

It may also be added that throughout the experiment Lot I. appeared much brighter on the skin, and generally looked more healthy.

Both lots realised 8s. 9d. per score of 20 lbs., or a total of £25 5s. 0d. for Lot I., and £25 8s. 9d. for Lot II., a difference of 16s. 3d. in favour of Lot I.

After deducting 5s. 3d. (the estimated value of the 16lbs. extra weight at the commencement) from Lot I., a cash balance of 11s. remains in favour of feeding pigs on raw maize-meal. To this balance might be added the cost of coals and extra labour involved in scalding the maize-meal given to Lot II. The position of Lot I. is therefore better than the cash balance represents.

This experiment points to the conclusion that when feeding maize-meal to pigs the trouble of scalding is not repaid by any extra increase in weight, and it would further appear that maize-meal in the raw state is more nourishing than when scalded.

The object of the second experiment was to ascertain whether sweet or sour separated milk has the greater feeding value.

Ten pigs of the Middle White breed, all of one litter, and nineteen weeks old, were chosen and divided into two lots of

five pigs each, the difference in the total live weights of the two sets being only 4 lbs. The experiment commenced on September 1st and finished on November 21st, 1899. Both lots received the same amounts of separated milk and meal (principally maize-meal), but to Lot I. the separated milk was given sour, while Lot II. received sweet separated milk. The manner of housing and general treatment were as described in the preceding experiment.

At the commencement of the experiment Lot I. weighed 700 lbs., and Lot II. 704 lbs., whilst on November 21st they had increased to 1,407 lbs. and 1,422 lbs. respectively.

Both lots of pigs were killed on the conclusion of the experiment and sold for 8s. 9d. per score of 20 lbs. The dressed weight of Lot I. was 1,020 lbs., which at 8s. 9d. produced £22 6s. 3d.; Lot II. weighed exactly 20 lbs. more than Lot I., so that the cash difference in favour of Lot II. was 8s. 9d.

From this difference must be deducted 1s. 9d., the estimated value of the 4 lbs. extra weight of Lot II. at the commencement of the trial. A balance of 7s. is thus left in favour of the use of sweet separated milk. The butcher's report was that both lots were of equally good quality.

It would seem therefore from this experiment that the feeding value of separated milk is not increased by souring, but that, if anything, its feeding properties are slightly impaired.

FEEDING EXPERIMENT WITH BULLOCKS.

An experiment to compare the feeding values of maize meal and barley meal was carried out by the University College of North Wales, Bangor, during the months of January, February, and March, 1900. Two lots of Welsh bullocks, two-and-a-half years old (four in each lot), which had been grazed on the College farm during the previous summer, were selected for the purpose. They were put in the stalls towards the end of December, and were similarly

fed until the experiment commenced on January 25th. The quantity of food given daily to each animal was not varied while the experiment continued. The daily ration for each was 4 lb. decorticated cotton cake, 2 lb. linseed cake, 5 lb. long hay. In addition, Lot I. received 4 lb. barley meal, whilst Lot II. received 4 lb. maize meal, and both lots received as much chaffed straw and pulped roots as they would eat. They consumed on the average 16 lb. chaff and 65 lb. roots per head per day. The analyses made in the College laboratory of the concentrated feeding stuffs, and the price per ton of each, are given below:—

	Decorticated Cotton Cake.	Maize Meal.	Barley Meal.	Linseed Cake.
	Per cent.	Per cent.	Per cent.	Per cent.
Water - - - -	10.7	13.8	13.0	11.5
Fat - - - - -	12.5	4.1	1.5	11.7
Albuminoids - -	29.1	9.5	11.2	33.7
Digestible Carbohydrates -	33.4	70.2	67.2	29.8
Fibre - - - - -	6.4	1.2	4.6	9.1
Ash - - - - -	7.9	1.2	2.5	4.2
	100.0	100.0	100.0	100.0
Price per ton	£6 15s. 0d.	£4 18s. 0d.	£5 15s. 0d.	£8 17s. 6d.

The animals were all weighed before the commencement of the experiment. They were sold as soon as they were sufficiently fat for the local trade. One was sold from each lot on February 24th, another on March 3rd, and the remaining two from each lot were sold on March 19th.

The total live weight of Lot I. (barley meal) at the commencement of the experiment was 39 cwt. 3 qr. 10 lb. and the total weight when sold was 42 cwt. 2 qr. 18 lb., or an increase of 2 cwt. 3 qr. 8 lb.; whilst Lot II., which were fed on maize meal, weighed 39 cwt. 3 qr. 21 lb. at the beginning, and 42 cwt. 2 qr. 25 lb. when sold, showing a gain of 2 cwt. 3 qr. 4 lb. The average increase in live weight per bullock was 79 lb. in the case of Lot I., and 78 lb. in the case of Lot II. The average cost per head of 676 lb. of cotton cake, 676 lb. of barley meal (in the case of Lot I.) or maize meal (in the

case of Lot II.), and 338 lb. of linseed cake fed to each lot was 23s. 6d. in the case of Lot I. and 24s. 3d. in the case of Lot II.

It will be seen that there was practically no difference between the increase in the two lots in live weight, but as the concentrated food supplied to Lot I. cost 1s. 3d. per head more than that supplied to Lot II., the advantage, though very slight, lies with the maize meal. But when the carcase weights are considered the result is much more in favour of Lot II. The cattle were all sold at 6½d. per lb. dead weight. The four bullocks in Lot I. weighed 2,455 lb., and those in Lot II. 2,525 lb., or 70 lb. more than the cattle in Lot I., which at 6½d. per lb. amounts to £1 16s. 3d., so that the cattle fed on the maize meal "killed" better than those fed on the barley meal.

EXPERIMENTS IN THE MANURING OF SWEDES.

Experiments in the manuring of swedes were carried out during the past year at five centres in Yorkshire under the direction of the Agricultural Department of the Yorkshire College, Leeds. In a report upon the results obtained, Professor Campbell states that though the crops at the several experimental centres were small, they were sufficiently regular to warrant a comparison being made of the effects of the different manurings. The scheme provided for a test of the following artificial manures applied with dung and without dung, viz., superphosphate alone, superphosphate in combination with sulphate of ammonia, and superphosphate in combination with sulphate of ammonia and sulphate of potash.

The manures employed were not necessarily the best for the root crop, nor was the scheme intended to determine the question either of the kinds or quantities of the manures that should be applied. All that was attempted in the experiments was to determine whether the use of the three artificial

manures is profitable with or without dung, and whether any or all should be omitted.

The average results of the experiments at the five centres collectively are shown below:—

Plot.	Manures Applied.	Average Yield per Acre.		Cost of Artificial Manures per Acre.
		Tons Cwts.	£ s. d.	
1.	Nil.	7 6	—	
2.	10 tons Dung	9 6	—	
3.	10 tons Dung; 4 cwt. Superphosphate	10 15	0 10 8	
4.	10 tons Dung; 8 cwt. Superphosphate	10 18	1 1 4	
5.	10 tons Dung; 4 cwt. Superphosphate; 1 cwt. Sulphate of Ammonia	11 13	1 1 2½	
6.	10 tons Dung; 4 cwt. Superphosphate; 1 cwt. Sulphate of Ammonia; 2 cwt. Sulphate of Potash	11 3	2 8 5	
7.	10 tons Dung	9 13	—	
8.	4 cwt. Superphosphate	8 3	0 10 8	
9.	4 cwt. Superphosphate; 144 lbs. Nitrate of Soda*	8 11	1 1 7	
10.	4 cwt. Superphosphate; 1 cwt. Sulphate of Ammonia	8 17	1 1 11	
11.	4 cwt. Superphosphate; 1 cwt. Sulphate of Ammonia; 2 cwt. Sulphate of Potash	10 7	2 8 5	
12.	8 cwt. Superphosphate; 1 cwt. Sulphate of Ammonia; 2 cwt. Sulphate of Potash	10 4	2 19 1	

*Containing Nitrogen equal to that in 1 cwt. Sulphate of Ammonia.

Plots 3 to 6 inclusive show the effect of artificial manures applied with dung. The addition of the artificial to dung gave an increased yield in every case over the plot manured with dung alone, but only in the case of the 4 cwt. of superphosphate by itself was the increase profitable. The application of sulphate of ammonia together with superphosphate somewhat increased the weight of the crop, but not in proportion to the cost; while the addition of potash to dung, superphosphate and ammonia did not even increase the yield. Plot 4 received a double quantity of superphosphate, viz., 8 cwts., in order to determine whether this large dressing would furnish a correspondingly increased yield, but inasmuch as the difference in the average yields obtained on Plots 3 and 4 was only 3 cwts., it is concluded that the extra dressing of 4 cwt. superphosphate would be altogether ineffective in a season like that of 1899.

Plots 8, 10, 11 and 12 show the average results obtained by the use of artificials alone. Compared with the unmanured plot (Plot 1) the use of superphosphate increased the yield; the addition of sulphate of ammonia was also accompanied by an increase; but the application of sulphate of potash together with superphosphate and sulphate of ammonia had a greater influence than either of the other dressings, though, owing to the smallness of the crop and the comparatively high cost of the sulphate of potash, the increased yield was not profitable last year. As in the case of the dunged plots, in this series also a plot (Plot 12) was tried with a double dressing of superphosphate, but here again the additional application of 4 cwts., of superphosphate was ineffective, as will be seen on comparing the yields obtained on Plots 11 and 12.

The effects of the use of dung are brought out by comparing the results obtained on the dunged and undunged plots as follows:—

Plots.	Manures per Acre.	Yield per Acre with Dung.	Increase per Acre over 10 tons Dung alone.	Yield per Acre without Dung.	Increase per Acre over unmanured Plot.
		Tons cwts.	Tons cwts.	Tons cwts.	Tons cwts.
3 and 8.	4 cwt. Super.	10 15	1 9	8 3	0 17
5 and 10.	4 cwt. Super. 1 cwt. Sulph. of Amm.	11 13	2 7	8 17	1 11
6 and 11.	4 cwt. Super. 1 cwt. Sulph. of Amm. 2 cwt. Sulph. of Potash	11 3	3 17	10 7	3 1

This comparison, Professor Campbell remarks, brings out what appears to be a fundamental principle which should govern the manuring of roots, viz., that where dung is applied, the application of nitrogen and potash in the form of artificials is unnecessary, but where farmyard manure is not applied, not only the nitrogen, but also the potash, must be included in the mixture.

EXPERIMENTS IN MANURING POTATOES.

Experiments on the growth of different varieties of potatoes under various systems of manuring have been carried out

during the past two years by the Agricultural Department of the University College, Nottingham, at Althorpe, Lincs., Hodsock and Blidworth, Notts. The season in 1899 was not on the whole favourable for potatoes and did not afford a fair opportunity for the action of artificial manures, but the results are stated to have been fairly satisfactory, and owing to the absence of any considerable amount of disease the crop was lifted in good condition. The trials at Althorpe were carried out in connection with the Lindsey County Council, and were intended to ascertain the most suitable varieties for the class of land and climate, and the most efficient systems of manuring.

The artificial manure that gave the best result was a mixture of $1\frac{1}{2}$ cwts. Nitrate of Soda with an equal weight of Sulphate of Ammonia and 6 cwts. of Superphosphate, costing £2 1s. 6d.; this gave an average yield from eight varieties of 10 tons 9 cwts. 3 qrs., as compared with a produce of 8 tons from the unmanured plot. The increase, valued at 50s. per ton, gave a profit over the cost of the manure of £4 3s. This manure was also very efficient in 1898, and stood at the head of the list, but the other manures did not exhibit uniform results in the two years. Owing to the want of rain, the plots on which the manure or part of it was broad-casted did not succeed better than where it was put in with the sets. None of the new varieties of potatoes tried surpassed the three sorts that are generally considered the best in the locality, viz., Selected Giant, Up-to-date, and Scottish Triumph.

Experiments were carried out at Hodsock in a field which had received a dressing of two tons of Crich lime per acre in the autumn of 1898. Only one variety of potato was planted, viz., Up-to-date. There were in all 19 plots, two of which received no manure, four received varying quantities of farmyard manure, four farmyard manure and artificials, and nine plots received artificials alone.

With regard to the plots which received farmyard manure alone, it will be seen from the table below that a moderate dressing of dung gave an increase of 4 tons 3 cwts., and 4 tons 8 cwts. over the unmanured plots, but no profitable increase was obtained from the heavier applications of farm-

yard manure. The addition to dung of a complete dressing of artificials, consisting of 4 cwts. superphosphate, $1\frac{1}{2}$ cwts. nitrate, and 2 cwts. kainit per acre, did not result in any increase over the plots which received farmyard manure only, except in one case, and then only of about 11 cwts. The table shows the results obtained both from the plots which received farmyard manure only, and from those which received in addition a complete dressing of artificials. It may be observed that the yields on the two unmanured plots were 7 tons 7 cwts. 1 qr., and 7 tons 2 cwts. per acre respectively.

	Dung only.			Dung with complete dressing of Artificials.		
	Tons	cwts.	qrs.	Tons	cwts.	qrs.
10 loads farmyard manure	11	10	0	11	10	0
15 " " "	11	11	2	11	9	0
20 " " "	11	12	0	12	3	1
25 " " "	11	16	3	11	4	3

The plots treated with artificials alone yielded considerably less than those which received dung in conjunction with artificials, but satisfactory results were only obtained when all three ingredients, phosphorus, potash and nitrogen, were present; the omission of any one of them caused the crop to fall almost to the level of the unmanured plots. As will be seen from the following figures Nitrate of Soda gave better results than Sulphate of Ammonia:—

	Yield per Acre.		
	Tons	cwts.	qrs.
4 cwts. Super., $1\frac{1}{2}$ cwts. Nitrate, and 2 cwts. Kainit	9	17	1
$1\frac{1}{2}$ cwts. Nitrate	8	0	2
2 cwts. Kainit	7	15	2
4 cwts. Super.	7	14	2
$1\frac{1}{2}$ cwts. Nitrate and 2 cwts. Kainit	8	12	3
2 cwts. Kainit and 4 cwts. Super.	7	13	3
$1\frac{1}{2}$ cwts. Nitrate and 4 cwts. Super.	7	10	2
2 cwts. Kainit, 4 cwts. Super, and $1\frac{1}{2}$ cwt. Ammonia	7	19	0
2 cwts. Kainit, 4 cwts. Super, $\frac{1}{2}$ cwt. Nitrate, and $\frac{1}{2}$ cwt. Ammonia	8	11	1
No Manure	7	7	1
	7	2	0

Compared with the unmanured plots it will be observed that the increase which was obtained by the use of 10 loads of-dung exceeded 4 tons per acre, while the largest increase obtained with artificials alone was about $2\frac{1}{2}$ tons on the plot where a complete dressing was applied.

Experiments which were carried out on light land at Blid-

worth did not show such a good result from the application of dung, but in the case of the artificial manures they confirmed the results furnished by the experiments at Hodsock, viz., that whilst a satisfactory increase may be obtained from a manure containing nitrogen, potash, and phosphates, the omission of any one of these ingredients, and particularly of potash, resulted in a very material decline in the produce. Farmyard manure at the rate of 10 loads per acre yielded 8 tons 8 cwt., and kiln dust at the rate of $\frac{1}{2}$ ton per acre yielded 10 tons and 2 qrs.

EXPERIMENTS ON THE FEEDING AND HOUSING OF POULTRY.

Some experiments to test the respective values of nitrogenous and carbonaceous rations for laying hens, and the influence of floored and unfloored poultry houses on the health of fowls have been carried out during the past two years at the West Virginia Agricultural Experiment Station.

The first experiments with nitrogenous and carbonaceous rations for laying hens were made in 1897-98; six lots of poultry were used with from ten to twenty fowls in a lot representing three breeds. Lots 1 to 3 were fed on a nitrogenous ration consisting of middlings, linseed meal, ground oats, and maize meal in varying proportions, together with ground fresh meat and bone, while Lots 4 to 6 received a carbonaceous ration, of which maize meal was the principal constituent. In addition, all the lots had either boiled potatoes or steamed clover hay, and, at night, all the whole grain they would eat, consisting of maize, oats, and wheat screenings, maize predominating for the lots fed with the carbonaceous ration. The test covered seven periods of thirty days each.

At the beginning of the experiment the fowls fed on the nitrogenous ration weighed 448 lbs. (per 100 fowls), and at the end of the seventh period 566 lbs. They consequently gained in weight 118 lbs., while the fowls fed with a carbonaceous ration gained only 11 lbs.

The nitrogenous ration cost slightly more money, but it is said to have been further profitable, because more eggs were laid by the hens fed on this ration, in addition to the gain in weight. Moreover, the eggs from the fowls fed with a nitrogenous ration were, it appears, larger, more fertile, and hatched better and produced far more vigorous chicks than those laid by the hens fed on the carbonaceous ration. Both lots of fowls are reported to have remained in a healthy, vigorous condition during the entire experiment.

The effect of the two kinds of rations on the fertility of the eggs was tested in incubators. Sixty-six per cent. of the eggs produced on the nitrogenous and 47 per cent. of those produced on the carbonaceous ration were fertile. The average weight per hundred of the former eggs was 12.68 lbs., and of the latter 11.57 lbs.

The second experiment was made in 1898-99 with four lots of White Leghorn chickens, each containing ten hens and one cock. Lots 1 and 3 were pullets, Lots 2 and 4 old fowls. Lots 1 and 2 were fed with the nitrogenous, and Lots 3 and 4 with the carbonaceous, ration. The test covered 7 periods of 30 days each. All the lots were given a mash of ground feed in the morning, Lots 1 and 2 receiving meat meal in addition during the first four periods, and ground fresh meat and bone during the remainder of the test. During periods 2, 3, and 4 all the lots were given boiled sugar beets; but, as the beets seemed to be making the fowls too fat, they were then dropped from the ration, although the fowls were very fond of them. At night all the lots were given as much grain as they would eat.

The results were calculated per 100 fowls. On this basis Lots 1 and 2 weighed respectively 227 and 304 lbs. at the beginning, and 272 and 273 lbs. at the close of the experiment; while Lots 3 and 4 weighed respectively, at the beginning 213 lbs. and 263 lbs., and at the close 250 lbs. and 300 lbs. It may be noted, however, that, had the experiment been concluded at the end of the third period, instead of the seventh, the fowls fed on the carbonaceous ration would have shown a gain of 74 lbs., and those fed on the nitrogenous ration a gain of 55 lbs. only, per 100 fowls.

The experiments to determine the influence of floored and unfloored houses on laying hens also extended over two years. In the first experiment six lots of fowls were included, representing the Black Langshan, Brown Leghorn, and Blue Andalusian breeds. Lots 1 to 3 were placed in pens in a portion of the poultry house which was floored with rough boards from 2 to 3 ft. above the ground, and the other lots were kept in pens in the unfloored portion. The grain ration fed varied somewhat during the five months during which the experiment lasted, but was uniform for all lots.

The results of the two years' experiments are stated to have shown that fowls remain in as healthy a condition, and lay as many or more eggs when kept in unfloored houses, as they do when kept in houses provided with floors.

PRODUCTION AND EXPORT OF FOOD GRAINS OF INDIA.

The proportion of the area of British India which is devoted to the production of food-grains is exceeded by few countries in the world, no less than 34 per cent. being devoted to this purpose. The area of India, exclusive of tributary States, is 542 million acres, and the surface under food grains such as rice, millets, wheat, barley, maize, and pulse in 1897-98 was according to the Agricultural Statistics of British India 182,745,000 acres, whilst the surface from which the remaining crops, including oil-seeds, cotton, sugar jute, fodder, orchard and garden produce was taken, only amounted to about 41 million acres, making a total productive area of 223 million acres. Of this, however, 27 millions carried more than one crop; so that the net cultivated area was about 196 million acres. It will therefore be seen that 82 per cent. of the gross cultivated area was devoted to the production of grain for food.

The most important of these grains is rice, which in 1897-98 occupied 70,781,000 acres, an area about 3 million acres above the average of the previous five years. This cereal is cultivated throughout India, but most largely in Bengal,

where about 38 million acres are annually sown. The other provinces where rice fields cover any considerable area are Madras, 6,700,000 acres; Burma, 6,600,000 acres; North West Provinces and Oudh, 7,400,000; and the Central Provinces, 4,600,000 acres. The total yield of rice in British India is stated to amount to 28 million tons in an average year, but no annual estimates of the yield are prepared for the whole of India. For the three provinces of Bengal, Madras, and Burma, the yield for five years 1894-98 averaged about 21,850,000 tons of cleaned rice. This grain, as is well known, forms one of the chief articles of human food in India, and it may be noted that of the total production only about 1,600,000 tons, or about 5.7 per cent., are exported.

The importance, however, of rice to the native population for food purposes is probably approached, if not exceeded, by that of millets and pulse; indeed, it is stated in the "Dictionary of Economic Products of India" that whilst rice is the staple food of the people of Bengal, and probably of Madras and Burma, yet, taking the people of India as a whole, millets and pulse collectively might with greater approximation to accuracy be named as the chief food materials. In many parts of India, rice is indeed as much a luxury as wheat is in others, and even in rice-producing districts the poor have often to eke out subsistence by greatly supplementing rice diet by coarser and less expensive articles. The area devoted to millet and pulse crops cannot be accurately stated as the statistics show about 26 million acres sown with "other grain and pulse crops," but it is probable that these are largely peas, beans, and other leguminous varieties; the surface, however, devoted to millet and gram or chick-pea alone amounted to nearly 51 million acres in 1897-98. Millets of various kinds are largely grown for home consumption in the wheat-producing districts; the principal varieties being jawar, *Sorghum vulgare* or great millet, bajra or spiked millet; and ragi, which is the staple grain of Mysore, where it was cultivated to the extent of 2,391,000 acres. The area devoted to jawar in 1897-98 was 23,800,000 acres; whilst bajra was grown on 12,900,000 acres; and ragi on 3,774,000 acres, in addition to the area in Mysore. No

estimate is made of the production, but it is practically all devoted to home consumption, the average annual export of jawar and bajra in the five years 1894-98 amounting only to about 48,000 tons, which was sent chiefly to the African coast of the Red Sea and to Aden and Arabia. There is also a regular export of these grains to England, where they are used for bird-food.

Gram or chick-pea covers about 10 million acres, but is chiefly grown in the cold season, and the same land yields in addition some other product, such as wheat or rice. The quantity exported amounts to about 17,000 tons annually, while there were also about 28,000 tons of other kinds of pulse exported.

With regard to wheat, which, from its effect on the European market, is the crop which attracts the most attention in this country, particulars of the current harvest will be found on p. 252 of this Journal, with details for the different provinces, including various native States. For purposes of comparison, however, the variations in acreage and production are shown in the following table for the past

Year.	Acreage.	Yield.	Quantity required for seed at two bushels per acre.	Exports, less imports, including flour, in the succeeding year.	Quantity available for consumption.
		Tons.	Tons.	Tons.	Tons.
1893-4	26,778,000	6,771,000	1,393,000	373,000	5,006,000
1894-5	25,004,000	6,279,000	1,245,000	538,000	4,496,000
1895-6	23,242,000	5,311,000	1,019,000	106,000	4,186,000
1896-7	19,024,000	4,803,000	1,230,000	150,000	3,513,000
1897-8	22,954,000	6,087,000	1,281,000	1,023,000	4,158,000
1898-9	23,923,000	6,340,000	934,000	506,000	4,880,000
1899-1900	27,438,000	4,891,000	—	—	—

*Flour estimated.

seven years, together with the amount remaining for consumption after deducting the exports of grain and flour, and allowing 120 lbs. per acre for seed. This amount appears to have averaged about 20,700,000 quarters during this period.

The above table represents a somewhat exceptional period, including as it does three unfavourable years, viz., 1895-6,

1896-7, and 1899-1900; but good wheat harvests are not, it is stated, to be expected with the regularity with which a good rice harvest may be expected in Burma, as the wheat crop is grown in regions which too frequently are subject to meteorological vicissitudes, and deficiency or irregularity in the monsoon rains spells varying degrees of misfortune for the cultivator.

The effect of the failure of the harvest upon the price of wheat may be judged by the following table, issued by the Statistical Department of India, which shows the number of kilograms (about 2½ lbs.) of wheat which could be obtained for one rupee in the Panjab, North-West Provinces, Central Provinces, and Bombay in certain months of the past seven years.

	Panjab.	N.-W. P. and Oudh.	Central Provinces.	Bombay.
	Kilos per rupee.			
March 1894	23'88	16'19	18'06	13'12
March 1895	21'62	15'19	14'56	14'56
March 1896	14'25	12'25	13'88	13'37
March 1897	8'25	8'88	9	7'75
March 1898	14'37	12'94	11'19	9'56
March 1899	17'5	17'19	15	12'04
August "	17'44	15'69	13'06	11'25
September "	11'60	12'87	11'19	9'62
October "	10'25	10'56	9'94	8'06
November "	10'37	11'25	9'10	7'62
December "	11'36	11'04	8'5	8
January 1900	10'56	11'25	9'37	8
February "	11	11'36	9'5	8
March "	11'81	12'11	9'44	7'62
April "	13	12'62	9'37	7'75

It will be seen from this that in 1894 and 1895, when the yield was considerably over 6 million tons, the weight of wheat which could be purchased in the Panjab for a rupee in March of those years was 52½ lbs. (23'88 kilos.) and 47½ lbs. (21'62 kilos.) respectively. In 1896, when the out-turn was not so promising and only amounted to 5½ million tons, the

quantity declined to 31½ lbs. (14.25 kilos.) and in the following year of famine, when the yield was almost identical with that of the current season 1899-1900, viz., 4,893,000 tons, only 18 lbs. (8.25 kilos.) were given for a rupee. In the two following years, with improved prospects, 31½ lbs. (14.37 kilos.) and 38½ lbs. (17.5 kilos.) could be obtained; but immediately on the failure of the monsoon in September, 1899, prices rose and the quantity per rupee declined to 25½ lbs. (11.69 kilos.) which was about the figure in March last.

With regard to the wheat export, this—as a consequence, no doubt, of bad and indifferent harvests—has shown a considerable falling off in recent years, the averages for quinquennial periods since 1879-80 being as follows:—

	Tons.
1879-80 to 1883-84	647,400
1884-85 „ 1888-89	903,300
1889-90 „ 1893-94	855,600
1894-95 „ 1898-99	407,200

The above figures are exclusive of wheat flour, which shows some tendency to increase, the average for five years 1889-90 to 1893-4 being 25,300 tons, and for 1894-5 to 1898-99 30,400 tons.

As regards the remaining food-grains, maize is grown on about 5½ million acres, chiefly in Bengal and the Panjab, and is used for home consumption, no export of this article being recorded. Barley has varied in the five years 1894-98 from 5 to 8 million acres, and is chiefly cultivated in the North-West Provinces and Oudh, Panjab and Bengal. A small export takes place, varying from one to four thousand tons.

HIRING FAIRS IN ENGLAND.

Hiring fairs, though formerly in existence in many parts of England, are now mainly confined to the Northern Counties. Even in these districts there has been a marked tendency in recent years for the best men to get re-engaged by their old employers, or by new masters, without going to the fairs.

The difficulty of getting women at the fairs for dairy work or for service in farmhouses is generally said to be an increasing one.

In Northumberland and Durham the yearly system of hiring the ploughmen or hinds, who form the larger proportion of the farm servants, is generally similar to that in Scotland. The men are hired at fairs in March, the term of service beginning in May. Half-yearly hirings are also held in some towns for unmarried men and youths, and also for women and girls for farmhouse work.

In the counties of Cumberland, North Lancashire, and Westmorland, where the majority of farm servants are unmarried and live and board in the farmhouses, the engagements are chiefly half-yearly. It is customary for farm servants to attend several hirings, often situated in two or perhaps three of these counties, with the object of obtaining amusement and of meeting their friends as well as of getting situations. In Yorkshire yearly hirings and also some half-yearly ones are held at most of the principal market towns in the three Ridings at May Day and Martinmas. Lincolnshire is the next county after those already referred to where the practice of hiring at fairs (or “statutes”) is the most common. Foremen and men in charge of animals are engaged by the year; single men are usually hired at fairs, but married men are generally engaged privately, often by advertisement. The married men live on the farms in cottages, which they always have free, with gardens. The unmarried men seldom lodge with the farmer, but generally with the foreman or “seedsman,” who receives from his employer a weekly cash payment for the board of each, or else a smaller cash payment, and an allowance of pork, potatoes, beer or other food. Occasionally the men receive more cash and find their own food. Single men are nearly all hired at the fairs held in the first and second weeks in May, and some foremen and married men in charge of animals are hired at the Candlemas fairs, of which that held at Louth is the principal. In the neighbouring counties of Nottingham and Rutland very similar systems prevail, the engagements usually taking place at May, though there is

some hiring at Martinmas. Married men are usually engaged privately and are not hired at fairs. In Rutland a little hiring, chiefly for lads to live in the farmhouses, still takes place in November at Oakham and Ketton; but the custom of hiring and of boarding in the farmhouses is almost extinct, and appears to be only resorted to where there are no cottages available. Yearly hirings take place in September in Cambridgeshire at Wisbech for foremen, shepherds, horsekeepers, and cattlemen. Married as well as unmarried men are frequently engaged at this fair. The horsekeepers are, as a rule, unmarried, and lodge in the foreman's cottage, where they either board themselves or are supplied with meals for about 8s. or 8s. 6d. a week.

In Derbyshire, Shropshire, Stafford, Warwick, Leicester, Worcester, Oxford, Berks, and Bucks, the practice of hiring at fairs ("statute fairs," or "mops" as they are called in some places) exists, though to a much smaller extent than formerly, in regard to the yearly hiring of men and youths to take charge of horses and cattle, and also of women and girls for situations in farmhouses and for domestic service. Many of the so-called hiring fairs in these counties are now merely pleasure fairs, the system of private engagements having become almost universal. In Cheshire the hirings formerly held have become extinct. The other counties in which hiring at fairs takes place are in the South and South-West of England; and in all the system may be said to be rapidly dying out, engagements being now made privately or through the medium of advertisements. Among those counties in which it is most prevalent are Hereford and Monmouth. A little hiring at fairs still takes place in Hampshire, Dorset, Wilts, and Gloucester, and a good many labourers of all classes are still hired at the yearly Dorchester fairs in February, though it is stated that they are not of the best class, either there or at the Wiltshire fairs.

[*Earnings of Agricultural Labourers in the United Kingdom. Cd. 346.*]

AGRICULTURE IN THE CONGESTED DISTRICTS OF IRELAND.

The ninth annual report of the Congested Districts Board for Ireland states that during the year ending March 31st, 1900, seven agricultural instructors were employed in various districts of three counties, viz., Donegal, Mayo, and Galway. In accordance with their duties, they advised small landholders as to the management and improvement of their land and stock, they lent farm implements, they inspected animals supplied by the Board, and they had charge of thirty-one example holdings, and about 500 experimental and example plots. The work on some example holdings chiefly consists of permanent improvements, draining, levelling, and clearing away rocks; in others small grants of seeds and manures are made in order to induce the occupiers to adopt a better rotation, or to grow crops such as mangolds, or new varieties of potatoes which may not be sufficiently known in the district. Free grants of vegetable and garden seeds were also made to 320 plot-holders, many of whom never grow any vegetables other than potatoes and cabbage.

The report states that the board had 26 stallions standing in the congested districts, viz., four thoroughbreds, fifteen hackneys, four Welsh cobs, one pony, and two cart-horses. The demand for the use of these horses was never so keen as in 1899, owing to the increased prices which have in recent years been realised for young stock. A large number of half-bred hackneys in the hands of private owners in the United Kingdom have been carefully watched with a view of ascertaining their merits, and almost without exception the reports have been satisfactory, while in no case has any want of staying power in the half-bred hackney been alleged. Good prices have frequently been obtained for horses bred and broken to harness in the congested districts, and the numerous inquiries made by dealers and other buyers regarding the districts in which the Board's horses are stationed point to an even keener demand in the future.

Seventy bulls were sold to farmers during the year on the instalment system, the total number now held by farmers

under this arrangement amounting to 229 animals, viz., 81 Galloways, 80 Polled Angus, 52 Shorthorns, and 16 Red Polls. The average cost of the bulls purchased in 1899 was £33, freight included, and they were sold as follows: the Shorthorns, Aberdeen Angus, and Red Polls for £15 each, and the Galloways at £10 a head. In all cases an additional sum of £10 is payable if the conditions in the agreement are not observed. The marked improvement that has taken place in the young stock in those districts where the scheme for the improvement of cattle has been in operation, and the increased prices that have been realised by the breeders, are reported to be most encouraging. The difficulty of obtaining suitable bulls at reasonable prices is, however, very considerable.

The prevalence of sheep scab prevented the Board from sending out rams. Twenty-eight boars, all of the Yorkshire breed, were sold during the year on the instalment system, thus increasing the total number held on those terms to 43.

Grants of £100 each were made to two poor districts in County Donegal for the erection of small buildings to be attached to the cottages for keeping milk and butter. An expenditure of £300 was authorised for carrying out experiments in the use of separated milk, alone or mixed with other foods, for feeding calves. Creameries have now become so numerous in Ireland that the best means of utilising separated milk for calf-feeding is a matter of very great importance. Small contributions towards the list of prizes offered at local shows were also made last year to several agricultural societies.

POULTRY REARING IN IRISH CONGESTED DISTRICTS.

The improvement of poultry in the West of Ireland was first undertaken by the Congested Districts Board in the year 1892. A large number of birds were distributed, but the system was found to be too liberal and expensive. Under the

present scheme, which was adopted in 1893, a limited number of fowls (generally 22) of an approved breed is supplied to a farmer or cottager in each small district. He receives from the Board one penny for every egg which he distributes, and it is also his duty to obtain, in exchange, an equivalent number of eggs of the country breed. This system has now been some years in full operation, and in 1899-1900 the Board paid no less than £400 for more than 98,000 eggs, which were distributed. The results are apparent in the increased size of eggs in many districts, and when the new system of grading eggs for market according to size becomes more general the improvement effected will, it is hoped, be still more appreciated by the people.

It has been found in the congested districts that the best laying fowls are not the pure breeds, but first crosses with them and the ordinary fowl of the country. As regards table breeds, however, the case is different, inasmuch as the crosses with the country fowl do not produce good results, and the finer birds hatched from the distributed eggs are consequently too often sent to market at the first opportunity. Notwithstanding this tendency, a good supply of table fowls has been maintained near Killarney, where there are two distributing centres; and one exporter despatched 4,900 birds during the year from that locality.

The varieties of fowls chiefly distributed during the year were Black Minorca, Leghorn, Faverolle, and Sussex, and the number of birds sent out amounted to 384 fowls, 578 Indian Runner ducks, 20 geese, and 5 turkeys, a total of 987, which cost £162. The popularity of Runner ducks is due to their good laying qualities and their immunity from fowl enteritis, a disease which is still very prevalent and very destructive.

From careful records kept by some of the Board's distributors, it has been ascertained that the laying average of the Indian Runner duck is 155 eggs for each bird, while the average for Minorca and Leghorn fowl is 150, and only 138 for the other breeds named; Plymouth Rocks do not give nearly so good a return. These records were obtained from stock kept under the average conditions which prevail in the Irish Congested Districts, where the poultry are exposed to

wind and rain, and during a considerable portion of the year they were fed entirely on Indian meal and potatoes.

[*Annual Report of the Congested Districts Board for Ireland. Cd.239. Price 5½d.*]

FLAX IN IRELAND.

The thirty-second annual report of the Flax Supply Association for the Improvement of the Culture of Flax in Ireland gives the following information as to the results of the flax harvest of 1899.

The area under flax in Ireland was 500 acres more than in 1898, but only amounted to a total of 34,989 acres. The figures for these two years were lower than in any previously recorded year, and, as will be seen from the following table, both the acreage and production were only about one-half of the average of the past ten years. The deficiency has been made up by an increase in the imports, the net supply for the two years 1898-99 together being about equal to the ten year average.

Year.	Acreage.	Production.	Imports.	Exports.	Net Supply.
		Tons.	Tons.	Tons.	Tons.
1895	95,200	12,970	33,500	5,253	11,225
1896	72,053	10,244	36,630	4,506	10,209
1897	46,576	6,818	37,743	4,446	10,007
1898	31,489	6,282	34,440	3,634	37,087
1899	34,989	6,743	40,745	3,418	43,450
Average for 10 years 1890-99.	69,374	12,254	37,383	4,326	40,309

The Association have employed experts in the three districts of Coleraine, Broughshane, and Dromara for the purpose of assisting and instructing farmers in the cultivation of flax, and the Report states that as a result a general improvement throughout the districts visited has been manifested and higher prices obtained.

In the Coleraine districts, two co-operative flax-scutching societies had been formed and numerous plots established for testing seeds and manures.

ACREAGE OF HOPS.

On the 29th August last the Board of Agriculture issued the following preliminary statement compiled from the returns collected on the 4th June, 1900, showing the acreage under hops in each county of England in which hops were grown, with a comparative statement for the years 1899, 1898, 1897.

COUNTIES.	1900.	1899.	1898.	1897.
	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>
GLOUCESTER	47	42	40	40
HANTS	2,231	2,319	2,263	2,306
HEREFORD	7,287	7,227	6,651	6,542
KENT	31,514	31,988	30,941	31,661
MONMOUTH	—	—	2	2
SALOP	138	138	126	129
SUFFOLK	4	4	3	2
SURREY	1,300	1,388	1,313	1,416
SUSSEX	4,823	4,949	4,829	5,174
WORCESTER	3,964	3,788	3,567	3,591
Total	51,308	51,843	49,735	50,863

THE PASTORAL INDUSTRY OF THE FALKLAND ISLANDS.

The last annual report issued regarding this colony states that the staple industry of sheep farming is in a flourishing condition which is likely still further to improve now that scab among the flocks has been eradicated.

There are 30 occupiers of land in the Falkland Islands, whose holdings and stock vary to a striking extent. There are only four farms of less than 6,000 acres, with an average

of 1,000 sheep each. Two farmers own 50,000 sheep each, and one has 258,000 on a farm of 800,000 acres.

With the exception of the island of South Georgia, of which the latitude corresponds to that of Yorkshire, there are no unappropriated lands. All the land leases, at £20 per section of 6,000 acres, were renewed by the Crown between the years 1892-7 for the space of 21 years, and station-holders have not shown any disposition to sell out or to transfer their leases. The area occupied is returned at 2,317,620 acres and the total of the flocks at 780,000 sheep.

EXPORT OF WHEAT FROM ARGENTINA.

The quantity of wheat which it is anticipated will be exported from the Argentine Republic during the present year is estimated by Mr. F. S. Clarke, Secretary of Her Majesty's Legation at Buenos Ayres, at some 2,000,000 tons, against a total of about 1,763,000 tons in 1899; and in support of this estimate it may be noted that according to the Argentine Trade Returns the actual quantity of wheat exported in the first six months of this year has amounted to 1,500,000 tons as compared with over a million tons for the same period of last year. No estimate of production has been issued by the Argentine Ministry referring to the current season, but the estimated area sown with wheat for the harvest 1899-1900 was officially stated to be about 400,000 acres more than in the previous year, and Mr. Vice Consul Hankin, in his report on Buenos Ayres, states that a larger crop has been gathered this year than ever before.

The following table shows the fluctuations which have taken place in the wheat export during the past eight years. The small quantity exported in certain years was due to the

damage sustained by the crops from locusts, hail-storms, etc.

Year.	Quantity.	Value.	Average Value per Ton.
	Tons.	£	£
1892	463,000	2,939,000	6.35
1893	992,000	4,692,000	4.73
1894	1,582,000	5,424,000	3.43
1895	994,000	3,894,000	3.92
1896	515,000	2,566,000	4.98
1897	100,000	694,000	6.94
1898	635,000	4,474,000	7.05
1899	1,763,000	—	—

As affording some indication of the home requirements of the Republic, the calculation made by the Ministry of Agriculture of the consumption and export of wheat up to the end of 1899 may be given here.

	Tons.	Tons.
Production of wheat in 1898-99 from an area of 7,503,000 acres	—	2,811,000
Export of wheat up to December 20th, 1899	1,697,300	
Export of flour	78,700	
Home consumption, 4,645,000 inhabitants at 293 lbs. each	608,000	
Seed for 7,900,000 acres at 58 lbs. per acre	205,000	2,589,000

This leaves a balance of 222,000 tons which were presumably remaining in the country at the beginning of this year. As the requirements for seed and consumption apparently amount to about 813,000 tons, a total production not differing materially from that of last year would seemingly admit of an export of about 2,000,000 tons.

In Argentina the cultivation of wheat and its export is being gradually promoted and improved. The extension of railways has done much already in the last few years to assist matters as regards transport, but, as Mr. Clarke points out, there is still an urgent want of grain elevators in different centres of production and export. It appears, however, that the Government have already granted a concession for 40 years to a private firm to erect grain elevators and the necessary storehouses in the port of Buenos Ayres. No rent for the land occupied is to be paid for the first five years, after which the question of rent is to be settled every five

years. A sum of £60,000 at least is to be expended on the works.

INTERNATIONAL CATTLE SHOW AT CHICAGO.

The Board have received from the Foreign Office information which has been furnished by Mr. Wyndham, Her Majesty's Consul at Chicago, relating to an International Live Stock Exposition which has been announced to take place at Chicago from the 1st to the 8th of December next.

The show is stated to be organised in accordance with the wishes of the associated live stock interests of the country, and that it is under the direction of the pedigree breeding associations and of the representative stockmen of the United States and foreign countries. It is intended purely for exhibition purposes, and its primary object is to display the improvement which has taken place in breeding fat cattle and the production of meat generally. There will be no gate money, inasmuch as there is no financial profit in view; but it is hoped that a fund will be created whereby the show will be repeated annually at Chicago. The scope of the exhibition will be very comprehensive, and it will include the various industries which are subsidiary to the meat trade. For instance, in addition to the show of cattle, sheep, and hogs, there will be exhibitions of (1) dressed meats and food products, showing the complete utilisation of all parts of the slaughtered animal used for food, as well as those parts not so used; (2) slaughter tests, showing the results of different feeding methods employed in fattening cattle for market, and the effect of different foods; (3) packing house methods and appliances, including Government inspection of meat, feeding appliances, and methods showing public inspection of live animals; and (4) transportation appliances of all kinds for the carriage of animals and meat.

A cart-horse show will also take place, but with this exception the exhibition will be limited to the "preparation of edible meats." There will be feeding demonstrations, the

animals will be slaughtered, and a carefully prepared bulletin will indicate, with regard to each carcass, the quality and quantity of food used.

Exhibits will not be limited to American products, and it is expected that some of the judges will be Englishmen. Exhibits from Canada, or any other foreign country, will be admitted in bond, with no charge for import duties, unless sold in the United States. All applications for entries must be made on printed forms, which may be obtained free from the General Manager, International Live Stock Exposition, Union Stock Yards, Chicago.

Mr. Wyndham has been informed that purchasers have been sent to England in order to buy choice stock for exhibition and subsequent sale, and he reports that a special order has been issued by the Secretary for Agriculture at Washington whereby Canadian cattle may be sent to the Exhibition without being subjected to the tuberculin test, provided they are accompanied by a certificate issued by a Canadian official or veterinarian, stating that the cattle are free from contagious and infectious disease. All such Canadian cattle, sheep, and swine will be sent straight to the Exhibition grounds, and they will be returned immediately to Canada at the close of the show.

CATTLE AND SHEEP RAISING IN THE UNITED STATES.

In an earlier number of this Journal attention was directed to the great decrease which has taken place in the numbers of beef cattle in the United States during the past decade. It was shown that the number of cattle, other than milch cows, after a rapid increase in the early eighties, attained a maximum of 37,651,000 head in 1892, when a decline set in which has since been continuous. So rapid has been this decline that the number on January 1st, 1900, was only 27,610,000, representing a loss of nearly 10,000,000 head in eight years. But the effect of this great depopulation of the bovine herds has not been reflected to an equal extent in the output of beef.

According to an interesting article by Mr. Clay, of Chicago, published in the Year Book of the United States Department of Agriculture for 1899, much of the apparent diminution in the production of beef consequent upon the decline in the numbers of cattle has been made up by what is known as the system of early maturity. A shorter period than was formerly the case is now occupied in preparing a beast for the butcher, and the two-year-old has taken the place of the three-year-old on the block. It is practically impossible to estimate the precise effects of this change in practice on the production of meat, but it is generally recognised that the loss in numbers has been largely compensated by finishing the animals at an earlier age.

As regards the composition of the existing herds in the United States, it appears that while there is a fair number of medium cattle there is a lack of prime bullocks. After the boom in cattle prices from 1882 to 1884, there followed a period of depression which drove the average breeder of fine stock almost out of the market. There was a serious depletion of the pure-bred herds, and in some years numbers of well-bred bulls had to be steered. Formerly cattle were largely reared on the open ranges of Texas, Colorado, Wyoming, Montana, and other Western States, but gradually the days of cattle grazing on free grass are being numbered. The present position is thus described: "When the ranchman found out the value of the grass on the arid regions, and was not overstocked, he raised a steer for a comparative trifle, and the men on the high-priced lands of the Eastern and Central States found a new competitor, who cut into their profits. But that era is coming to a close. The free grazing lands, or at least the watered portions, are being pre-empted in one way and another, so that the cost of producing a steer in the West varies but little from that of growing one in the East, when the cost of transportation to market and other incidentals are considered. The breeding of cattle on free grass is practically a thing of the past. A few large herds remain, but in another decade they will have gone. The free grass of the West will be cropped by cattle that are fed in fields in the winter, by steers

imported from other parts of the country, but the lion's share will go to our vast flocks of sheep that have found a natural home in the valleys and divides of the Western and inter-mountain States."

In the case of sheep there have been greater variations than in cattle. A maximum sheep-stock of 50,627,000 was reached in 1884, and afterwards succeeded by a fall to 42,599,000 in 1889, which was followed by a rise to 47,274,000 in 1893, and by a further fall to 36,819,000 in 1897; but since the latter year there has been an uninterrupted rise to 41,883,000 in 1900. An interesting feature connected with the production of mutton has been the growth of the flocks grazed on the open range lands which now constitute the great source of the mutton and wool supply of the United States. The "range sheep" is displacing the "range steer." "We are," says Mr. Clay, "so to speak, in a transition state, so far as our flocks are concerned. With low prices for wool, and our sheep unable to compete in a mutton line against our beef and hog products, the small raiser of sheep in such states as Ohio and Indiana was driven out of the field. On free grass they could be produced cheaply, and the fed Western wether, raised say in Wyoming and finished on Nebraska corn, could be placed on the market at a figure far below the cost of the same animal in the granger states."

But in the opinion of this authority the grazing of sheep on the open range cannot long be maintained under present conditions. As the flocks increase, the supply of wild grass will become more and more exhausted, and winter feed will have to be provided, with a consequent material rise in the cost of production. As a result, Mr. Clay expects to see smaller flocks in the West, more attention to winter feeding, and consequently less loss: "Then will come the day when the flocks of the pure-blood breeder will be drawn upon heavily and undoubtedly successfully, although from the peculiarities of this trade it is by no means so certain that the results will be as far reaching in this branch of our live stock trade as in the beef-making line."

To the influence of the foreign demand, mainly British, is attributed much of the progress of the cattle industry in the

United States. In Mr. Clay's view the foreign demand has been the greatest incentive to improvement. "It developed," he says, "years ago in the inquiry for our hog products, an issue we were able successfully to meet. In our sheep exports we are still along way below the European standard. True, we send large numbers of sheep to Great Britain, but they fill a third-rate place. Thus far blood has not been used effectively in this line, but it will come. It is with cattle that we are at present reaping the best results of well-sown seed. We go to the parent country, buy in Aberdeen their best Shorthorns and Angus cattle, from Hereford and other parts of England we import the best white-faced blood. Streaming through our native pure-bred herds it reaches in diluted form our feed-yard steers, and then it returns across the ocean, giving that reciprocity of trade which England cultivates so generously. The Europeans do not get our best cattle, because New York and Boston still claim these, but the exporter buys a grade close to the top. He wants nothing else. This influence on the market has been far-reaching and all-powerful when we come to gauge quality. Our foreign demand is here to stay, and it is a most important factor in our commerce. It can be helped mightily by the breeders of both classes—those who raise the bulls and those who raise the steers. It is a fertile field, boundless in its size, and it is ready to be cultivated. It is a mine from which we can dig more gold than from all the real mines put together. It gives labour and means of support to hundreds of thousands of our farmers, and that means happiness, individual and national. One of the well-springs of our prosperity rises in our export trade, and among its various branches our live stock products form no mean proportion; for, in our annual shipments across the Atlantic, we estimate our cattle and sheep in hundreds of thousands, and our dressed products in millions of pounds. Our live cattle exports alone last year exceeded in value £6,250,000, while our meats and dairy products had an aggregate value of £37,500,000, a seventh of the total value placed upon our exports of domestic merchandise in the calendar year 1899."

CATTLE INDUSTRY OF KANSAS.

In connection with the foregoing article, attention may be usefully directed to an interesting report by Mr. Vice-Consul Young on the cattle trade of Kansas. This industry cannot be treated as totally distinct from that of the surrounding country, inasmuch as the industry in Kansas is essentially bound up with that of Oklahoma, Texas, and other parts; the same cattle at one time running upon the open range in New Mexico, and at another time feeding in the maize-fields of Eastern Kansas. From a cattleman's point of view the western country may be divided into three sections: the first, of which Eastern Kansas is typical, is a rich, well-watered country, producing abundant crops, of which maize is the chief, and containing admirable pastures of blue grass. In the second district, of which Central Kansas is a type, the rainfall is somewhat uncertain, but maize and other feeding crops are grown along the watercourses, while the uplands produce a "blue stem grass," which furnishes excellent grazing. The third district resembles Western Kansas, and embraces land of little value except for grazing, the rainfall is very irregular, and the herbage consists for the most part of what is known as "buffalo grass," which grows throughout the west and down into Texas.

According to Mr. Young's report, there has been a tendency in the Western States to improve the herds by the introduction of high-class pedigree bulls, as it has been found that the cost of this system is more than met by the increased yield of beef thereby obtained for the same expenditure on grass and feed. The most popular grade of cattle at the present time is the Hereford, but there is, it seems, also a demand for Polled Angus, and Shorthorns find favour with many breeders. It is now usual for cattle-raisers to run the stock animals in pastures separate from the steers, and the two grades are differently handled. Stock cattle are no longer permitted to run on the open range in the more settled districts of Texas, but they are kept almost entirely to fenced pastures. From such animals an average

calf return of about 60 to 70 per cent. is generally looked for. In the case of steers, it is customary in the Panhandle district of Texas to allow for an annual loss of about 5 per cent., while with stock cattle the loss is usually reckoned at not less than 10 per cent.

The feeding of steers is a most important industry throughout the Western States, and maize constitutes the principal fodder for this purpose, the majority of farmers preferring to give this corn to cattle rather than sell it. "The argument is," Mr. Young writes, "that by feeding cattle and getting the resulting increase in weight as well as the better price paid for matured beef cattle, a larger sum is netted from the corn than by selling it direct." The Kansas farmer, therefore, when his crop is ready, frequently buys steers, borrowing the money to do so. The corn and other crops are then given to the steers, and these animals marketed when ready. Apart from maize and alfalfa (or lucerne), the most usual feeding-stuffs employed are kaffir corn, sorghum, soy beans, stock peas, clover, millet, timothy and other hays. The steers usually weigh about 1,000 lbs. before being fed, and, with a well-balanced ration, are calculated to put on, under favourable circumstances, as much as three pounds a day, so that with a hundred days' feeding a steer is estimated to have a live weight of 1,300 lbs. These figures are given as averages only; variations, of course, occur with the character of the animal and other conditions. The market price of a steer weighing 1,000 lbs. to the farmer is put at £7, and the cost of feeding the animal for 100 days is estimated at £3; against this outlay there is the value of the steer weighing 1,300 lbs., which is put at 20s. per 100 lbs., or a total of £13, thus leaving £3 gross profit, from which the cost of handling, transportation, and other incidental charges have to be deducted.

THE DAIRYING INDUSTRY OF THE UNITED STATES.

The estimated number of cows in the United States on Jan. 1, 1900, was 16,292,360, as compared with 15,952,883 on

the same date in 1890 and 12,027,000 ten years earlier. The States possessing the largest number of cows are New York, 1,487,000; Iowa, 1,263,000; Illinois, 1,021,000; Wisconsin, 1,003,000; and Pennsylvania, 970,000. The States having over 500,000 each, but less than 800,000, are Ohio, Kansas, Missouri, Minnesota, Nebraska and Indiana. Texas also is credited with 700,000 cows, but very few of them are dairy animals.

As regards the breeds of cows, shorthorns formed the foundation upon which many dairy herds were built up during the first half of this century, and much of this blood is still found in dairying districts. But shorthorns are now chiefly bred for beef, and the dairy industry mainly depends upon animals graded and improved from Ayrshires, Holsteins, Friesians, and Channel Islands stock. Associations for the maintenance of the purity of the respective breeds have been formed since 1850, and they all record pedigrees and publish registers or herd-books. The number of pure-bred animals of these different breeds is estimated at between 200,000 and 300,000, but their blood is so generally diffused that half-breds or higher grades are numerous in all dairy herds.

The factory system, co-operative and otherwise, has become an important feature of the American dairying industry. At first the cheese factories and creameries were established on purely co-operative principles, and it is in this form that the system has usually been extended. The organisation of such establishments has been thus described, "The cow owners and producers of milk co-operate and share upon any agreed basis, in organising, building, equipping, and managing the factory and disposing of its products. The farmers interested as joint owners, and all who contribute milk and cream, are called the patrons. The operations are managed by a committee or board of directors chosen by and from the patrons. If the business is large enough to warrant the expense, the immediate supervision of the concern and all its interests is entrusted to a single manager employed by the board. In a factory of this kind all expenses are deducted from the gross receipts from sales,

and the remainder is divided *pro rata* among the patrons upon the basis of the raw material contributed." In addition to these co-operative concerns there are now numerous examples of factories run by companies and private owners.

The factory system is stated to have removed cheese-making in the United States almost entirely from the category of domestic arts to that of manufactures. Farm-made cheeses are only used locally and make no impression upon the markets. In the middle of this century it is estimated that about 100 million pounds of cheese were made annually in the United States, and all of it in farm dairies; whilst, at the close the annual production is estimated at about 300 million pounds, nearly all of which is made in factories. Of these establishments there are nearly 3,000, but they vary greatly in capacity and many are very small. New York and Wisconsin have each a thousand, and these two States produce three-fourths of the entire output of the country. The other cheese-making States, in the order of quantity produced, are Ohio, Illinois, Michigan, and Pennsylvania; but they are all comparatively unimportant. A change which is taking place in the factory system is that of bringing a number of factories previously independent into a "combination" or under the same management. This tends to improve the quality and secure greater uniformity in the product, and often reduces the cost of manufacture. More than nine-tenths of all the cheese made is of the familiar variety, copied from the Cheddar, but new kinds and imitations of foreign varieties are increasing. The cheese made in the country, with the small importations added, and the exports amounting to 30,000,000 to 50,000,000 pounds deducted, gives a yearly allowance per head of about $3\frac{1}{2}$ lbs.

In spite of the rapid increase of creameries, especially in the newer and growing agricultural States, such as Minnesota, Nebraska, Kansas, South Dakota, and Washington, there is still much more butter made on farms in the United States than in creameries. Creamery butter controls all the large markets, the dairy butter making comparatively little impression on the trade.

The total number of creameries in the United States is

stated to be about 7,500, and of this number, Iowa, which is the principal butter-producing State, has 780, about two-fifths of which are co-operative. In these creameries about 88,000,000 pounds of butter are yearly made from the milk of 624,000 cows, and it is estimated that in the same State another 50,000,000 pounds of butter are made in farm dairies. The total butter product of this State is therefore one-tenth of the total production of the country, which is estimated at about 1,400,000,000 lbs. New York is next in importance as a butter-making State, and then come, in order, Pennsylvania, Illinois, Wisconsin, Minnesota, Ohio, and Kansas. The average quality of butter in America is said to have materially improved since the introduction of the creamery system and the use of modern appliances. Nevertheless so considerable a quantity of poor butter is made as to make it a large and profitable business to collect it from country shops at very low prices and to "renovate" it by patent processes. This renovated butter is sold to a considerable extent as the true creamery article, of which it is a fair imitation while fresh, but several States have recently made laws to identify the product and prevent buyers from being deceived. No butter is imported into the United States, and the quantity exported is as yet insignificant. The home consumption is estimated at the rate of about 20 lbs. annually per head.

[Year Book of the United States Department of Agriculture, 1899]

AGRICULTURE IN CUBA.

In the annual report on the trade of Cuba for the year 1899, Mr. Carden, H.M. Consul-General at Havana, gives some interesting information respecting the present agricultural conditions of the island, which exhibits the anomaly of a purely agricultural and exceptionally fertile country depending very largely on foreign countries for its food supply. It is estimated that in 1899 the total imports of food products alone amounted in value to something like

£6,740,000. Detailed statistics of the trade of Cuba are not yet available, except as regards live stock. Of this there were imported 339,000 steers in 1899, partly for food and partly for labour, besides 60,000 cattle for breeding purposes. These cattle came mostly from Mexico and Central America.

Stock raising has always been a lucrative industry in Cuba in times of peace, pasture and water being plentiful, and the climate equable, while there are few insect pests or diseases. The home market is large, as meat is widely used by all classes as an article of diet, and there is a constant demand for working bullocks for farm use: cattle are therefore not exported. The profits of the industry in the early part of the last decade were little, if at all, inferior to those derived from the cultivation and manufacture of sugar, while the capital represented by the live stock alone, without taking the value of the farms into consideration, was over £18,000,000. This once flourishing industry was, however, annihilated during the late insurrection, and it practically no longer exists.

Complete returns of the live stock in the whole island at the end of 1898 are not obtainable, but official data showed that in three provinces the horned cattle then numbered 104,286, as compared with 1,401,743 in the same provinces in 1892, in which year the total in the whole island was returned as 2,585,309. There would thus appear, on the same basis, to be not more than 200,000 cattle in Cuba at the end of 1898.

It would seem difficult in the present impoverished condition of the country to restock the farms to any large extent; and the lowest price for imported cattle being now about double the price of Cuban cattle eight years ago, without making any allowance for losses from the acclimatisation fevers to which all foreign animals are more or less liable, the island will probably for some considerable time be dependent on foreign countries for its meat supply, the value of which is estimated at nearly two million pounds.

Poultry farming is another industry which was almost completely destroyed during the insurrection. In an interesting pamphlet which was recently published locally, it is stated that before the war 25,000 fowls, worth about 1s. 10d.

each, and 1,500,000 eggs, worth 7s. 6d. per 100, were consumed weekly in the city of Havana, representing together a value of £400,000 per annum of home produce. Since the end of 1898 comparatively few Cuban fowls or eggs have been obtainable, and the Havana market is now principally supplied from abroad, the imports of eggs averaging 900,000, and of fowls 10,000, a week. The price is very little higher than formerly to the wholesale dealer, but the amount which has to be remitted abroad to pay for them (over £200,000) constitutes another not inconsiderable drain on the resources of the island.

Mr. Carden is of opinion that the export of early vegetables from Cuba to the United States would not fail to be profitable. For years past, however, potatoes, beans, onions, olives, grapes, and other similar produce, which can be successfully grown in Cuba, have been imported in considerable quantities from Spain and the Canary Islands, and the official returns show that in the last ten years from £100,000 to £120,000 worth of fresh vegetables were exported annually from the United States to Cuba. In 1899 the importation of potatoes into the port of Havana alone amounted to 1,000,000 bushels, valued at £150,000.

The forests of Cuba, nevertheless, constitute a source of wealth which has not as yet been much worked. Besides the forests, which are private property, there are nearly 1,250,000 acres of timber which belong to the State.

CEREAL CULTIVATION IN TRIPOLI.

In a report issued by the Foreign Office relating to the resources of Tripoli, Mr. Consul-General Jago states that the local methods at the present day employed in the cultivation of grain are the same which have obtained for ages past, and no attempt to introduce modern methods has ever been made. When the first heavy autumnal rains have well saturated the ground, the seed is sown broadcast by hand; the soil is then ploughed up, and the seed thereby covered. The

rest is left to nature, and the uses of the harrow and weeding are unknown. No manure is employed save the droppings of animals which pasture on the stubble after harvest, and then only in the rare instances where the peasant is rich in flocks and herds. The ploughshare, constructed of wood and tipped with iron, is from 15 to 18 inches long, and about four inches broad, and turns up the soil to a depth of about 3½ inches. It is drawn by one animal (cow, camel, ass, or old horse), and weighs from 14 to 22 lbs., according to the strength of the animal and the condition of the soil. Although by this process the soil is scratched rather than ploughed, experience has proved that where the rainfall is small, deeper ploughing is prejudicial to the young plants by exposing too great a depth of soil to the drying action of the weather, thus preventing them in due time from profiting by the underlying moisture. Some two years ago, two Scotch gentlemen who are engaged in agriculture in Cyprus introduced light Scotch ploughs on their lands but were obliged to revert to the native plough as best adapted to the climate and its small rainfall. But even with these primitive methods, such is the fertility of the soil, aided solely by atmospheric agencies, that, with abundant and opportune rains, the results are surprising in point of yield. The superabundance of available land and the long fallow which it permits must, however, also be taken into account. A "good crop" is so called in Tripoli when twentyfold of the seed sown is realised, a "poor one" when the yield is only tenfold, and a return of seven or eightfold suffices only to recoup the cost of cultivation.

The area under barley is more than three-fourths of the cultivated land. It constitutes the food of the bulk of the people, and is the mainstay of the country. Owing to the excellent quality and whiteness of Tripoli barley it is sought after for malting purposes, and the surplus beyond what is required for local wants goes almost entirely to England. No exotic seed is imported, the native being esteemed superior. Its average weight per imperial bushel is about 58 lbs. Stored in Tripoli it rapidly deteriorates through weevils and flies, but in warehouses in England it preserves its good condition for two or three years. In the

district of Zleiten, it is stored in wells sunk in the rock, and keeps good for several years, but this custom does not obtain elsewhere, owing to the sandy character of the soil. Mr. Jago estimates from the best information available that the barley harvest varies, according to the amount and distribution of the rainfall, between 1,400,000 and 2,000,000 bushels; the former representing a fairly good harvest, and the latter a very good one, occurring about once in 10 years. In bad years the yield falls as low as 475,000 bushels.

The extent of land suitable for the cultivation of wheat is restricted, and while barley straw is used as fodder for animals, wheaten straw is valueless. During the past ten years, wheaten flour and semolina to the value of £30,000 to £40,000 a year have been imported from France, but chiefly from Italy. The preference for foreign flour is largely caused by the poverty of the majority of the inhabitants of Tripoli and of the smaller towns, who, unable out of their small and precarious daily earnings to lay in even the smallest stock of wheat, content themselves with buying every day the small quantities of foreign flour which suffice for their daily wants.

[*Foreign Office Reports, Miscel. Series. No. 527. Price 2d.*]

THE CARRIAGE OF WHEAT FROM CHICAGO.

The United States Department of Agriculture has published, in the "Crop Reporter," some interesting information regarding the relative cost of transportation of wheat by rail and lake from Chicago. It appears that the railways began to compete actively with the water routes for the grain trade about thirty years ago, but that owing to the lack of facilities for loading and unloading, high working expenses and small train loads, they had previously been at a decided disadvantage. But improved methods, resulting in a lessened cost of transportation, have greatly improved the position of the railways, and enabled them not only to equal, but eventually to surpass, their competitors in the carriage of many of the

cereals and cereal products. The wheat traffic from Chicago is, however, a notable exception to this general rule, and the lake lines have not only been able to maintain their supremacy, but they have slowly and surely increased it.

A comparison from year to year of the amount of wheat carried by the two systems shows marked fluctuations from which definite conclusions can be drawn only by taking average percentages for a number of years. It is thus found that during the period from 1870 to 1879, inclusive, the lakes controlled over 68 per cent. of this traffic. In the next ten years this was increased to 69 per cent., while from 1890 to 1898 inclusive the average percentage of wheat exported from Chicago by the lake lines was 78. These figures cover a period of twenty-nine years and clearly indicate a substantial gain made by the lake lines in their competition with the railroads.

The "Crop Reporter" states that freight rates between Chicago and New York have a great significance, owing to the fact that for many years it has been an established policy to use them as a basis for rates between many western cities and points on the Atlantic seaboard. Statistics are given in this connection which indicate a strong and steady downward tendency, the rail rates always being much higher than those used by the water lines, as the following figures show:—

Years.	Average rate in pence per bushel.		
	By lake and canal.	By lake and rail.	By all rail.
1880	d.	d.	d.
1885	6'13	7'85	9'95
1890	2'93	4'51	7'00
1895	2'92	4'25	7'15
1896	2'05	3'47	6'08
1897	2'69	3'66	6'00
1898	2'17	3'68	6'16
	2'21	2'48	5'77

Since 1890 extremely low rates have generally prevailed, especially on shipments by water, and this has resulted in Chicago receiving an increased percentage of the wheat crop

of the country for transportation eastward. The percentage of the total output of wheat of the United States moved eastward by way of Chicago in the decade 1880-1889 was 3'18, while for the eight years beginning 1st January, 1890, it was 5'08.

NEW DUTCH LAW FOR THE PREVENTION OF FRAUD IN THE BUTTER TRADE.

The Board have received through the Foreign Office a copy of a law dated 9th July, 1900, for preventing fraudulent practices in the butter trade in Holland. This law is to come into force on a date to be fixed hereafter, and repeals the law of 23rd June, 1889.

In the new law butter is defined as an article containing no fat constituents other than those derived from milk; and margarine is defined as an article resembling butter but containing fat not derived from milk. Power is reserved to give another name than margarine to any mixture resembling butter, which may be introduced into the butter-trade, but the word "butter" must form no part of such name. All the provisions of this law which are applicable to margarine, are also applicable to such mixtures.

Margarine may not be sold, kept in a shop or other place of sale accessible to the public, exposed, conveyed, imported, exported or kept in stock for transport or exportation, unless the word "Margarine" appears in legible letters on all the packages, or if the article is not packed, on the article itself, and the notice must be distinctly visible to the customers and the public.

A dealer in margarine exposed in a market or similar place of sale must place a board above the article on which the word "Margarine" is inscribed in distinct letters clearly visible to the public. If both sides of the board are visible to the public, the inscription must be placed on both sides.

When margarine is on sale in a shop used for the sale of that article or for butter and margarine, the inscription "margarine" must appear over the outside door, and on the

windows nearest both sides of the door, in distinct letters and clearly visible to the public. Similar inscriptions are obligatory for margarine factories, as also for warehouses and buildings where the article is stored. When butter and margarine are kept in stock in the same shop, or in any other place of sale accessible to the public, the last-named article must either be kept in a separate part of the premises, or be divided from the butter by a partition distinctly visible to the buyers.

Neither on the article itself nor on the package containing it may any other letters than the word "margarine" appear, except the name or the initials of the maker, of the salesman, and of the place of origin, and the indications of the quality of the article generally employed in the trade. In the case of margarine despatched to an address, no additional words must be put on the outer package except the address of the person for whom the article is intended, and the marks which, according to the custom of the trade, are necessary for the transport.

A person convicted twice within two years of offences against the foregoing provisions is prohibited, without special permission, to expose for sale butter and margarine at the same time in the same shop, or any other place of sale accessible to the public, or in the same market.

Certain special officials, known as butter-inspectors and assistant butter-inspectors, together with other officials of the State and Communal Police, are charged with enforcing this law, and these officials are to have access to shops and other premises where butter and such like articles are publicly sold.

The warehouses and conveyances in use by public carriers are also to be accessible at all times to the butter-inspectors.

The officials charged with the execution of the law are empowered to take samples of butter and such-like articles in shops or other premises, or in course of delivery. They are also authorised to take samples of butter and articles resembling butter found on the premises of manufacturers of, or dealers in margarine, which are not provided with the required notices, but samples must not be taken of margarine marked as prescribed. Power is likewise given to these officers

to search all means of conveyance (no delay must, however, be caused thereby in the service of a public means of conveyance), and to examine all goods in which it is suspected that butter or articles resembling butter are concealed, as well as goods in which it is suspected that any of these articles are packed.

The law provides that two samples shall always be taken from the same package, and that when desired the market value shall be paid for the samples. Compensation is to be granted to the person interested, on his request, for the damage done to the owner of the articles concerned by taking the samples, if the articles, upon examination, turn out to be butter.

The two samples are to be sealed up by the official and submitted with a statement of the origin of the samples for examination by the experts appointed by the Minister of the Interior. The examination of the samples is to be conducted according to instructions to be given by the Minister of the Interior by at least two sworn chemists working independently of each other, to be appointed by that Minister. The method followed in that examination may be communicated to the person interested. The results of this examination are to be notified by the Public Prosecutor's Department to the person concerned, who may have the second sample examined at his own expense, and for three weeks after this notification the Public Prosecutor can institute no prosecution against the person. The person concerned is also authorised to affix his own seal to the samples.

Offences against certain of the provisions are punishable with imprisonment not exceeding three months or a fine not exceeding three hundred florins; and in the case of a second conviction within two years, with imprisonment not exceeding six months or a fine not exceeding six hundred florins, while the sentence of the Court is to be published at the expense of the convicted person.

For offences in cases where the articles concerned were intended for exportation to foreign countries or to be sent to the Dutch Colonies the maximum punishments are double the above. The maximum punishments are also doubled if the

provisions as to marking are not complied with, in cases where both butter and margarine are present.

IMPORTATION OF MEAT INTO GERMANY.

The Board of Agriculture have received through the Foreign Office a further memorandum by the Commercial Attaché at Berlin on the German Inspection of Meat Act, with a more detailed account of its provisions than was given in the last number of this *Journal* (p. 62).

Sections 1 to 11 of the law, inclusive, deal with the actual slaughter of animals, and with the sale of meat of all kinds, including the flesh of cattle, pigs, sheep, goats, horses, and dogs. Local authorities are empowered to take the necessary steps to examine all animals when there is an outbreak of infectious disease, and all meat, whether raw or prepared, and fat and sausages, are liable to inspection under the law. Meat of doubtful quality can only be sold for human consumption under certain conditions, and when it has been rendered perfectly harmless under police supervision. Such meat can only be sold in a special part of the shop or other place of sale, with the distinct information that it has been rendered edible, and a notice clearly indicating the nature of the meat must be placed over it for the purchaser to see. Meat of this kind may not be sold in any room where originally sound meat is on sale, and the permission accorded by the police for the sale of such meat can be cancelled at any time.

With regard to Section 12, which is the important paragraph affecting meat importations, the provisions of this section are as follows:—

The importation of meat in airtight closed boxes or in similar casings, as also of sausages and other mixtures of chopped meat, is forbidden within the German Customs limits.

In other respects, the importation of meat into the German Zollverein will be regulated by the following provisions up to the 31st December, 1903:—

1. Fresh meat may only be imported in whole carcasses which, however, in the case of cattle (with the exception of calves) and of pigs may be in complete halves.

To the carcasses there must be attached the pleura, peritoneum ("Brust und Bauchfell"), the lungs, the heart, and kidneys. The Bundesrath is empowered to extend this regulation to other organs.

2. Prepared meat can only be imported when experience has shown that all possibility of injury to health is excluded, or when, on importation, the absolute freedom from injurious properties can be ascertained with certainty. This regulation, it is considered, cannot be carried out in consignments of salted meats ("Pöckelfleisch") when the weight of single pieces is less than 4 kilos. (about 8lbs. 15 ozs.); this rule does not apply to ham, bacon, and intestines ("Därme").

Meat which has undergone a process for the purposes of preservation, but which has, in its chief features, still retained the properties of fresh meat, or which can, by a suitable process, regain the properties of fresh meat, is not to be considered as prepared meat; such meat is subject to the provisions of sub-section 1.

For the period after 31st December, 1903, the regulations dealing with the importation of meat are to be revised by law. Should such new regulations not have been completed by that date, then the regulations of sub-section 2 as to importation will remain in force until further notice.

Section 13 provides that imported meat is to be subjected to an examination, which will be carried out with the co-operation of the Customs officials. Exception is made, however, in favour of such meat as can be proved to have been prepared within the Zollverein, or which is merely destined for direct through transport *via* Germany. In these latter cases importation can only take place at certain Customs Houses, which will be specified by the Bundesrath.

The provisions of Sections 12 and 13 are not applicable to game, poultry, and meat introduced by travellers for their con-

sumption on journeys, except in so far as the Bundesrath may determine. The Bundesrath is also empowered to issue prohibitions of importation and regulations connected therewith, other than those formulated in the said Sections.

Imported meat is to be subject to the provisions set forth in the earlier portion of the Law with regard to meat destined for human consumption; but if the said meat be unfit for consumption, it may be allowed, under certain precautionary regulations, to be re-exported from Germany instead of being destroyed.

Imported meat, not intended for human consumption, can be admitted without examination, after having been rendered unfit for such consumption.

The importation and sale of horse-flesh can only take place when the nature of the meat is clearly shown by an inscription in the German language; and persons specially permitted by the Police Authorities to sell such flesh must post up a legible notice to the effect that horse-flesh is sold or used on their premises, and may not sell it in the same room where the flesh of other animals is sold. The Bundesrath is empowered to extend these regulations to the flesh of donkeys, mules, dogs, and other animals.

Meat which has undergone examination can again be subjected to an official inspection only for the purpose of ascertaining whether it has gone bad in the interval.

In the industrial methods of preparing meat, no ingredients or processes are to be employed which might impart injurious properties to the meat, and meat so prepared must not be imported or sold. The Bundesrath will determine what methods fall under this regulation.

The Bundesrath is authorised to frame all regulations and fix all fees, etc., connected with carrying out this law, especially the fees chargeable for the examination of imported meat.

Sections 26 to 28, inclusive, deal with the fines and punishments incurred by infringement of the Law; Section 29 prescribes that the provisions of the Law of 14th May, 1879, dealing with articles of food, are to remain unaltered; and Section 30 provides that the sections of the present Law,

which relate to the arrangements for the inspection and slaughter of meat, are to come into force on the day of its publication. In other respects, the date on which the Law will come into effect, as a whole or in part, will be fixed by an Imperial Decree with the sanction of the Bundesrath.

With regard to Section 12, Sub-section 1, by a Decree published on June 30th last, the importation of meat within the limits of the Zollverein in air-tight closed boxes, or in similar casings, as also the importation of sausages and other mixtures of chopped up meat is forbidden from the 1st of October next.

The remainder of Section 12 is not put into operation at present. This Decree will stop all importation of canned meats from Queensland, and may also affect some Canadian imports. It is to be noted that the Law leaves importation outside the limits of the Zollverein free; that is to say, at any of the free ports, such as Hamburg.

The Board have received information through the Foreign Office that a Department of Agriculture under the direction of Mr. Quam as Minister, has been formed in Norway, and commenced work on 1st April

Norwegian Department of Agriculture. last. The chief matters falling within the scope of this Department are as follows:—Measures relating to the advancement of agriculture and breeding of domestic animals, dairying, agricultural education, allotments; management of certain funds devoted to agricultural objects, including reclamation and improvement of land, advancement of industries in country districts, and loans to municipalities to supply the want of corn; shooting, freshwater fisheries, measures taken by factories to prevent the pollution of rivers, measures for the prevention of the interference of timber-floating with fishing and the use of fishing implements; ownership of Crown Land; the Crown Estate in Finmarken, forestry, measures relating to damage due to forest fires,

approval of statutes of associations for the insurance of domestic animals; civil veterinary matters, including measures relating to infectious diseases among sheep, cattle, etc.; and the inspection of meat.

All the above matters were formerly controlled by the Department of the Interior. The Department of Agriculture has not taken over any matters belonging to any other Department than that above mentioned.

In the Annual Statement of Trade for 1899 particulars are given of the value of the imports and exports of certain articles of an agricultural character usually included under the heading of "goods unenumerated."

**Miscellaneous
Agricultural
Imports and
Exports.**

The imports of 1899 included cut and everlasting flowers to the value of £211,106, and manufactured basketware to the value of £244,988, whilst the imports of willows were valued at £38,162, or over £9,000 more than last year. The imports of glue stock, glue, size and gelatine were of some importance and amounted together to £633,684, an increase of nearly £90,000, whilst the re-exports of these articles were returned at £65,143. Among other imports may be mentioned albumen, £11,723; fruit-juice, £70,858; grass and moss, £10,899; dextrine, £9,939; and straw envelopes, ropes, etc., valued at £69,361.

The exports of British produce included various animal products valued in the aggregate at £497,517, and comprising the following items: Bladders and sausage casings, £137,003; bones, £34,948; feathers, £28,156; hair, £91,417; hide cuttings, £64,812; horns and hoofs, £54,109; and glue, size and gelatine, £87,072. Among other items it may be noted that British hay was exported to the value of £11,955; and plants and shrubs to the value of £45,144. Other articles of British manufacture included oil-seed cake, £196,749; bran and pollard £123,212; straw plaiting, £39,456; and basket-ware £14,558.

An Act has been passed by the Legislature of the Isle of Man, promulgated on 5th July last, whereby the owner or occupier of land in that Island may be required to cut down weeds growing upon such land so as to prevent them from seeding, the term weeds being defined as including thistles, cushags, and common docks.

According to the results of the latest Census the number of persons engaged in agriculture, forestry, and occupations connected therewith in Hungary, including Croatia and Slavonia, was 13,328,786, this figure comprising 5,708,317 persons actually occupied and 7,620,469 dependents. Of the persons occupied, 1,233,664 were returned as day labourers (650,843 males and 582,821 females) and their dependents numbered 1,189,671. The other classes returned as occupied numbered 4,474,653, of whom 3,438,115 were males, and their dependents amounted to 6,430,791 persons. The proportion of the agricultural population to the total population of Hungary (17,463,791) is shown by the following percentages:

Proportion of persons actually occupied in agriculture to total occupied population	78.46
Proportion of persons occupied in agriculture with their dependents to total population	76.83

From this it would appear that in 1890 agriculture supported 76.83 per cent. of the entire population of Hungary, including Croatia and Slavonia. In Austria, the number of persons, including dependents, living by agriculture, according to the Census of 1890, was 13,351,379, which represented 56.32 per cent. of the entire population.

[Die Landwirtschaft Ungarns.]

The area under forests in Sweden is returned at 47,500,000 acres, or about 46 per cent. of the area of land in Sweden. Of this area 18,427,243 acres, or about 39 per cent., belong either to the State, to certain communities, or public institutions, and are called public forests, being placed under the supervision of a Bureau under the Royal Agricultural Department. The total is made up as follows: Crown parks, 9,354,404 acres; quicksand plantations, 3,333 acres; undivided Crown lands, 2,390,562 acres; King's domains, 483,177 acres; forests assigned for maintenance of civil and ecclesiastical officers, 902,486 acres; mine forests, 761,036 acres; forests assigned to public institutions, 129,667 acres; common woods, 1,476,624 acres; city forests, 104,780 acres; and forests of Crown lands and plantations, 2,821,173 acres. The desire to increase the public forests has led the Swedish Riksdag to devote large sums of money annually to the purchase of land in order to establish new Crown parks.

[Forestry in Sweden: United States Senate Report No. 452, 1900.]

According to returns collected concerning the distribution of property in Austria, it appears that of the 116,000 square miles which form the total area of the country, some 82,000 square miles, or 71 per cent., belong to small proprietors, and 34,000 to large land owners. In this classification a property is considered large if it measures more than 200 hectares (500 acres), and pays a direct tax of 100 florins. Small holdings are commonest along the Adriatic coast, where over 90 per cent. of the land falls into this category large estates appear to be more general in Bukowina, Salzburg, and Galicia.

A distinctive feature of the live stock census of the United States, which was taken in June of this year, is that in addition to enumerating as on former occasions the live stock on farms, provision has been made on this occasion for the collection of statistics of live stock in the country generally. A special schedule has been provided in which all cattle, sheep, swine, horses, and mules in all cities and villages in transit or otherwise will be taken into account. This will include all horses and mules used by railway, tramway, omnibus and other companies, and private persons.

The British Acting Consul-General at San Francisco states that in June, 1899, 26 of the 30 fruit canning establishments in California formed a combination under the name of the California Fruit Cannery Association. The joint capacity of these establishments is 2,110,000 cases, equal to about 52,750 tons of fruit. In order to effect a saving in the working expenses, it is probable that only 14 of the canneries will be employed, the other 12 remaining idle, instead of running part of the time, as was frequently the case on account of lack of material. Certain fruits will be packed in special factories, whilst in order to decrease the cost of transportation the canneries located in the interior will be employed on the varieties of fruit growing in their respective neighbourhoods. Articles of agreement, it is stated, have been signed, binding the members of the association to pay certain definite prices for the purchase of fruit from the growers, and fixing the selling price, which up to the present has not been advanced.

In the dried fruit industry also growers have been considering methods of co-operation in the disposal of their produce, and an organisation called the Californian Cured Fruit Association has been formed to control and dispose of the produce. While it nominally includes all the dried fruit interests, it is

at present practically a prune growers' association, and includes the owners of four-fifths of the prune-bearing acreage. It is formed on the lines of the Raisin Growers' Association, which has been very successful. By means of this association it is expected that prunes, which are now sold at a very low price, and which fluctuate to such an extent that dealers are unwilling to trade in them, will be placed on a profitable basis.

[Foreign Office Report, Annual Series. No. 2,506. Price 2½d.]

Hungarian Poultry Industry.

In Hungary considerable attention is being directed to the development of the poultry industry, the interest in which has been largely aroused by the demand for poultry products for export. At the time of the agricultural inquiry of 1895 the stock of poultry of all kinds in the kingdom, including Croatia and Slavonia, was 32,765,000. This total embraces fowls, ducks, pigeons, geese, and turkeys, but the number of each kind was not separately recorded. In 1884 the poultry enumerated in Hungary, exclusive of Croatia and Slavonia, amounted to 32,914,000 head, comprising 21,681,000 domestic fowls, 5,630,000 geese, 2,674,000 ducks, 2,246,000 pigeons, and 683,000 turkeys. Hungary enjoys a considerable export trade in live and dead poultry, and the net exports of eggs have in recent years approached 600,000 cwts. yearly. Since 1890 the Hungarian Ministry of Agriculture has made special efforts to improve the race of native fowls by providing selected cocks for breeding purposes, which may be purchased by poultry keepers, or they may be exchanged for cocks of the common variety in the case of the poorer peasantry. There are eleven State poultry-breeding stations attached to agricultural schools, in addition to a central poultry-rearing school and depot at Gödöllő. The fowls bred at these stations are mainly of the Plymouth Rock and Langshan breeds, while Pekin ducks, Embden geese, and French and bronze turkeys are also reared for breeding purposes.

[Die Landwirtschaft Ungarns, 1900.]

The Board have received information through the Foreign Office that it is proposed to hold an exhibition of agricultural machinery at Krasnoyarsk next year, while an exhibition of winnowing and sorting machinery is to take place at Marinsk.

At a show of peasant ploughs held last May at Vinnitz in the Podolski Government, where 20 of 45 exhibits were foreign, the first prize was taken by a front-beamed two-wheeled plough from Nikolaieff, costing 13 roubles, chiefly on account of its lightness, good make, and cheapness. The exhibit taking second prize cost 25 roubles.

Flax ranks as the second industrial crop of Belgium. It occupied in 1895 an area of 75,600 acres, of which 57,524 acres, or 76 per cent., were accounted for by the two provinces of Flanders. Fifty years previously, in 1846,

Cultivation of Flax in Belgium.

flax was grown on 73,801 acres in Belgium; by 1866 the extent of land under the crop had increased to 140,904 acres; but there was afterwards a fall to 99,000 acres in 1880, and this has been followed, as shown above, by a further decline to 75,600 acres. In 1866, when the crop occupied the largest area, 82,135 acres were grown in the provinces of East and West Flanders, and of the remaining 57,770 acres Hainault had 26,276, Brabant 11,841, Antwerp 9,551, and Namur 7,170. In 1895 the acreage returned for the two Flanders was 57,524 acres, while Hainault had only 7,815 acres, Brabant 4,629, Antwerp 3,446, and Namur 1,620.

The conditions governing the cultivation of flax in Belgium are briefly discussed in a recent volume issued by the Ministry of Agriculture and Public Works dealing with the Agricultural Inquiry of 1895. It appears that it is difficult to ascribe any preponderating influence to the physical characteristics of the soil in the determination of the distribution of this crop, for while it is true that it is grown to

the largest extent in the sandy soil of Flanders, it is also produced in some of the clay districts, and also on the strong lands of the Polders. More consideration is to be given to the climatic conditions; the period of vegetation of the flax plant being relatively short, its cultivation is centred in localities where the fluctuations in temperature are least marked, and where the operations of sowing can consequently be carried out in a short period. The question of rainfall does not appear to be of equal importance, since it varies considerably in the flax growing districts; on the other hand, the crop is grown largely along the courses of certain rivers, notably the Lys, the waters of which are particularly suitable for retting. Apart from these natural conditions some account must be taken of the economic conditions, such as the abundance of labour; for instance, it is observed that in the districts where flax is chiefly grown the density of population considerably exceeds that of the remaining districts of Belgium.

[Recensement Général de 1895. Partie analytique.]

REPORTS ON FOREIGN CROPS.

CROPS IN THE UNITED STATES.

The September report of the Statistician of the Department of Agriculture at Washington furnishes the following particulars as to the condition of the principal crops in the United States on September 1st, 1900.

The average condition of the entire wheat crop when harvested was 69·8 or 1·1 points lower than the average of last year, and 16·9 points lower than that of 1898.

The general average condition of maize was 80·6 or 4·6 worse than at the corresponding date of last year. Oats had an average condition of 82·9, an improvement of 3·9 points on the average at the same date in 1898. Barley showed an average condition of 70·7, this being 16 points lower than that of last year. The average condition of potatoes was 80, or 3·6 points worse than that recorded for the 1st September, 1899.

CROPS IN POLAND.

A report received in July from Her Majesty's Acting Consul General in Poland stated that the Polish wheat crop, according to observations taken on June 18th, was estimated to be about 25 per cent. below the average, while rye was reported to be nearly 34 per cent. short of an average crop. But the results of the harvesting of winter grain, which began on or about July 14th, will, it is stated, show a considerable improvement on the above estimates so far as these cereals are concerned, and an average crop of both summer and winter grain was expected in the Lithuanian Government. Sugar beet promised to be below

the average, but potatoes were expected to yield, on the whole, a crop not far short of the average.

THE WHEAT HARVEST OF INDIA, 1899-1900.

The final general memorandum on the wheat harvest of India for 1899-1900 summarises the results as follows:

In the three wheat-growing provinces of Northern India, namely, the Panjab, the North-Western Provinces and Oudh, and Bengal, the wheat harvest was on the whole a little over the average, though not so good as last year. In the North-Western Provinces the yield was good, better than last year, and much better than the average, which was affected by bad years. In the Panjab the yield was not up to the average, which was, however, raised by extremely good years, nor was it as good as last year's harvest. In Bengal the yield was better than the average, but not as good as last year. The season was not on the whole favourable for these provinces, and only resort to extensive irrigation permitted the relatively satisfactory yield recorded. The actual estimated yield in tons for these three provinces is as follows:

	Panjab.	North-Western Provinces.	Bengal.	TOTAL.
Average of five years ...	2,163,908	1,418,972	476,400	4,059,280
Last year ...	1,977,777	1,808,516	656,400	4,442,693
Present season ...	1,823,182	1,950,814	572,600	4,346,596

Elsewhere the crop was a lamentable failure. The monsoon retired after scanty and irregular rain in September, and thereafter there was practically uninterrupted drought in most parts of the region now stricken by famine. In many places no sowings could be made, and in others the crop was unable to maintain itself in a soil which held no moisture. Often indeed even irrigation was of no avail, for the wells and canals held no water. In this region, which comprises all Central and Western India, the crop obtained was but little more than one-fourth of the crop of last year. The yield was 544,000 tons, as compared with 1,980,533 tons on an average

of five years, and nearly two-fifths of this result was obtained in the northern districts of the Central Provinces. In Berar and the Nizam's territory there was practically no harvest and Bombay was almost as bad. In Central India and Rajputana from two-thirds to three-fourths of the crop were lost.

The total yield from all the provinces is estimated to amount to 4,890,596 tons, and the following particulars are given for the different provinces, with comparative figures for last year.

Province.	Area.		Production.	
	1899-1900.	1898-99.	1899-1900.	1898-99.
	Acres.	Acres.	Tons.	Tons.
Panjab ...	6,366,500	7,729,200	1,823,182	1,977,777
North-Western Provinces and Oudh ...	4,800,709	4,818,528	1,950,814	1,808,516
Bengal ...	1,555,800	1,582,500	572,600	656,400
Central Provinces ...	1,619,989	2,505,299	194,070	456,169
Bombay ...	1,259,909	2,470,998	97,824	737,385
Sind ...	357,622	369,706	71,116	81,231
Berar ...	17,910	436,362	251	21,892
Nizam's Territory ...	419,633	1,196,520	2,026	35,604
Rajputana ...	360,733	1,196,014	79,289	276,388
Central India ...	676,083	1,613,851	99,170	287,749
Mysore ...	2,758	4,029	254	492
Total ...	17,437,646	23,923,007	4,890,596	6,339,603

CROPS IN RUSSIA.

According to reports received through the Foreign Office from Mr. Henry Cooke, British Commercial Agent in Russia, the harvests prospects at the beginning of August in European Russia were generally favourable and above the average. The Siberian crops were, however, reported to be unsatisfactory, and fears were entertained as to the yield being sufficient to meet the demands of the coming winter, the increasing export of Siberian grain of late years having considerably reduced reserves, while the immigration movement has, till its present temporary interruption, been assuming larger and larger proportions.

CROPS IN FRANCE.

The official returns as to the condition of the crops in France on 15th of July show that the condition of winter wheat was very good in 1 department, good in 23, fairly good in 52, passable in 7, and indifferent in 1; spring wheat also was good or fairly good in nearly all the departments in which it is grown. With regard to rye the condition was generally reported to be better than wheat; but in the case of oats it was inferior, only 25 departments being reported as good or very good, 32 as fairly good, and 21 as passable or indifferent. Barley, on the whole, was reported to be good or fairly good. The condition of the vineyards appeared to be above the average, no less than 35 departments being reported as very good, and 30 as good. The condition of the other crops might be described as fairly good.

CROPS IN GERMANY.

The official report on the condition of the crops in the German Empire in the middle of August last states that the very hot weather in July was not beneficial to the crops, with the exception of spring wheat and clover. Among the winter grains the condition of rye was represented as only an average crop for the whole of the Empire, whilst in Prussia, Saxony, and some other States the yield is expected to be below the average. Even in Bavaria, from which the most favourable reports have been received, the yield in consequence of the somewhat thin growth was considerably short of that of last year. In the case of winter wheat, which had suffered here and there from blight, rust, etc., and from premature ripening by the heat in July, a good average harvest on the whole was expected.

Spring grains, on the other hand, promised a better yield than in most recent years, although there had been complaints of losses from wind, hail, and other causes. The estimates for the whole Empire indicate that the harvest of

oats, spring wheat, barley, and rye is expected to be considerably above the average. Potatoes, too, appear nearly everywhere to have been in fine condition; the prospects of this crop at the date of the report had seldom been so good, and were reported to be better than at the corresponding period in any of the past seven years. Clover and lucerne had suffered very much through the dry season, and though these had been improved in parts by the rainfall at the beginning of August it was feared that there would be a scarcity of fodder.

CROPS IN AUSTRIA.

According to the report of the Austrian Ministry of Agriculture on the condition of crops in the middle of August, wheat had at that date been mostly gathered in. The yield was satisfactory in Upper and Lower Austria, where the quality was generally good, and in the Alpine districts, where a crop of average quality was obtained. In Moravia and Bohemia the yield was less than last year, and in the east of Austria, which had suffered much from drought, the wheat harvest was reported to be much inferior to that of last year. Barley in Upper and Lower Austria, which was ready for cutting in July, had been successfully harvested, but in the rest of the country the harvest operations had been retarded by rain, and much of the barley was still uncut. The cutting of the oats was to a large extent in progress, and the crop promised, except in the eastern districts and some parts of Bohemia, to be the best among the cereals. Maize had suffered from the dryness of the season and the heat, but it recovered to a large extent in August, and promised to yield a good crop, especially in the eastern and Alpine districts. Potatoes were expected to give a satisfactory yield, and the hay crop is reported to have been on the whole a good one.

CROPS IN HUNGARY.

According to the reports received by the Hungarian Ministry of Agriculture up to the 10th July, the wheat crop

in Hungary is estimated to have yielded this year about 16,912,500 quarters, as compared with 17,623,000 quarters last year. The estimated yields of the other principal cereals are as follows:—Rye, 4,776,000 quarters, against 5,500,000 quarters in 1899; barley, 6,396,500 quarters, against 7,375,500 quarters; and oats 7,319,000 quarters against 8,306,000 quarters. The grain harvest of 1900 appears, therefore, to have been generally inferior to that of last year.

Potatoes were reported to be in good condition, and sugar-beet and other roots were also satisfactory.

CROPS IN ITALY.

The official reports published by the Ministry of Agriculture in the *Rivista Meteorico Agraria* state that the results of the wheat harvest in Italy have shown the crop to be fairly good in quality, but somewhat deficient in yield. Other cereals were, however, generally satisfactory. Maize suffered from want of rain in July, but the prospects for this grain in August were on the whole favourable. In the northern and central districts the yield promised to be only an average one, but the quality was good, and in the south the crop was more satisfactory.

Vines promised an average yield of grapes except in some of the southern provinces and Sardinia, where much injury had been done by *Peronospora*; olives, on the other hand, were generally satisfactory. Potatoes, tomatoes, and vegetables had not done well.

CROPS IN MANITOBA.

The bulletin issued by the Manitoban Ministry of Agriculture on August 6th last gives the estimated area and yield of the principal crops in the current year. The area sown with wheat was estimated at 1,806,215 acres, but of this no less than 348,819 acres are considered to have been rendered

unproductive by drought, etc., and on this reduced area of 1,457,396 acres the yield is only expected to amount to $7\frac{1}{2}$ bushels per acre, or a total yield of 10,938,613 bushels. The dry weather in the early part of the summer, and rain at the beginning of July, have rendered the growth of the crop very irregular, so that until the wheat is threshed the above figures can only be regarded as estimates. With regard to oats and barley, 143,842 acres and 23,414 acres respectively of these crops were destroyed by drought; of oats, 429,108 acres are reported as producing 8,747,168 bushels, or over 20 bushel per acre; whilst 2,682,815 bushels of barley were obtained from 155,111 acres.

CROPS IN ONTARIO.

The official estimated yield of the principal crops grown in the province of Ontario in 1900 was issued on the 4th August last. The area under winter wheat, amounting to 1,068,640 acres, is estimated to have produced 22,812,293 bushels, the yield per acre being 21.3 bushels, as compared with only thirteen-and-a-half bushels in 1899. The spring wheat crop produced 6,728,927 bushels on 376,905 acres, or 17.9 bushels per acre. The total estimated wheat crop therefore amounted to 29,541,000 bushels, against 21,481,000 bushels last year. The acreage under barley was 577,810 acres, and the total yield was 16,296,332 bushels, compared with 14,830,891 bushels last year. Oats were sown on 2,398,834 acres, and produced 88,305,160 bushels, or 36.8 bushels per acre; in 1899 the oats crop amounted to 89,897,724 bushels on 2,363,778 acres.

CROPS IN NOVA SCOTIA.

A report on the crops and live stock in Nova Scotia was issued by the Provincial Government on the 18th July last. The publication is compiled from information supplied by over 100 reliable correspondents selected from the most important agricultural districts.

REPORTS ON FOREIGN CROPS.

The winter of 1899-1900 in Nova Scotia was remarkable for the absence of snow and heavy frosts, but there was a long season of heavy rains, which continued until the end of May. The spring was consequently cold and wet, and sowing was from one to three weeks late. The early summer was, however, too dry, and the hay crop was materially shortened. The individual reports, taken as a whole, indicate fair average crops, but the yield of hay, potatoes, oats, and some other grains was expected to be a little short of the average. There was a fair prospect of an abundant crop of fruit; and an increase of beef and dairy cattle, and of sheep, is reported from many parts of the Province.

GRAIN HARVESTS IN VICTORIA.

The *Victorian Government Gazette* of the 9th June last published information relating to the harvests in the Colony during the last five years. The following statistics relate to the two principal cereal crops for the twelve months ending 31st March in each year:

Crop.	1896.	1897.	1898.	1899.	1900.
Wheat:—					
Area - - - acres	1,111,736	1,130,511	1,657,400	1,134,193	2,161,693
Production - bushels	5,060,174	7,091,039	10,580,217	19,581,314	15,277,012
Yield per acre - bushels	4'61	4'49	6'38	9'09	7'04
Oats:—					
Area - - - acres	255,503	419,460	294,183	266,159	271,250
Production - bushels	2,830,045	6,316,951	4,209,479	5,323,410	6,115,116
Yield per acre - bushels	11'28	16'25	16'35	20'72	22'55

PARLIAMENTARY PUBLICATIONS.

Board of Agriculture, Annual Report on the Distribution of Grants for Agricultural Education and Research in the year 1899-1900 [Cd. 310]. Price 7½d.

The total amount distributed by the Board in Grants for Agricultural Education and Research in the year 1899-1900 amounted to £7,750, exclusive of expenditure incurred in the inspection of the educational and experimental work of the several institutions aided, and in inspecting and reporting on the work of certain county councils. The larger portion of the funds distributed consisted as formerly of subventions of a general character to eight collegiate centres of Agricultural Education in England and Wales, working in connection with 37 separate administrative counties. Grants of a subsidiary character were made to certain institutions providing facilities for dairy instruction not available at the aided colleges; certain sums were also awarded in aid of the cost of specific experiments undertaken, under arrangement with the Board, by agricultural societies and associations. Reference is made in the report to the fact that at the examinations conducted under the joint auspices of the Royal Agricultural Society of England and the Highland and Agricultural Societies of Scotland, for the recently established "national diploma," six out of the seven diplomas awarded were won by the students from the colleges receiving subventions from the Board. Attention is also directed to the facilities provided at the institutions assisted by the Board for affording advice to farmers on scientific questions arising locally and particularly in connection with the early detection or prevention of plant diseases and insect attacks.

In the appendix to the report statements are furnished

respecting the educational work done during the year by the subsidised colleges and dairy institutes. Summaries are also given of some of the principal experiments carried out under the supervision of these institutions and of the societies referred to below.

As an indication of the diversified nature of the experimental and research work in agriculture, carried out in England and Wales during the year 1899-1900, it is interesting to note that the investigations of which summaries are given in the appendix include a rotation experiment conducted on uniform lines in different parts of the country; a number of manurial experiments on grass, and on root and grain crops; experiments in the economic feeding of bullocks, calves, and swine; in the treatment of finger and toe; in the eradication of charlock; in the cultivation and manipulation of hops; and in the manufacture of cider.

The following is the lists of the grants awarded by the Board in 1899-1900:—

Institutions aided	Work.	Grant 1899-1900.
University College of North Wales, Bangor	Collegiate centre	£ 800
Do. do. do.	Farm	200
Durham College of Science, Newcastle-on-Tyne	Collegiate centre	800
Do. do. do.	Farm	200
South-Eastern Agricultural College, Wye	Collegiate centre	800
Do. do. do.	Farm	200
University College of Wales, Aberystwith	Collegiate centre	800
Reading College	do.	800
Yorkshire College	do.	800
University of Cambridge, Agricultural Dept.	do.	800
University College, Nottingham	do.	400
Midland Dairy Institute	Dairy instruction	300
British Dairy Institute, Reading	do.	300
Eastern Counties Dairy Institute, Ipswich	do.	300
Bath and West and Southern Counties Society	Field experiments	50
Do. do. do.	Cider experiments	100
Agricultural Research Association, Aberdeen	Agricultural experiments	100

- (1) *Return, Local Government Board:—Rateable Property (England and Wales).* (H.C. 150.) Price 11d.
 (2) *Return, Local Government Board, Scotland:—Lands and Heritages (Scotland).* (H.C. 221.) Price 9d.

The first return shows the rateable value of buildings, railways, and other kinds of rateable property in England and Wales in 1870, 1894, and 1899, distinguishing for the year 1899 agricultural land from other lands. In 1870 the rateable value of lands, including agricultural and other lands, was £39,835,088, in 1894 it had fallen to £33,654,550, and in 1899 there was a further decline to £31,312,342, the difference between the first and latest period representing a diminution of 21·4 per cent.

The rateable value of “agricultural land,” as distinguished from “other lands,” was first shown separately in the Valuation Lists in 1896, when it was required for the purposes of the Agricultural Rates Act, 1896, which provides *inter alia* that during the period of five years from 31st March, 1897, to 31st March, 1902, “the occupier of agricultural land in England shall be liable in the case of certain rates (including the Poor Rate) to pay one-half only of the rate in the pound payable in respect of buildings and other hereditaments.” According to statements furnished to the Local Government Board, the rateable value of agricultural land was—

On the 20th July, 1896 (the date of the passing of the Agricultural Rates Act)	£ 24,565,058
At Lady-day, 1897	24,342,620
At Lady-day, 1898	24,160,332
And at Lady-day, 1899	24,034,703

The decrease between 20th July, 1896, and 25th March, 1899, in the rateable value of agricultural land has been £530,355, which, calculated on the rateable value of £24,565,058 on 20th July, 1896, is equivalent to a decrease of 2·16 per cent., or 0·8 per cent. per annum.

An examination of returns for counties shows that the decline in rateable value of agricultural lands since July, 1896, has been greatest in the counties of Bedford, Berks, Dorset, Essex, Norfolk, Oxford, and Suffolk, in all of which

it exceeds five per cent. On the other hand, the fall is less than 1 per cent. in Cornwall, Durham, Hunts, Stafford, York North Riding, and York West Riding, and in nine Welsh counties. Six counties show a slight increase, viz., Cheshire, Northumberland, Surrey, Westmorland, Denbigh, and Merioneth. Attention is directed in the Return to a statement made in an earlier Return (C. 8,300) of Session 1896, presented to Parliament by the Royal Commission on Agriculture, that "in estimating the values the practice of the different assessment committees has not always been uniform, either throughout the country or even in the same districts at different times"; and that "the assessments of agricultural land in many instances, especially in the most depressed districts, have not been reduced in proportion to, or concurrently with, the fall in the rent, and in some cases no account whatever is taken of temporary remissions."

The return showing the valuation of lands and heritages throughout Scotland according to the Valuation Rolls also contains, among other particulars, a statement of the valuation of agricultural lands and heritages as defined in the Agricultural Rates, etc. (Scotland) Act, 1896, in the years ending Whitsunday, 1896 and 1900. For the earlier year the total valuation of such agricultural lands and heritages in Scotland is given as £5,827,462 and in 1900 as £5,634,559, the difference representing a decline of £192,903, or 3·3 per cent.

Report of the Progress of the Ordnance Survey to 31st March, 1900. [Cd. 327.] Price 3s. 9d.

Good progress is stated in this Report to have been made with the various services on which the Ordnance Survey is engaged, and the progress would have been better had it not been for the war in South Africa. This affected the Survey in two ways—first, by reducing the staff, as seven out of a total of twenty-four were sent to South Africa, only one being replaced; and, secondly, by the large number of maps of South Africa required by the War Office. It is stated that

every soldier proceeding to the war was provided with a map, and the total number of maps printed for that Department during the year was 374,538, the largest number printed for the War Office in any previous year having been 64,850. The Ordnance Survey was also asked to undertake at very short notice some heavy work for the London Government Act Commission. These causes have combined to reduce to some extent the out-turn of the regular work, and their effect will be even more felt next year. The total number of maps printed far exceeded that in any previous year.

Among other work may be noticed the special surveys made for the Congested District Board in Ireland, which have been unusually heavy; while the preparation of special and the supply of ordinary maps for the Land Registry have increased very rapidly. A number of surveys have been carried out for the Board of Agriculture in different parts of the country in connection with the redemption of tithe rent-charge; and it may be mentioned that the number of maps printed for the Board was 6,950.

As regards maps of England and Wales, those on the scale of 25 inches to the mile ($\frac{1}{25000}$) have now been revised for twenty-two counties, this work having been completed during the year for the counties of Anglesey, Berks, Carnarvon, Cumberland, Denbigh, Glamorgan, Northampton, Notts, and Oxford, while others are in course of revision. The six-inch maps are, as a rule, being reduced from the revised edition of the larger scale maps above referred to. The one-inch map has been undergoing revision since 1893, and this work was completed last year, so that the whole of this map is now published in a uniform style and revised up to a recent date.

Government Laboratory.—Report of the Principal Chemist for the year ended 31st March, 1900. [Cd. 348.] Price 2½d.

Dr. T. E. Thorpe, Principal Chemist of the Government Laboratory, in reporting on the work performed in his

Department, states that the number of samples examined on behalf of the Board of Agriculture increased from 1,600 in 1898-99 to 1,745 during the past year. The increase was partly due to the Sale of Food and Drugs Act, 1899, which came into force on the 1st of January last, and partly to inquiries instituted on behalf of the Departmental Committee appointed to inquire into the normal composition of milk and cream with a view to the framing of regulations as required by Section 4 of the Act.

The sampling of imported butter at the ports was continued as in previous years, 1,393 samples being taken, of which 6 gave distinctly abnormal results; 399 contained boric preservatives; and 300 were coloured with coal-tar dyes, the use of which appears to be on the increase, and is especially prevalent in Holland, the United States, and Australia. The number of samples taken of imported margarine was 132, of which 99 were of Dutch and 25 of German origin, and the analyses showed that imported margarine is usually made with cotton-seed oil, contains boric preservative, and is artificially coloured with a coal-tar yellow. The German margarines were found in every case to contain sesame oil, as required by the German Margarine Law. The samples from France and the United States, six in number, consisted of the raw oleomargarine base, intended for manufacture in this country. Two samples from the United States, entered as "Butter Oil" (being simply butter-fat), were also for use in the manufacture of margarine on this side.

The sampling of cheese, milk, and cream under the new Food and Drugs Act only came into operation in the first quarter of the present year, and 51 samples of cheese, 25 of condensed milk, and 3 of fresh milk were taken.

Agricultural Education, Scotland.—Report of the Committee of Council on Education in Scotland, 1899-1900. [Cd. 170.] Price 4d.

The portion of this Report which deals with Agricultural Education in Scotland states that the negotiations for the

amalgamation of the Agricultural Department of the Glasgow and West of Scotland Technical College with the Kilmarnock Dairy School have been brought to a successful conclusion. The new institution, which is known as the West of Scotland Agricultural College, has been placed under the direction of a Board of Governors, very largely representative of agricultural interests, who may be trusted, from their intimate knowledge of the wants of the farming community, to give to the work of the new College that direction which is most likely to be productive of benefit to the agriculture of the district. In addition to the Government grant, the new institution has received the promise of very substantial support from the various local authorities of the West of Scotland; and the Department think that this example might with advantage be more largely followed by local authorities in other parts of Scotland as regards the support of Agricultural centres in other districts. The support given to each Institution from Imperial and national funds must be to a large extent dependent upon the appreciation of its work in the various localities concerned, as evidenced by continued local support, and the Scottish Education Department think that the most effective way of securing such support, as well as of ensuring that the work of each Institution shall take the direction most likely to be productive of benefit to the locality, is to entrust its executive management to a body of Governors who are thoroughly representative of the most enlightened opinion on agricultural subjects among both farmers and landowners.

The Department do not think it feasible or desirable to make practical instruction in agriculture part of the curriculum of rural schools in general, but they think it possible to give to the studies of the more advanced pupils in many of these schools such a direction as shall foster their interest in rural life, and give them some insight into the scientific principles which underlie the practice of agriculture. To afford opportunity to teachers in suitable localities to qualify themselves more fully to give instruction of this nature, it is recommended that classes for the instruction of teachers in matters appertaining

to agriculture should, as a rule, be held at the central agricultural institutions, and should be under the general direction of the managers thereof; but the funds for the maintenance of such classes should not be a charge upon the special agricultural grant to those institutions. The object of that grant is, in the first place, to foster the scientific study of agriculture (to the highest possible degree) by, it may be, a comparatively select body of students; and, in the second place, to make the results of scientific research known as widely as possible among the farming community by suitable agencies, so as to ensure that this expenditure of public funds shall be a direct benefit to the agriculture of the country. The application of the funds to any purpose less germane to the principal object should be jealously guarded against.

The Department's grant of £2,000 has during the present year been augmented from the sum available under Section 2, sub-Section 4, of the Local Taxation Account (Scotland) Act, 1898, so that the amount distributed shows an increase as compared with the previous year.

	1898-99	1899-1900.
	£ s. d.	£ s. d.
Aberdeen University (Agricultural Department) -	295 0 0	600 0 0
Edinburgh School of Rural Economy -	570 0 0	800 0 0
Glasgow and West of Scotland Agricultural College -	750 16 8	2,000 0 0
Kilmarnock Scottish Dairy Institute -	295 0 0	
Expenses of Inspection -	89 3 4	
	£2,000 0 0	£3,477 17 2

Report of the Chief Inspector of Factories and Workshops for 1899. [Cd. 223.] Price 6s. 11½d.

This report refers to the action taken by the Home Office to prevent anthrax being contracted in the combing and sorting of wool, and handling of hides, skins and

horsehair. Special rules were established in 1896 for the sorting of certain dangerous kinds of wool and hair, but it has been found that many reported cases of anthrax arose in processes other than sorting, and in November, 1899, the Secretary of State certified the processes of sorting, washing, combing and carding wool, goat-hair and camel-hair as dangerous or injurious to health. In April last special rules were accordingly issued for the management of hide and skin factories and wool-combing factories.

The number of cases of anthrax in human beings reported in the above trades amounted during the past year to 55, of which 14 were fatal. This was nearly double the number for 1898, when 28 were reported, as compared with 23 in 1897, and 17 in 1896.

PRICES OF LIVE STOCK.

RETURNED UNDER THE WEIGHING OF CATTLE ACT.

The returns furnished to the Board of Agriculture under the Markets and Fairs (Weighing of Cattle) Act, 1891, show that during the second quarter of the current year the numbers of cattle, sheep and swine entering the 21 scheduled markets of Great Britain were less than in the corresponding quarter of 1899. The number of cattle exposed for sale in the three months was 309,000, as compared with nearly 320,000, while sheep numbered 1,145,000, against 1,200,000 in 1899; the number of swine appearing at these markets was 103,000, as compared with 106,000 in the second quarter of the previous year.

Animals.	2nd Quarter, 1900.	2nd Quarter, 1899.
CATTLE:	No.	No.
Entering markets	309,384	319,826
Weighed	34,806	36,305
Prices returned -	31,684	32,498
Prices returned with quality distinguished	25,709	25,962
SHEEP:		
Entering markets	1,145,266	1,200,077
Weighed	10,802	14,124
Prices returned with quality distinguished	8,392	12,045
SWINE:		
Entering markets	103,473	106,310
Weighed	721	713
Prices returned with quality distinguished	717	601

The number of cattle returned as having passed over the weighbridge in the six Scottish markets was nearly a third of the whole number shown, or 30.7 per cent. In England

the percentage was scarcely 5.4 per cent. of the aggregate number entering the markets. Information as to price is not forthcoming for all of these, but the proportion of those weighed and priced exceeded 8 per cent. of the whole accounted for as exposed for sale in Great Britain. The use of the weighbridge remains insignificant in the case of sheep and pigs, sheep being returned as weighed at only six of the 15 English centres and at four of the six Scottish markets, and swine being weighed in any material number only at Newcastle, and on a much smaller scale at three other places.

The weighbridge seems to have never once been resorted to throughout the three months at Bristol, and only a single animal was weighed at York. At Ashford, Norwich, and Salford, although some cattle were weighed, no information is forthcoming as to their prices.

The table which follows gives for seven English and six Scottish markets the number and average price per stone and per cwt. of fat cattle of each class weighed and priced.

PLACES.	INFERIOR or Third Quality.			GOOD or Second Quality.			PRIME or First Quality.		
	Number.	Price per Stone.	Price per Cwt.	Number.	Price per Stone.	Price per Cwt.	Number.	Price per Stone.	Price per Cwt.
Carlisle	310	s. d. 3 5	s. d. 27 4	294	s. d. 3 10½	s. d. 31 2	1,618	s. d. 4 5½	s. d. 35 6
Leicester	—	—	—	27	3 9½	30 4	43	4 4	34 8
Leeds	1	3 6	28 0	49	3 7½	28 10	339	4 3½	34 4
Liverpool	28	3 4	26 8	41	3 8	29 4	694	4 6	36 0
London	10	3 3	26 0	242	4 4½	35 2	996	4 11½	39 10
Newcastle	—	—	—	227	4 7	36 8	1,090	4 10½	39 2
Shrewsbury	125	3 8½	29 6	373	4 2½	33 10	200	4 8½	37 6
Aberdeen	1,121	3 6	28 0	1,000	4 3½	34 6	1,202	4 8½	37 10
Dundee	394	3 4	26 8	1,285	4 4½	35 0	1,198	4 8½	37 6
Edinburgh	—	—	—	2,914	4 7½	37 2	180	4 9½	38 6
Falkirk	14	3 8½	29 10	352	4 5½	35 10	451	4 6½	36 6
Glasgow	166	4 2	32 8	559	4 4	34 8	2,675	4 8½	37 8
Perth	—	—	—	156	4 7½	36 10	103	4 10½	38 10

As usual, except in a few instances, the total number of animals which were graded as of the third quality, whereof

prices were reported, was relatively small, and no quotations whatever for this grade were supplied from Leicester, Newcastle, Edinburgh, or Perth. The prices recorded for first quality animals, which in the immediately preceding months of this year fluctuated between 33s. 4d. per cwt. at Leeds and 40s. at London, now range from 34s. 4d. to 39s. 2d., the quotations for nine of the thirteen markets in this table reaching or exceeding 37s. 6d. per cwt.

A comparison of the prices realised at each of these thirteen places during the second quarter of 1900 and of 1899 respectively is made in the following table, and indicates that in the great majority of cases a considerably higher level of value has prevailed than in the same quarter of the previous year.

PLACES.	INFERIOR or Third Quality.		Good or Second Quality.		PRIME or First Quality.	
	1900.	1899.	1900.	1899.	1900.	1899.
	Per Cwt. s. d.	Per Cwt. s. d.	Per Cwt. s. d.	Per Cwt. s. d.	Per Cwt. s. d.	Per Cwt. s. d.
Carlisle - - -	27 4	26 8	31 2	30 10	35 6	34 4
Leicester - - -	—	30 2	30 4	30 8	34 8	35 4
Leeds - - -	28 0	28 0	28 10	28 6	34 4	32 2
Liverpool - - -	26 8	25 2	29 4	30 4	36 0	34 2
London - - -	26 0	27 6	35 2	34 10	39 10	38 4
Newcastle - - -	—	28 4	30 8	32 8	39 2	37 0
Shrewsbury - - -	29 6	29 4	33 10	32 8	37 6	35 0
Aberdeen - - -	28 0	26 6	34 6	32 10	37 10	36 4
Dundee - - -	26 8	28 10	35 0	32 8	37 6	34 8
Edinburgh - - -	—	—	37 2	35 2	38 6	35 10
Falkirk - - -	29 10	31 0	35 10	34 4	38 0	35 8
Glasgow - - -	32 8	32 4	34 8	33 8	37 8	36 0
Perth - - -	—	28 10	36 10	32 4	38 10	35 8

The number of fat cattle which were reported as actually sold at a rate per stone or per cwt. of live weight previously agreed upon were most numerous in Glasgow and Falkirk. The prices calculated from these sales alone show a range of from 37s. 4d. to 41s. 2d. per cwt. for first quality, and from 31s. 10d. to 36s. 8d. for second quality.

By averaging the returns for fat cattle of first and second quality at the above places, for each month separately, an approximate indication of the general course of prices in the country during the first six months of this year may be fairly obtained, and the higher prices as compared with 1899 are clearly shown.

Months.	Good, or Second Quality. per cwt.		Prime, or First Quality. per cwt.	
	1900.	1899.	1900.	1899.
	s. d.	s. d.	s. d.	s. d.
January - - -	34 8	32 6	37 2	34 6
February - - -	34 6	32 6	36 8	34 8
March - - -	34 2	32 10	36 0	34 10
April - - -	33 8	33 2	35 10	35 2
May - - -	35 6	33 4	37 4	35 6
June - - -	37 6	35 2	39 2	37 0

Shrewsbury is still almost alone in reporting the sale of store cattle in any numbers by weight, the transactions in this market in all three qualities of store cattle exceeding 3,000 head. Much smaller numbers of store stock were reported as sold by weight at Leicester, Dundee, Edinburgh, and Glasgow.

The usual table giving details for each of the scheduled places is appended.

Cattle, Sheep, and Swine, entering the Markets and Marts of the undermentioned Places, with the Number Weighed, as received from the Market Authorities in the **Second Quarter** of 1900 under the Markets and Fairs (Weighing of Cattle) Act, 1891 (54 & 55 Vict. c. 70).

PLACES.	Cattle.			Sheep.			Swine.		
	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.
ENGLAND.	No.	No.	No.	No.	No.	No.	No.	No.	No.
Ashford	3,542	91	—	34,028	15	—	5,643	—	—
Birmingham	9,471	7	1	22,413	—	—	46,609	—	—
Bristol	11,219	—	—	32,978	—	—	2	—	—
Carlisle	19,671	2,222	2,222	63,158	—	—	3,788	—	—
Leicester	19,767	146	104	19,121	23	23	1,728	—	—
Leeds	8,257	389	389	38,170	1,531	1,531	—	—	—
Lincoln	2,773	—	—	15,981	—	—	3,737	41	41
Liverpool	6,823	763	763	83,325	752	752	—	—	—
London	17,190	2,560	1,248	144,070	2,346	71	823	—	—
Newcastle-upon-Tyne	24,293	1,317	1,317	78,014	—	—	9,989	587	587
Norwich	32,555	75	—	71,267	—	—	8,034	—	—
Salford	24,156	454	—	157,496	—	—	851	—	—
Shrewsbury	15,197	3,709	3,652	19,774	49	—	8,005	19	15
Wakefield	17,005	1,064	195	63,778	—	—	409	—	—
York	25,756	1	1	29,745	—	—	—	—	—
SCOTLAND.									
Aberdeen	12,485	4,915	4,915	69,145	4,565	4,565	4,461	—	—
Dundee	4,072	2,931	2,931	6,826	823	823	823	—	—
Edinburgh	18,198	7,142	*3,347	62,276	—	—	21,246	—	—
Falkirk	3,110	827	817	1,713	—	—	35	—	—
Glasgow	16,031	3,654	3,152	68,360	335	264	1,992	—	—
Perth	16,013	2,546	*349	63,628	363	363	4,296	74	74
TOTAL for ENGLAND	237,675	12,801	9,808	873,318	4,716	2,377	29,620	647	643
TOTAL for SCOTLAND	71,709	22,005	*15,811	271,948	6,086	6,015	13,853	74	74
Total	309,384	34,806	*25,709	1,145,266	10,802	8,392	43,473	721	717

* Prices for 3,778 cattle in addition to the above were quoted from Edinburgh and for 2,197 cattle from Perth, but without distinguishing the quality.

PRICES OF MEAT, CORN AND DAIRY PRODUCE.
AVERAGE PRICES OF DEAD MEAT, per Stone of 8 lbs., at the LONDON CENTRAL MEAT MARKET, during the Second Quarter of 1900, and during the Months of June, July and August, 1900.

(Compiled from the prices quoted weekly in the "Meat Trades Journal.")

DESCRIPTION.	2nd Quarter, 1900.			June, 1900.			July, 1900.			August, 1900.		
	s.	d.	s. d.	s.	d.	s. d.	s.	d.	s. d.	s.	d.	s. d.
BEEF:—												
Scotch, short sides	4	5	10 4 8	4	10	10 5 0	4	8	10 5 0	4	8	10 4 10
" long sides	4	1	11 4 3	4	4	11 4 6	4	2	11 4 4	—	—	—
English	3	11	11 4 1	4	2	11 4 4	4	0	11 4 2	3	11	11 4 2
Cows and Bulls	2	1	11 3 2	2	1	11 3 5	2	0	11 3 1	2	11	11 3 1
American, Birkenhead killed	3	9	11 4 0	3	11	11 4 1	3	9	11 3 11	3	7	11 3 9
" Deptford killed	3	9	11 4 0	3	11	11 4 2	3	9	11 4 0	3	7	11 3 11
Argentine	2	11	11 3 4	—	—	—	—	—	—	—	—	—
American Refrigerated hind-quarters	3	9	11 4 0	3	11	11 4 2	3	9	11 3 11	3	11	11 4 2
" fore-quarters	2	7	11 2 9	2	7	11 2 9	2	8	11 2 10	2	8	11 2 10
Australian, Frozen hind-quarters	2	4	11 2 6	2	8	11 2 10	2	11	11 —	2	9	11 2 10
" fore-quarters	2	0	11 2 1	1	11	11 2 0	2	1	11 —	2	1	11 2 2
New Zealand, Frozen hind-quarters	2	6	11 2 8	2	10	11 2 11	2	11	11 3 0	2	10	11 3 0
" fore-quarters	2	1	11 2 2	2	0	11 2 2	2	3	11 2 5	2	2	11 2 3
MUTTON:—												
Scotch, Prime	5	4	11 5 8	5	6	11 5 11	5	3	11 5 8	5	0	11 5 5
English, Prime	5	0	11 5 5	5	1	11 5 6	4	11	11 5 5	4	8	11 5 2
Ewes	3	10	11 4 3	3	8	11 4 1	3	8	11 4 1	3	2	11 3 8
Continental	4	6	11 4 10	4	7	11 4 11	4	6	11 4 10	4	4	11 4 7
River Plate, Town killed	3	8	11 4 0	—	—	—	—	—	—	—	—	—
New Zealand, Frozen	2	8	11 3 2	3	1	11 3 6	2	6	11 3 1	1	11	11 2 6
Australian, Frozen	2	7	11 2 9	2	11	11 —	2	5	11 2 7	2	0	11 2 2
River Plate, Frozen	2	5	11 2 8	2	12	11 —	2	7	11 2 9	2	0	11 2 2
LAMB:—												
English	6	1	11 7 3	5	3	11 6 5	5	7	11 5 11	5	1	11 5 9
New Zealand, Frozen	3	5	11 3 8	3	9	11 3 11	3	0	11 3 3	2	6	11 3 0
VEAL:—												
English	4	6	11 4 10	4	4	11 4 8	4	2	11 4 6	4	2	11 4 7
Foreign	3	11	11 4 4	3	11	11 4 3	3	6	11 4 0	3	7	11 4 1
PORK:—												
English, best	3	10	11 4 2	3	8	11 4 0	3	6	11 3 11	3	10	11 4 2
" secondary	3	5	11 3 9	3	3	11 3 7	3	2	11 3 5	3	3	11 3 8
Foreign	—	—	—	—	—	—	—	—	—	—	—	—

AVERAGE WHOLESALE PRICES of CATTLE and SHEEP, per Stone of 8 lbs., sinking the offal, at the METROPOLITAN CATTLE MARKET, during the under-mentioned Quarters of 1899 and 1900.

PERIOD.	CATTLE.			SHEEP.		
	Inferior.	Second.	First.	Inferior.	Second.	First.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
2nd Quarter, 1899	2 7	3 11	4 6	3 4	5 1	5 9
3rd Quarter, "	2 4	3 11	4 7	3 3	4 11	5 8
4th Quarter, "	2 7	3 11	4 9	3 4	5 0	5 8
1st Quarter, 1900	2 11	4 1	4 9	3 5	5 1	5 10
2nd Quarter, "	3 1	4 1	4 9	3 5	5 7	6 4

AVERAGE WHOLESALE PRICES OF BEEF and MUTTON, per Stone of 8 lbs., by the Carcase, at LIVERPOOL and GLASGOW, during the under-mentioned Quarters of 1899 and 1900.

PERIOD.	LIVERPOOL.*				GLASGOW.†			
	BEEF.		MUTTON.		BEEF.		MUTTON.	
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
2nd Quarter, 1899	2 4 10 3	8	4 0 10 5	4	3 0 10 4	2	4 4 10 5	4
3rd Quarter, "	2 4 11 3	8	3 0 11 5	0	2 4 11 3	8	3 4 11 4	4
4th Quarter, "	2 6 11 4	0	3 0 11 4	8	2 8 11 3	8	3 4 11 4	4
1st Quarter, 1900	2 6 11 4	0	4 0 11 5	6	3 2 11 4	2	4 4 11 5	4
2nd Quarter, "	2 10 11 4	2	4 0 11 5	8	3 6 11 4	0	4 10 11 5	10

* Compiled from information furnished by the Medical Officer of Health, Liverpool. The prices quoted are for Carcases of Animals slaughtered at the Liverpool Abattoir, and do not apply to Imported Meat.

† Compiled from information furnished by the Principal of the Veterinary College, Glasgow.

BERLIN MARKET.

AVERAGE PRICES of CATTLE and SHEEP (First Quality Dead Weight) in the BERLIN CATTLE MARKET in the under-mentioned Months of 1900.

MONTHS.	CATTLE.		SHEEP.	
	Per Cwt.		Per Cwt.	
1900.	s. d.	s. d.	s. d.	s. d.
June - - - - -	61 1	to 64 11	63 2	to 66 2
July - - - - -	63 9	" 67 9	65 2	" 68 3
August - - - - -	65 11	" 69 6	66 5	" 70 6

NOTE.—The above prices have been compiled from the weekly returns published in the *Deutsche Landwirtschaftliche Presse*.

PARIS MARKET.

AVERAGE PRICES of CATTLE, SHEEP, and SWINE (Medium Quality) in the PARIS CATTLE MARKET in the under-mentioned Months of 1900.

MONTHS.	OXEN.	CALVES.	SHEEP.	PIGS.
	Per Cwt.	Per Cwt.	Per Cwt.	Per Cwt.
LIVE WEIGHT.				
1900.	s. d.	s. d.	s. d.	s. d.
June - - - - -	28 9	42 2	33 11	39 9
July - - - - -	27 11	40 1	32 7	41 4
August - - - - -	27 6	39 7	34 2	42 8
DEAD WEIGHT.				
1900.	s. d.	s. d.	s. d.	s. d.
June - - - - -	47 5	70 3	68 8	56 10
July - - - - -	47 3	67 11	66 0	58 10
August - - - - -	46 4	66 5	68 5	60 6

NOTE.—The above prices have been compiled from the weekly returns published in the *Journal d'Agriculture Pratique*.

CHICAGO.

PRICES of CATTLE at CHICAGO per Cwt. (Live Weight) in the under-mentioned Months of 1900.

Months.	Good Dressed Beef and Shipping Steers.		Export Cattle.		Extra Prime Cattle.	
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1900.						
June -	23 4 10	24 7	23 1 to	25 8	25 7 to	26 11
July -	24 3 "	25 8	23 1 "	25 5	25 5 "	26 11
August -	25 7 "	27 4	24 8 "	26 11	26 11 "	28 3

Compiled from the Live Stock Reports issued by Messrs. Clay, Robinson, and Co. of the Union Stock Yards, Chicago, Illinois.

AVERAGE VALUES, per Cwt., of various Kinds of DEAD MEAT Imported into the United Kingdom from FOREIGN COUNTRIES and BRITISH POSSESSIONS in the under-mentioned Quarters of 1899 and 1900.

(Computed from the Trade and Navigation Accounts.)

PERIOD.	BEEF.		MUTTON.	PORK.		BACON.	HAMS.
	Fresh.	Salted.	Fresh.	Fresh.	Salted.		
2nd Quarter 1899 -	39 6	26 6	32 6	41 9	20 2	35 4	38 9
3rd Quarter "	38 0	24 2	31 3	42 9	19 6	36 3	43 2
4th Quarter "	37 11	27 2	31 10	42 10	21 11	37 9	45 2
1st Quarter, 1900 -	39 6	27 11	31 4	42 10	24 9	37 1	45 0
2nd Quarter, "	40 1	26 11	36 3	43 0	24 8	41 6	46 7

AVERAGE PRICES of British Corn per Quarter of 8 imperial bushels,* computed from the Weekly Averages of Corn Returns from the 196 Returning Markets of ENGLAND AND WALES, pursuant to the Corn Returns Act, 1882, together with the QUANTITIES returned as sold at such Markets, in the under-noted periods of the Years 1900, 1899, and 1898.

QUARTER ENDED	PRICES.			QUANTITIES.		
	1900.	1899.	1898.	1900.	1899.	1898.
Wheat.						
	s. d.	s. d.	s. d.	Quarters.	Quarters.	Quarters.
Lady Day -	25 11	26 3	35 1	868,378	868,579	699,657
Midsummer -	25 9	25 1	41 5	854,497	954,293	557,504
Michaelmas -	—	25 2	32 8	—	754,667	308,279
Christmas -	—	26 4	27 2	—	913,421	1,036,975
Barley.						
	s. d.	s. d.	s. d.	Quarters.	Quarters.	Quarters.
Lady Day -	25 1	27 1	27 9	888,949	830,398	902,452
Midsummer -	24 3	24 6	26 10	93,157	92,648	47,021
Michaelmas -	—	24 4	25 10	—	237,935	99,741
Christmas -	—	26 6	28 2	—	2,135,782	2,603,841
Oats.						
	s. d.	s. d.	s. d.	Quarters.	Quarters.	Quarters.
Lady Day -	16 7	16 11	17 5	246,949	251,841	26,150
Midsummer -	18 2	17 6	19 10	110,163	137,834	93,475
Michaelmas -	—	17 3	19 7	—	147,902	78,787
Christmas -	—	16 4	16 11	—	238,783	289,652

* Section 8 of the Corn Returns Act, 1882, provides that where returns of purchases of British Corn are made to the local inspector of Corn Returns in any other measure than the imperial bushel, or by weight or by a weighed measure, that officer shall convert such returns into the imperial bushel, and in the case of weight or weighed measure the conversion is to be made at the rate of 60 imperial pounds for every bushel of wheat, 50 imperial pounds for every bushel of barley, and 39 imperial pounds for every bushel of oats.

CORN PRICES:—HARVEST YEAR.

AVERAGE PRICES of British Corn per Quarter of 8 imperial bushels, computed from the Weekly Averages of Corn Returns from the 196 Returning Markets, together with the QUANTITIES returned as sold at such Markets during each of the Harvest Years ending 31st August 1890 to 1900.

HARVEST YEARS.	PRICES.			QUANTITIES.		
	Wheat.	Barley.	Oats.	Wheat.	Barley.	Oats.
	s. d.	s. d.	s. d.	Quarters.	Quarters.	Quarters.
1889-90 -	31 2	28 10	18 6	3,289,806	3,281,141	558,053
1890-91 -	35 5	28 0	19 1	3,496,788	3,659,382	602,887
1891-92 -	33 4	27 2	20 8	3,267,038	3,260,327	488,830
1892-93 -	26 8	24 10	18 9	2,676,227	3,383,094	547,412
1893-94 -	25 5	26 5	18 4	2,087,062	2,876,977	542,425
1894-95 -	21 5	21 5	14 8	2,180,959	3,136,415	693,121
1895-96 -	24 10	22 4	14 1	1,640,943	3,366,364	672,547
1896-97 -	28 8	23 2	16 9	2,597,268	3,200,612	551,912
1897-98 -	36 2	26 11	18 3	2,534,224	3,339,842	599,666
1898-99 -	26 0	26 1	17 3	3,498,515	3,620,760	777,676
1899-1900 -	26 4	25 2	17 4	3,255,654	3,355,241	722,859

AVERAGE PRICES of **British Corn** per Quarter of 8 imperial bushels, computed from the Returns received under the Corn Returns Act, 1882, in each of the under-mentioned Weeks in 1900, and in the corresponding Weeks in 1899 and 1898.

Weeks ended (in 1900).	Wheat.			Barley.			Oats.		
	1900.	1899.	1898.	1900.	1899.	1898.	1900.	1899.	1898.
Jan. 6	s. d. 25 9	s. d. 27 0	s. d. 34 11	s. d. 25 7	s. d. 28 3	s. d. 27 9	s. d. 16 2	s. d. 17 0	s. d. 16 10
" 13	25 11	27 2	35 0	25 5	28 2	27 8	16 3	17 1	17 4
" 20	26 0	27 0	34 11	25 8	27 11	27 10	16 2	17 1	17 5
" 27	25 10	26 7	34 6	25 9	27 9	27 8	16 4	17 0	17 2
Feb. 3	25 8	26 6	34 10	25 4	27 2	28 0	16 6	17 0	17 6
" 10	25 10	26 8	35 1	25 3	27 2	27 8	16 5	17 0	17 5
" 17	26 1	26 0	35 0	24 11	26 10	27 11	16 8	16 11	17 8
" 24	26 3	25 7	35 5	25 1	26 7	27 6	16 9	16 11	17 10
Mar. 3	26 4	25 8	35 10	24 6	26 7	28 0	16 10	17 0	17 11
" 10	25 11	25 10	35 8	24 8	26 7	27 10	16 11	16 11	17 9
" 17	25 10	25 10	35 6	24 6	26 3	28 0	16 11	16 10	17 10
" 24	25 11	25 4	35 4	25 0	26 8	28 6	17 1	17 0	17 8
" 31	25 10	24 11	35 3	24 11	26 2	27 11	17 2	16 11	17 10
Apl. 7	25 10	24 7	35 2	24 10	25 1	27 0	17 2	16 11	17 11
" 14	25 11	24 6	35 3	24 5	25 7	28 0	17 8	16 10	18 2
" 21	26 0	24 8	36 1	24 9	25 2	28 3	17 3	17 1	18 4
" 28	26 0	25 0	38 4	25 2	25 10	27 10	17 11	17 5	18 11
May 5	25 11	25 3	42 4	25 3	24 5	27 8	18 0	17 6	20 4
" 12	25 11	25 4	45 11	24 10	23 11	27 1	17 11	17 9	21 1
" 19	25 7	25 3	48 1	24 5	23 11	26 0	18 5	17 10	21 3
" 26	25 5	25 2	47 9	23 11	23 8	26 5	18 2	17 8	21 5
June 2	25 5	25 4	46 3	24 4	24 4	26 10	18 6	18 1	21 0
" 9	25 3	25 6	45 4	23 8	21 10	25 8	18 8	18 2	20 11
" 16	25 6	25 7	42 4	23 8	23 1	26 1	18 11	17 10	20 5
" 23	25 9	25 7	40 8	23 5	26 2	24 3	18 11	17 11	20 7
" 30	26 11	25 7	38 3	23 4	24 2	23 4	19 3	18 0	20 8
July 7	27 10	25 7	36 10	22 10	21 9	25 0	19 5	18 1	20 5
" 14	28 7	25 5	37 1	23 2	20 4	24 1	19 1	17 11	20 10
" 21	29 0	25 5	38 1	23 8	21 10	25 0	19 3	18 0	20 10
" 28	29 3	25 2	36 11	24 4	22 5	24 2	19 9	18 2	20 11
Aug. 4	28 10	24 10	35 7	23 10	20 9	26 11	19 4	18 0	20 7
" 11	28 7	24 8	33 8	23 7	22 6	27 5	19 8	17 9	20 9
" 18	28 10	24 7	32 7	23 3	26 11	24 4	19 11	17 4	19 11
" 25	28 10	24 7	30 7	24 10	26 5	27 6	18 8	17 1	19 3
Sept. 1	28 8	25 0	28 1	25 2	25 10	27 8	18 1	16 7	18 11
" 8	28 7	25 5	26 10	25 8	26 5	27 9	17 10	16 6	17 10
" 15	28 4	25 4	25 7	25 4	27 1	26 10	17 1	16 2	16 10
" 22		25 4	25 5		27 4	26 9		16 1	17 1
" 29		25 6	25 9		26 11	27 0		16 5	16 7
Oct. 6		26 0	26 6		28 0	27 5		16 5	16 7
" 13		27 3	26 6		27 9	27 11		16 5	16 6
" 20		28 2	26 8		27 6	28 1		16 10	16 6
" 27		28 1	27 4		27 4	28 8		16 3	16 8
Nov. 3		27 2	28 4		27 2	28 6		16 7	17 2
" 10		26 7	28 4		26 9	28 7		16 5	17 5
" 17		26 1	28 1		26 4	28 5		16 7	17 2
" 24		25 8	27 9		26 2	28 4		16 7	17 1
Dec. 1		25 7	27 7		25 10	28 6		16 6	17 1
" 8		25 7	27 6		25 10	28 6		16 5	17 3
" 15		25 4	27 2		25 7	28 5		16 1	17 0
" 22		25 6	26 9		25 10	28 6		16 0	17 0
" 29		25 9	26 11		25 5	28 4		16 2	17 0

AVERAGE PRICES of WHEAT, BARLEY, and OATS per IMPERIAL QUARTER in BELGIUM in the under-mentioned Months of 1900.

Month.	Wheat.	Barley.	Oats.
1900.	s. d.	s. d.	s. d.
May	28 2	23 11	20 1
June	28 10	24 1	20 6
July	29 11	23 8	20 9

The above prices have been compiled from the official monthly averages published in the *Moniteur Belge*.

AVERAGE PRICES of WHEAT, BARLEY, and OATS per IMPERIAL QUARTER in FRANCE, and ENGLAND and WALES, in the under-mentioned Months of 1900.

MONTH.	FRANCE.	ENGLAND.
WHEAT.		
1900.	Per Qr. s. d.	Per Qr. s. d.
June	33 0	25 9
July	33 3	28 8
August	32 6	28 9
BARLEY.		
1900.	Per Qr. s. d.	Per Qr. s. d.
June	23 5	23 8
July	23 4	23 6
August	23 3	23 10
OATS.		
1900.	Per Qr. s. d.	Per Qr. s. d.
June	19 7	18 10
July	19 9	19 4
August	19 9	19 4

Note.—The prices of French grain have been compiled from the official weekly averages published in the *Journal d'Agriculture Pratique*. The prices of British grain are official averages based on the weekly returns furnished under the Corn Returns Act, 1882.

AVERAGE PRICES of WHEAT, BARLEY, and OATS per IMPERIAL QUARTER at the under-mentioned Markets in the under-mentioned Months of 1900.

Month.	London.	Paris.	Breslau.
WHEAT.			
1900.	Per Qr.	Per Qr.	Per Qr.
	s. d.	s. d.	s. d. s. d.
June - - - -	26 11	34 11	29 10 to 33 6
July - - - -	28 8	34 10	29 9 " 33 5
August - - -	29 8	33 11	29 6 " 33 3
BARLEY.			
1900.	Per Qr.	Per Qr.	Per Qr.
	s. d.	s. d.	s. d. s. d.
June - - - -	23 3	24 0	22 7 to 26 2
July - - - -	24 6	23 10	22 7 " 26 2
August - - -	24 8	23 10	23 3 " 26 8
OATS.			
1900.	Per Qr.	Per Qr.	Per Qr.
	s. d.	s. d.	s. d. s. d.
June - - - -	19 5	20 8	18 8 to 19 8
July - - - -	20 1	20 3	18 5 " 19 5
August - - -	18 10	21 2	18 5 " 19 5

Note.—The London quotation represents the price of British corn as returned under the Corn Returns Act, 1882; the price of grain in Paris is the official average price of French grain in that city; the quotations shown for Breslau represent the prices of grain of good merchantable quality.

PRICES OF WOOL.

PRICES OF ENGLISH WOOL, per pack of 240 lbs., in the under-mentioned Months of 1900.

(Compiled from the Economist.)

DESCRIPTION.	June, 1900.	July, 1900.	August, 1900.
	£ s. £ s.	£ s. £ s.	£ s. £ s.
South Down - -	8 0 to 11 10	8 0 to 11 10	8 0 to 11 10
Half-breds - - -	6 10 " 8 10	6 10 " 8 10	6 10 " 8 10
Leicester - - -	6 0 " 7 0	6 0 " 7 0	6 10 " 7 0
Kent Fleeces - -	6 0 " 7 0	6 0 " 7 0	6 0 " 7 0

MEAN WHOLESALE PRICES of BUTTER, MARGARINE, and CHEESE in the under-mentioned Months of 1900.

(Compiled from the Grocer.)

DESCRIPTION.	June, 1900.	July, 1900.	August 1900.
	Per Cwt.	Per Cwt.	Per Cwt.
	s. d. s. d.	s. d. s. d.	s. d. s. d.
BUTTER :			
Cork, 1sts - - -	85 6 - -	91 0 - -	93 6 - -
" 2nds - - - -	84 0 - -	90 0 - -	91 0 - -
" 3rds - - - -	83 0 - -	88 0 - -	86 6 - -
" 4ths - - - -	78 0 - -	83 0 - -	80 0 - -
Friesland - - -	93 0 to 95 6	95 0 to 97 0	104 0 to 106 0
Dutch Factories -	95 0 " 99 0	99 0 " 103 0	107 6 " 111 6
French Baskets -	92 6 " 96 6	98 0 " 104 6	107 6 " 113 6
" Crocks and Firkins -	87 6 " 90 6	93 0 " 95 6	99 6 " 103 6
" 2nds and 3rds -	81 6 " 85 6	87 0 " 91 0	93 6 " 97 6
Danish and Swedish -	105 6 " 109 0	106 0 " 109 0	118 0 " 122 0
Finnish - - - -	90 6 " 98 6	93 0 " 99 6	100 6 " 110 6
Russian - - - -	84 6 " 93 0	84 6 " 94 6	85 6 " 97 6
Canadian and States -	94 0 " 103 0	88 6 " 103 6	87 0 " 108 6
Colonial, fine - -	91 0 " 102 6	96 0 " 106 0	102 6 " 106 6
" good and inferior -	76 0 " 86 6	82 0 " 92 0	90 6 " 96 6
Fresh Rolls (Foreign) per doz. -	10 0 " 13 0	10 3 " 13 9	10 6 " 14 6
MARGARINE - - -	38 0 " 62 0	38 0 " 62 0	38 0 " 62 0
CHEESE :			
Cheddar, new - -	65 0 " 79 6	56 6 " 65 6	58 6 " 67 0
" Loaf - - - -	74 0 " 76 0	63 6 " 65 6	61 0 " 63 0
Wiltshire, Loaf -	- - - -	56 6 " 60 0	60 6 " 62 6
Double Gloucester -	- - - -	56 0 " 60 0	57 0 " 61 0
Derby, Factory - -	55 6 " 60 0	55 0 " 58 0	54 0 " 60 0

WEEKLY PRICES. (WHOLESALE) of VEGETABLES and FRUIT
at COVENT GARDEN MARKET.(Compiled from the *Gardeners' Chronicle*.)

	Week ending									
	August 2nd.		August 9th.		August 16th.		August 23rd.		August 30th.	
VEGETABLES—	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Artichokes, Globe, per doz.	1 6 to 2 0	1 6 to 1 6	1 6 to 1 6	1 6 to 1 6	1 6 to 1 6	1 6 to 1 6	1 6 to 1 6	1 6 to 1 6	1 6 to 1 6	1 6 to 1 6
Beans, Scarlet Runners, per bushel	2 6 3 0	6 0	—	4 0 6 0	1 6 3 0	1 6 3 0	1 6 3 0	1 6 3 0	1 6 3 0	1 6 3 0
" Broad, home-grown, per bus.	1 0 1 6	1 0 1 6	1 6 2 0	1 6 2 0	1 6 2 0	1 6 2 0	1 6 2 0	1 6 2 0	1 6 2 0	1 6 2 0
" English, Dwarf, per bushel	4 0	6 0	—	4 0 6 0	3 0 5 0	2 0 3 0	2 0 3 0	2 0 3 0	2 0 3 0	2 0 3 0
Beet, per dozen	0 6 1 0	0 6 1 0	0 6 1 0	0 6 1 0	0 6 1 0	0 6 1 0	0 6 1 0	0 6 1 0	0 6 1 0	0 6 1 0
Cabbage, per tally	2 0 5 0	2 0 5 0	2 0 5 0	2 0 5 0	2 0 5 0	2 0 5 0	2 0 5 0	2 0 5 0	2 0 5 0	2 0 5 0
" per doz.	0 6 1 0	0 6 1 0	0 6 1 0	0 6 1 0	0 6 1 0	0 6 1 0	0 6 1 0	0 6 1 0	0 6 1 0	0 6 1 0
Carrots, new, per doz.	1 0 2 6	1 0 2 6	1 0 2 6	1 0 2 6	1 0 2 6	1 0 2 6	1 0 2 6	1 0 2 6	1 0 2 6	1 0 2 6
Cauliflowers, per doz.	2 0 3 6	2 0 3 6	2 0 3 6	2 0 3 6	2 0 3 6	2 0 3 6	2 0 3 6	2 0 3 6	2 0 3 6	2 0 3 6
Cress, per doz. punnets	1 6	1 6	1 6	1 6	1 6	1 6	1 6	1 6	1 6	1 6
Cucumbers, per doz.	1 9 2 9	1 0 2 3	1 0 2 3	1 0 2 3	1 0 2 3	1 0 2 3	1 0 2 3	1 0 2 3	1 0 2 3	1 0 2 3
Endive, new French, per doz.	2 0	2 0	2 0	2 0	2 0	2 0	2 0	2 0	2 0	2 0
Horseradish, English, per bundle	1 6	1 6	1 6	1 6	1 6	1 6	1 6	1 6	1 6	1 6
Leeks, per doz. bunches	2 0	2 0	2 0	2 0	2 0	2 0	2 0	2 0	2 0	2 0
Lettuce, English Cabbage, per bushel	1 0 2 0	1 6 2 6	1 6 2 6	1 6 2 6	1 6 2 6	1 6 2 6	1 6 2 6	1 6 2 6	1 6 2 6	1 6 2 6
" English Cos, per score	0 6 2 0	1 0 2 0	1 0 2 0	1 0 2 0	1 0 2 0	1 0 2 0	1 0 2 0	1 0 2 0	1 0 2 0	1 0 2 0
Mint, new, per doz. bunches	2 0	1 6 2 0	1 6 2 0	1 6 2 0	1 6 2 0	1 6 2 0	1 6 2 0	1 6 2 0	1 6 2 0	1 6 2 0
Mushrooms, House, per lb.	1 6	0 9 1 0	0 6 1 0	0 6 1 0	0 6 1 0	0 6 1 0	0 6 1 0	0 6 1 0	0 6 1 0	0 6 1 0
Onions, picklers, per sieve	3 6	3 0	3 0	3 0	3 0	3 0	3 0	3 0	3 0	3 0
" Green, per dozen	1 6 2 6	2 6 3 0	2 6 3 0	2 6 3 0	2 6 3 0	2 6 3 0	2 6 3 0	2 6 3 0	2 6 3 0	2 6 3 0
Parsley, per doz. bunches	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0	1 0
" per sieve	0 9 1 0	0 9 1 0	0 9 1 0	0 9 1 0	0 9 1 0	0 9 1 0	0 9 1 0	0 9 1 0	0 9 1 0	0 9 1 0
Peas, per bushel	2 0 4 0	3 0 6 0	4 0 5 0	4 0 5 0	4 0 5 0	4 0 5 0	4 0 5 0	4 0 5 0	4 0 5 0	4 0 5 0
Potatoes, per ton	60 0 0	60 0 0	60 0 0	60 0 0	60 0 0	60 0 0	60 0 0	60 0 0	60 0 0	60 0 0
Radishes, per doz. bunches	1 6	1 6	1 6	1 6	1 6	1 6	1 6	1 6	1 6	1 6
Salad, small, per doz. punnets	1 3	1 3	1 3	1 3	1 3	1 3	1 3	1 3	1 3	1 3
Spinach, per sieve	2 0	1 6 2 0	1 6 2 0	1 6 2 0	1 6 2 0	1 6 2 0	1 6 2 0	1 6 2 0	1 6 2 0	1 6 2 0
Tomatoes, English, new, per 12 lbs.	4 6 5 6	4 6 5 6	5 0 5 6	5 0 5 6	5 0 5 6	5 0 5 6	5 0 5 6	5 0 5 6	5 0 5 6	5 0 5 6
Turnips, new, per dozen	3 0	3 0 4 0	2 6 4 0	2 6 4 0	2 6 4 0	2 6 4 0	2 6 4 0	2 6 4 0	2 6 4 0	2 6 4 0
Vegetable Marrows, per dozen	0 6 1 0	0 6 1 0	0 6 1 0	0 6 1 0	0 6 1 0	0 6 1 0	0 6 1 0	0 6 1 0	0 6 1 0	0 6 1 0
Watercress, per dozen bunches	0 4 1 0	0 4 1 0	0 4 1 0	0 4 1 0	0 4 1 0	0 4 1 0	0 4 1 0	0 4 1 0	0 4 1 0	0 4 1 0
FRUIT—										
Apples, English—										
Suffields, per bushel	per sieve	3 0 4 0	2 6 3 6	1 6 3 6	1 6 3 6	1 6 3 6	1 6 3 6	1 6 3 6	1 6 3 6	1 6 3 6
Kecwicks, per bushel	1 0 2 0	2 0 2 6	2 0 2 6	2 0 2 6	2 0 2 6	2 0 2 6	2 0 2 6	2 0 2 6	2 0 2 6	2 0 2 6
Julians, per bushel	—	2 6 3 0	1 6 3 0	1 6 3 0	1 6 3 0	1 6 3 0	1 6 3 0	1 6 3 0	1 6 3 0	1 6 3 0
Quarrendons, per bush.	—	5 0 8 0	4 0 5 0	3 6 5 0	3 6 5 0	3 6 5 0	3 6 5 0	3 6 5 0	3 6 5 0	3 6 5 0
Cherries, English, per sieve	4 0 4 6	4 0 6 0	3 0 6 0	3 0 6 0	3 0 6 0	3 0 6 0	3 0 6 0	3 0 6 0	3 0 6 0	3 0 6 0
Currants, Black, per sieve	2 0 8 0	8 0	7 0	7 0	7 0	7 0	7 0	7 0	7 0	7 0
" Red, per sieve	2 0 4 0	3 0	3 0	3 0	3 0	3 0	3 0	3 0	3 0	3 0
" White, per gal.	2 0 2 6	2 0	2 0	2 0	2 0	2 0	2 0	2 0	2 0	2 0
Grapes, Hamburgh, new, per lb.	0 9 2 0	0 9 1 6	0 9 1 6	0 9 1 6	0 9 1 6	0 9 1 6	0 9 1 6	0 9 1 6	0 9 1 6	0 9 1 6
" Alicante, per lb.	1 0 1 6	1 0 1 6	1 0 1 6	1 0 1 6	1 0 1 6	1 0 1 6	1 0 1 6	1 0 1 6	1 0 1 6	1 0 1 6
Greengages, per sieve	—	4 0 5 0	3 6 5 0	3 6 5 0	3 6 5 0	3 6 5 0	3 6 5 0	3 6 5 0	3 6 5 0	3 6 5 0
Peaches, Class A, per doz.	6 0 9 0	8 0 10 0	6 0 9 0	6 0 9 0	6 0 9 0	6 0 9 0	6 0 9 0	6 0 9 0	6 0 9 0	6 0 9 0
" Class B, per doz.	4 0 6 0	3 0 5 0	2 0 4 0	2 0 4 0	2 0 4 0	2 0 4 0	2 0 4 0	2 0 4 0	2 0 4 0	2 0 4 0
Pears, Williams, French, in boxes (48)	7 0	4 6 5 0	2 0 3 0	2 0 3 0	2 0 3 0	2 0 3 0	2 0 3 0	2 0 3 0	2 0 3 0	2 0 3 0
Plums, per sieve	2 0 4 0	1 0 7 0	1 0 4 0	1 0 4 0	1 0 4 0	1 0 4 0	1 0 4 0	1 0 4 0	1 0 4 0	1 0 4 0
Raspberries, per dozen punnets	3 0 6 0	2 0 3 0	2 0 3 0	2 0 3 0	2 0 3 0	2 0 3 0	2 0 3 0	2 0 3 0	2 0 3 0	2 0 3 0

DISEASES OF ANIMALS IN GREAT BRITAIN.
NUMBER of OUTBREAKS of **Foot-and-Mouth Disease**
and of **Swine-Fever**, with the Number of CATTLE and
SWINE Slaughtered by order of the Board of Agriculture,
in GREAT BRITAIN in each of the under-mentioned
periods.

QUARTER ENDED	Foot-and-Mouth Disease.		Swine-Fever.	
	OUTBREAKS Confirmed.	ANIMALS Attacked.	OUTBREAKS Confirmed.	SWINE Slaughtered as Diseased, or as having been exposed to Infection.
	No.	No.	No.	No.
March, 1899	—	—	594	8,077
June, 1899	—	—	917	10,799
September, 1899	—	—	453	6,645
December, 1899	—	—	358	5,276
March, 1900	7	99	438	4,980
June, 1900	2	24	736	7,600

NUMBER of OUTBREAKS reported as having taken place, and
Number of ANIMALS returned as having been ATTACKED
by **Anthrax** and **Glanders** in GREAT BRITAIN in each
of the under-mentioned periods.

QUARTER ENDED	Anthrax.		Glanders (including Farcy).	
	OUTBREAKS Reported.	ANIMALS Attacked.	OUTBREAKS Reported.	ANIMALS Attacked.
	No.	No.	No.	No.
December, 1898	139	223	168	306
March, 1899	135	247	176	328
June, 1899	153	315	175	263
September, 1899	113	222	261	526
December, 1899	133	202	241	355
March, 1900	140	213	259	486
June, 1900	103	279	286	461

NUMBER of CASES of **Rabies** in DOGS in GREAT BRITAIN
during each of the under-mentioned periods.

THREE MONTHS ENDED	Number of Cases.
31st March, 1899	1
30th June, 1899	6
30th September, 1899	2
31st December, 1899	—
31st March, 1900	—
30th June, 1900	—

DISEASES OF ANIMALS IN IRELAND.

NUMBER of OUTBREAKS of **Pleuro-Pneumonia** and of **Swine-Fever**, with the Number of **CATTLE** and **SWINE** Slaughtered by order of the Lord Lieutenant and Privy Council in IRELAND, in each of the under-mentioned periods.

QUARTER ENDED	Pleuro-Pneumonia.			Swine-Fever.	
	OUT- BREAKS Confirmed.	CATTLE found Diseased.	CATTLE Slaughtered as having been exposed to Infection.	OUT- BREAKS Con- firmed.	SWINE Slaughtered as Diseased, or as having been exposed to Infection.
	No.	No.	No.	No.	No.
March, 1899	—	—	—	80	1,356
June, 1899	—	—	—	95	1,541
September, 1899	—	—	—	119	2,463
December, 1899	—	—	—	28	495
March, 1900	—	—	—	40	702
June, 1900	—	—	—	78	1,394

NUMBER of OUTBREAKS reported as having taken place, and Number of ANIMALS returned as having been ATTACKED by **Anthrax**, **Glanders**, and **Rabies** in Ireland in each of the under-mentioned periods.

QUARTER ENDED	Anthrax.		Glanders (including Farcy).		Rabies.	
	OUT- BREAKS REPORTED.	ANIMALS ATTACKED.	OUT- BREAKS REPORTED.	ANIMALS ATTACKED.	CASES REPORTED.	
	No.	No.	No.	No.	DOGS.	OTHER ANIMALS.
March, 1899	1	1	—	—	20	5
June, 1899	—	—	4	6	22	3
September, 1899	1	3	2	4	30	5
December, 1899	—	—	3	4	7	1
March, 1900	1	6	4	5	7	—
June, 1900	1	1	3	7	4	1

THE "LABOUR GAZETTE."

The "Labour Gazette," the Journal of the Labour Department of the Board of Trade, contains an article each month on the state of employment among agricultural labourers in the various parts of the United Kingdom. Special articles also appear therein from time to time on the rates of wages paid to agricultural labourers, the Hiring Fairs in Great Britain, and on migratory Irish agricultural labourers. The "Labour Gazette" is issued on the 15th of each month, and may be obtained direct from the Publishers, Messrs. Horace Marshall & Son, Temple House, Temple Avenue, London, E.C., at the rate of 2s. per annum, post free. Copies may also be ordered through any newsagent, price 1d. each.

ORDNANCE SURVEY MAPS OF GREAT BRITAIN AND IRELAND.

The Ordnance Survey are issuing a new series of folding pocket maps for England and Wales on the scale of one inch to the mile. The maps are printed in colours on sheets 18 by 12 inches, mounted on canvas, in a cover or flat, price 1s. each. The one-inch scale map can also be procured at the same price in black and white, showing outline and contours; or in outline, with hills printed either in black or brown: the outline map has recently been revised. These maps are not only useful for general topographical purposes, but should also prove serviceable to cyclists and pedestrians, since they show all roads, indicating their character and whether metalled or not, footpaths, hills, rivers, towns, villages, railway stations, and local boundaries.

There are agents for the sale of Ordnance Survey Maps in most of the chief towns, and maps can be ordered and indexes, etc., seen at many Head Post Offices, in places where there are no agents. They can also be ordered, through any bookseller or railway bookstall, from the Director-General, Ordnance Survey Office, Southampton; or in the case of Ireland, from the Officer in Charge, Ordnance Survey, Dublin.

POST OFFICE SAVINGS BANKS, WITH GOVERNMENT SECURITY.

ADVANTAGES TO DEPOSITORS.

SECURITY.—The Post Office Savings Banks are established by Act of Parliament, and every depositor has the *direct security* of the State for the repayment of his deposits.

DEPOSITS.—Any sum from a shilling upwards, excluding pence, may be deposited at one time, and any number of deposits may be made in the course of a year (ending 31st December) up to a limit of 50*l.* A person may have 200*l.* in all on his deposit account, including interest.

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INTEREST at the rate of 2*l.* 10*s.* per cent. per annum is allowed on every complete pound deposited, so long as the sum to a depositor's credit does not exceed 200*l.* Whenever the balance exceeds that sum, interest will be allowed on 200*l.* and the excess will be invested for the depositor in Government Stock, unless the depositor should otherwise direct.

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POSTAGE FREE.—No charge for postage is made to a depositor, if in the United Kingdom, for any letter passing between him and the Chief Office on Post Office Savings Bank business.

LIST OF LEAFLETS ISSUED BY THE BOARD OF AGRICULTURE.

Number.	Title.
Leaflet No. 1	Mites on Currant and Nut Trees.
" " 2	Vine and Raspberry Weevils.
" " 3	The Turnip Fly or Flea.
" " 4	Caterpillars on Fruit Trees.
" " 5	The Mangel Wurzel Fly.
" " 6	The Field Vole.
" " 7	<i>Out of Print.</i>
" " 8	Farmers and Assessments to Local Rates.
" " 9	Ensilage.
" " 10	Wireworms.
" " 11	The Daddy Longlegs or Crane Fly.
" " 12	The Gooseberry Saw-Fly.
" " 13	Acorn Poisoning.
" " 14	The Raspberry Moth.
" " 15	The Apple Blossom Weevil.
" " 16	The Apple Sucker.
" " 17	<i>Out of Print.</i>
" " 18	Fertilisers and Feeding Stuffs Act.
" " 19	Pea and Bean Weevil.
" " 20	The Magpie Moth.
" " 21	The Warble Fly.
" " 22	The Diamond Back Moth.
" " 23	Potato Disease.
" " 24	The Ribbon Footed Corn-Fly.
" " 25	The Cockchafer.
" " 26	Farmers and the Income Tax.
" " 27	Remission of Tithe Rentcharge.
" " 28	Anthrax.
" " 29	Swine Fever.
" " 30	The Codlin Moth.
" " 31	The Onion Fly.
" " 32	Foul Brood or Bee Pest.
" " 33	Surface Caterpillars.
" " 34	The Woolly Aphis or American Blight.
" " 35	The Celery Fly.
" " 36	Cultivation of Osiers.
" " 37	Rabies.
" " 38	The Carrot Fly.
" " 39	Assessments to Land Tax.
" " 40	The Kestrel or Windhover.
" " 41	The Red Spider or Spinning Mite.
" " 42	The Short-eared Owl.
" " 43	Titmice.
" " 44	The Common Lapwing or Plover.
" " 45	The Starling.
" " 46	The Stem Eelworm.
" " 47	The Asparagus Beetle.
" " 48	The Pea Thrips.
" " 49	The Fruit Tree Beetle.
" " 50	Water Wagtails or "Dishwashers."
" " 51	The White or Barn Owl.
" " 52	Gooseberry Blight.
" " 53	The Pear Midge.
" " 54	The Spotted Flycatcher.
" " 55	The Swallow.
" " 56	The Canker Fungus.
" " 57	External Parasites of Poultry.
" " 58	Internal Parasites of Poultry.
" " 59	Improvement of Land Act.
" " 60	The Wood Leopard Moth.
" " 61	Sheep Scab.
" " 62	The Pear and Cherry Sawfly.
" " 63	Destruction of Charlock.
" " 64	White Root Rot.
" " 65	The Small Ermine Moths.

Copies of the above leaflets may be obtained free of charge and post free on application to the Secretary, Board of Agriculture, 4, Whitehall Place, London, S.W. Letters of application so addressed need not be stamped.

THE JOURNAL OF THE BOARD OF AGRICULTURE.

Vol. VII. No. 3. DECEMBER, 1900.

THE GRAIN HARVEST OF 1900.

The preliminary statement showing the estimated produce of the three chief cereal crops in Great Britain, in the harvest of 1900, was issued on the 5th inst. by the Board of Agriculture in the customary form. These statistics showed the yield per acre alike of wheat, barley, and oats to be more or less below the average of the preceding ten years. The yield per acre of wheat was estimated at $28\frac{1}{2}$ bushels, or rather more than $1\frac{1}{2}$ bushels below the decennial average. This figure is nearly $4\frac{1}{2}$ bushels below the estimated yield for 1899, and nearly $6\frac{1}{2}$ bushels below the remarkably heavy crop of 1898. Not since 1895 has so small a return been indicated, although the crop of 1897 only exceeded that of the present year by about half a bushel per acre. In Wales and Scotland, this year, the wheat crop appears to have been relatively better than in England, although the area under wheat in these districts is much too small to affect materially the general result. The yield of $25\frac{1}{2}$ bushels credited to Wales was not only above the normal average of the Principality by more than $1\frac{1}{2}$ bushel, but slightly exceeded the crop of last year. In Scotland the yield per acre was half a bushel below the local average. The coincidence of a deficient yield per acre with a substantial reduction in the acreage resulted in a total production of wheat smaller than in any year previously recorded, with the exception of 1893 and 1895.

A general review of the reports received from the estimators makes it appear that the great corn-growing district which comprises the Eastern and North-Eastern counties of England

ad relatively the greatest deficiency in the past season, the yield per acre being markedly less than that returned in 1897, whereas in some other districts, such as the East Midland and South-Eastern counties, the crop of 1900 slightly exceeded that of 1897.

The comparative wheat yields are given below :—

WHEAT.	Estimated Total Produce.		Estimated Yield per Acre.		Average of the Ten Years 1890-99.
	1900.	1899.	1900.	1899.	
	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>
England	49,528,385	62,380,067	28'39	32'83	30'15
Wales	1,332,299	1,380,938	25'79	25'62	24'15
Scotland	1,779,125	1,768,320	36'43	37'42	36'98
Great Britain	52,639,809	65,529,325	28'53	32'75	30'15

The estimated average yield of barley for the whole of Great Britain is reported as short of the decennial average by more than two bushels per acre, and nearly three bushels less than the crop of 1899. This yield is thus smaller than in any recorded year except 1893, being slightly less than in 1895. North of the Border the crop was relatively more deficient than in England, although the falling off in comparison with 1899 was not so great. In Wales the yield of barley, like that of wheat, exceeded both the ten years' average and the estimate for the previous year. The figures are as follow :—

Barley.	Estimated Total Produce.		Estimated Yield per Acre.		Average of the Ten Years 1890-99.
	1900.	1899.	1900.	1899.	
	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>
England	50,977,265	56,164,313	30'99	34'34	33'44
Wales	3,341,872	3,328,494	31'81	31'41	30'10
Scotland	7,995,373	8,222,891	33'29	34'19	36'20
Great Britain	62,314,510	67,715,698	31'31	34'16	33'50

As was the case also in 1899, the Northern Counties showed the highest yield per acre of barley, but the Eastern Counties, which last year stood second, gave this year a return lower than that of the country generally.

The estimated yield of oats in Great Britain approximated more nearly both to the decennial average and to the previous year's crop than did that of either wheat or barley. The deficiency was, however, greater in England than in Scotland.

OATS.	Estimated Total Produce.		Estimated Yield per Acre.		Average of the Ten Years 1890-99.
	1900.	1899.	1900.	1899.	
	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>
England	73,604,178	73,905,288	39'56	41'48	40'80
Wales	7,238,305	7,527,952	33'44	34'18	33'20
Scotland	34,005,054	33,313,304	35'83	34'78	36'55
Great Britain	114,847,537	114,746,544	37'95	38'77	38'81

The following table gives the yield per acre of wheat, barley, and oats respectively, as estimated for each of the groups of counties into which England is divided for the purposes of these returns.

Divisions of England.		Estimated yield per acre in 1900.		
		Wheat.	Barley.	Oats.
		<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>
I. (a)	Beds., Hunts., Cambs., Suffolk, Essex, Herts., Middlesex, London.	27'46	30'80	42'41
	(b) Norfolk, Lincoln, York E.R.	29'97	30'92	43'24
II. (a)	Kent, Surrey, Sussex, Berks., Hants.	28'77	31'60	40'15
	(b) Notts., Leicester, Rutland, Northants, Bucks., Oxon., Warwick.	28'23	29'16	34'35
III. (a)	Salop, Worcester, Gloucester, Wilts., Monmouth, Hereford.	28'13	30'16	36'86
	(b) Somerset, Dorset, Devon, Cornwall.	25'76	30'92	38'50
IV. (a)	Northumberland, Durham, York, N.R., York, W.R.,	28'43	33'39	39'81
	(b) Cumberland, Westmoreland, Lancs., Stafford, Cheshire, Derby.	30'85	32'09	38'83

THE QUALITY OF BARLEY GROWN AFTER ROOTS.

Barley grown after swedes or turnips that are consumed by sheep folded on the land is generally of inferior quality and rarely makes a good malting sample, and yet probably more barley is grown upon this tilth, as in the typical four course rotation, than upon any other. If we look down the records of the Brewers' Exhibition we almost always find that the prize-winning barleys have been grown after wheat, after clover, or as the second barley crop after roots.

For this inferiority of barley taken after roots there are several reasons. In the first place the tilth is rarely good or uniform; in some places the land is much poached because there happened to fall a spell of wet weather when the fold was on that spot; some parts may have been folded a month or two back, in others the plough immediately follows the fold; secondly, the seeding is generally late, the sheep can rarely be got off the land, and a seed-bed prepared before the middle or end of March, and a February seeding is necessary for first-class barley. A third cause is the large quantity of rapidly acting manure that is left in the soil by the sheep. If we take the Rothamsted figures for an average crop of 14 tons per acre of swedes and 2 tons of leaves, we find the crop contains, per acre, 98 lbs. of nitrogen, 22 lbs. of phosphoric acid, and 80 lbs. of potash, of which the sheep will only retain 7, 4, and 5 lbs. respectively, returning to the soil 91 lbs. of nitrogen, 18 lbs. of phosphoric acid, and 75 lbs. of potash. This is a large amount of manurial material, roughly equivalent to a dressing of 600 lbs. nitrate of soda, 170 lbs. of superphosphate, and 600 lbs. of kainit; it is also

in a highly available condition for the plant, the nitrogen and the potash particularly being mainly in a soluble form.

Some loss of nitrogen may result from "denitrification" (see Krüger and Schniedewind, Landw. Jahr. XXIX., 747, for an experiment bearing on this point), but the appearance of the growth always points to a superabundance of nitrogen.

It is evident that not only is the manure available for the crop large in quantity, but it is also very badly balanced; the excess of nitrogen will produce an extreme vegetative development, an immediate flush of flaggy* growth with a weak straw, and a tendency to late ripening, while the phosphoric acid, which is particularly connected with the development and ripening of the grain, bears only a small proportion to the other manurial materials.

Although it is difficult to remedy the effect of the tilth and the late seeding in the case of barley after roots, it may be possible to modify the ill-balanced manuring, and by the use of quick-acting phosphatic manures to correct the more or less abnormal growth induced by the excess of nitrogen and potash. Of course there will generally be a residue of phosphatic manure in the soil from the dressing used for the swede crop, which is highly phosphatic; still, this residue may not be sufficiently available for a plant with a short period of growth like barley. Experiments on these lines have been conducted by the South-Eastern Agricultural College at Wye during the past four years, at first on small plots, but during the last two years on comparatively large fields; in addition to dressings of superphosphate, trials have been made with sulphate of potash and salt, as being often recommended and used when barley is taken after roots.

As the experiments were mainly concerned with the quality of the barley, the grain was subjected to a thorough examination in the laboratory, and the tables which follow show the composition of twenty-one samples of barley thus grown in 1899. The characters of most importance in deciding upon the quality of the sample are the weight per bushel, or better the weight of 100 grains, the proportion of starch and nitrogen, and the proportion of

flinty and mealy grains; but as there is a great lack of analytical data concerning British-grown cereals, we decided to complete the analyses in the usual fashion by determinations of the fat, ash, and fibre. All the barleys under consideration were of the Chevalier type, grown in Kent in 1899 on very similar soils, light flinty loams on chalk, and except the samples numbered 22 to 28 they were grown after a root crop that had been folded off.

No.	Moisture.	Fat.	Starch.	Nitrogen.	Crude Fibre.	Ash.	Bushel Weight.	Number of grains in 20 grains.	Weight in grams of 100 grains.	Mealy Corns.	Half flinty Corns.	Flinty Corns.
	%	%	%	%	%	%	lbs.			%	%	%
1.A	16.1	1.61	56.9	1.33	4.0	2.24	57.7	464	4.31	23	28	9
2.B	16.13	1.43	57.3	1.32	4.4	2.24	58.5	454	4.40	19	21	11
3.C	16.05	1.45	63.2	1.38	4.2	2.16	58.7	440	4.55	20	72	8
4.D	15.78	1.75	57.1	1.49	4.0	2.13	58.7	431	4.64	16	71	13
5.E	15.91	1.57	54.4	1.37	4.2	2.17	58.7	432	4.63	19	73	8
6.A	15.21	2.20	60.4	1.52	4.0	2.60	These two samples being doubtful were not further examined.					
7.B	15.82	1.34	58.7	1.62	4.4	2.61						
8.C	15.69	1.47	62.5	1.63	4.2	2.56	57	448	4.46	23	69	18
9.D	16.29	1.57	57.7	1.55	4.3	2.49	57	461	4.34	22	50	28
10.E	16.53	1.62	59.1	1.52	4.2	2.47	57.5	455	4.40	33	51	16
11.A	18.50	1.84	57.4	1.72	4.6	2.10						
12.B	15.20	1.53	56.7	1.63	4.5	2.32						
13.C	15.00	1.74	57.1	1.72	3.9	2.15						
14.D	15.58	1.60	53.0	2.0	4.2	2.13						
15.E	15.80	1.63	54.8	1.84	4.0	2.16						
16.A	15.27	2.10	58.4	1.55	3.9	2.0	55	422	4.74	38	57	15
17.B	17.22	1.69	57.0	1.41	4.5	2.13	56	440	4.55	32	54	14
18.A	15.43	1.50	59.7	1.45	3.9	2.23	59	392	5.10	48	54	8
19.E	14.01	1.51	55.6	2.62	3.8	2.26	58	406	4.92	37	53	16
20.A	14.46	2.0	50.1	1.51	4.0	2.23	58.5	416	4.81	46	48	6
21.E	14.32	1.66	60.3	1.4	4.0	2.23	58.7	414	4.83	64	21	5
22	16.61	1.38	51.1	1.5	4.7	2.40	..	446	4.48	8	53	39
23	17.29	1.38	54.1	1.53	4.1	2.48	..	426	4.69	14	46	40
24	16.76	1.28	54.9	1.55	4.7	2.39	..	428	4.68	8	62	30
25	16.34	1.14	51.7	1.39	4.6	2.40	..	436	4.58	16	59	25
26	16.11	1.34	53.8	1.47	4.7	2.45	..	425	4.70	15	55	30
27	15.84	1.34	58.4	1.39	4.8	2.49	..	427	4.68	26	61	13
28	16.16	1.30	55.3	1.43	4.9	2.44	..	438	4.56	35	51	24
Mean values of samples 1-21	16.23	1.65	57.9	1.55	4.1	2.27						

The starch determinations were made as follows: A quantity of grain was ground and weighed, then boiled up with water for half an hour; after cooling, 10 c.c. of freshly prepared malt extract was added to hydrolise the starch, and the mixture was allowed to stand in a warm place for twelve hours and filtered; the hydrolysis of the starch was then completed by boiling the solution with hydrochloric acid and the dextrose determined by Fehling's solution, a correction being made by a blank experiment for the malt extract added. For the determination of the "crude fibre," 2 per cent. solutions of sulphuric acid and alkali were employed. The bushel weights and other physical factors were determined by Professor J. Percival; the chemical analyses were made by Mr. F. T. Holbrook, of the Wye college.

In the above tables samples 1 to 5, 6 to 10, and 11 to 15 are from similarly manured plots in three different places; 16 and 17, 18 and 19, 20 and 21 are from larger fields, one half of which was manured experimentally.

The dressings used were as follows:—

Mark A (Numbers 1, 6, 11, 16, 18, 20), unmanured.

" B (" 2, 7, 12, 17), 3 cwt. per acre superphosphate.

" C (" 3, 8, 13), 3 cwt. superphosphate, 1 cwt. sulphate of potash.

" D (" 4, 9, 14), 3 cwt. superphosphate, 3 cwt. salt.

" E (" 5, 10, 15, 19, 21), 5 cwt. superphosphate.

Of course comparisons can only be instituted between the barleys coming from the same field—i.e., between the members of the series 1 to 5, or the series 6 to 10, or between 16 and 17, or 20 and 21; but by looking at the figures in this way the effect of the manures may be traced.

Taking the mean values of samples 1 to 21 we obtain the following average composition for barley grown after roots in 1899 in Kent:—

Moisture	16.23 per cent.
Fat	1.65 "
Proteids (Albuminous Compounds)	9.15 "
Starch	57.9 "
Pentosans and other Carbohydrates (by difference)	8.7 "
Crude Fibre	4.1 "
Ash	2.27 "
	100.00

The figure 9.15 for proteids is obtained by multiplying the nitrogen percentage, 1.55, by the factor 5.9, instead of the

more usual factor of 6.25.* The carbohydrates other than starch, which are dissolved by the acid and alkali used in determining the crude fibre and have not been directly estimated, are mostly pentosans. As starch does not admit of accurate determination and as "crude fibre" is a purely empirical term, the figures are in fair agreement, for Tollens has shown† that the pentosans in barley amount to 9-10 per cent.

Effect of Superphosphate.—In the experiments made during 1897 and 1898 upon the same plan dressings of 3 cwt. superphosphate had generally given an increased yield of corn but not of straw; 5 cwt. of superphosphate had generally increased the yield still further, but as these conclusions had only been drawn from small plots of $\frac{1}{16}$ acre, it was necessary to confirm them by a trial on a larger scale. Accordingly the land of the College farm which fell to barley in 1899, a field of $17\frac{1}{2}$ acres, was equally divided, and one half was manured with 3 cwt. superphosphate per acre. The crop on each piece was stacked and threshed separately with the following results:—

No. 16, 8.85 acres unmanured gave 49 qrs. head corn, 5 qrs. tail.
 " 17, 8.85 " with super. gave 54 " " 9 $\frac{1}{2}$ " "

Two fields on Amage Farm, Wye, were treated in the same way—half left unmanured, half manured with 5 cwt. per acre of superphosphate. The returns were:—

No. 18, unmanured, 48 bushels per acre.
 " 19, 5 cwt. super, 52 " " "
 " 20, unmanured, 46 " " "
 " 21, 5 cwt. super, 51 " " "

These numbers, obtained by experiments upon a commercial scale, show that a dressing of 3 to 5 cwt. of superphosphate will give an increase of about 5 bushels to the acre, an increase that will pay for the application of the manure, irrespective of any improvement that may have been effected in the quality.

In order to judge of the effect of superphosphate on the composition of the grain, we must compare in the table above the samples marked B, which have been grown on

* See Osborne, J., Am. Ch. Soc. XVII. (1895), 539, and Ritthausen, Landw. Ver. Stat. 47 (1896), 391.

† Tollens, J. f. Landw. 1897, 106. Cross and Bevan, Berichte, 1894, 27, 1064.

plots receiving 3 cwt. per acre of superphosphate, with samples marked A, which are from plots receiving no manure, and again with samples marked E, from plots receiving 5 cwt. per acre of superphosphate. Samples 6 and 7 must be rejected, as after analysis it was found that their identity was doubtful. On making the comparisons thus indicated, it will be seen that a dressing of 3 cwt. of superphosphate raises the bushel weight and lowers the percentage of nitrogen, both of which are factors of value, for it is difficult to make good beer from barley with a high nitrogen content. The proportion of starch and the relative proportion of mealy and flinty grains is little affected by the superphosphate dressings.

The effect of 5 cwt. of superphosphate on the grain is not marked with the consistency that is seen in the case of 3 cwt. dressings of superphosphate; perhaps the large quantity of superphosphate combined with the dry seasons over-accelerates the ripening before the grain has had time to fill, but in each year we have found the grain from the plots with 5 cwt. superphosphate little if at all better as regards weight per bushel, proportion of nitrogen, proportion of mealy and flinty corns, than the corn from the unmanured plots.*

The colour and appearance of the grain have always been improved by the dressings of superphosphate. This was particularly noticeable on comparing the samples grown on a large scale; the farmer who grew samples 18-21 reported that he obtained a better price for his crop through the superphosphate dressings. In our own case the two lots were unfortunately sold in small parcels and at different times as seed barley, but 17, which received superphosphate, was judged to be worth 2s. per quarter more than 16 from the unmanured part of the field.

Calculating the monetary return on this basis we obtain:—

	Yield per acre, bushels	Price per qr.	Gross return.
16. Unmanured.	44.3	28s.	154s.
17. 3 cwt. super.	48.8	30s.	180s.

to which must be added about 10s. for the extra four bushels of tail corn. The cost of the dressing may be taken as

* See Journal S.E. Agricultural College, vii. 32; viii. 17.

7s. 6d., making with the cost of sowing a total expenditure of 8s. per acre.

We thus obtain a net profit of 28s. per acre for the application of 3 cwt. of superphosphate per acre to barley taken after roots folded on the land.

Effect of Sulphate of Potash.—To judge of the effect produced by a dressing of 1 cwt. per acre of sulphate of potash (90 per cent.) it is necessary to compare samples C, from land which received 3 cwt. superphosphate and 1 cwt. of sulphate of phosphate, with samples B, from plots receiving the superphosphate only. It will be seen that in each series the starch reached its maximum in the grain which had been grown with potash manure, but no consistent effect upon the other constituents of the barley can be traced. These results accord with the known function of potash in determining the formation of carbohydrates. It is, however, somewhat surprising to find so small a quantity of potash producing this effect when the soil had previously been enriched in soluble potash by the residue from feeding the roots. The increased proportion of starch should make the barleys more valuable for brewing, but the ordinary commercial valuation does not set these samples at any higher price.

Effect of Salt.—The plots from which came the samples marked D received 3 cwt. salt per acre in addition to 3 cwt. superphosphate; hence a comparison must be made between samples D and B to ascertain the effect of salt. It is seen that the salt always causes a deterioration of sample; the starch is lowered, the nitrogen is increased, and the proportion of flinty corns similarly rises.

These results are in accord with those obtained in 1897 and 1898; in all the seven cases reported the proportion of nitrogen had been increased by the dressings of salt, and in most cases other evidence of the deterioration of the samples by dressings of salt was to be found.

Composition of the barleys as affected by manures:—

The samples numbered 22–28 are not comparable with the others; they are from plots upon the College farm, where barley had been grown for five years in succession, the manurial treatment having been the same each year. The

sample numbered 22 came from the continuously unmanured plot; the others had each year a general manure, but from 23 the potash, from 24 the nitrogen, and from 25 the phosphoric acid was omitted; 26 and 27 received a complete artificial manure, but 27 twice as much as 26, 28 received dung instead of artificials.

The continuous omission of any one ingredient of a manure, nitrogen, potash, or phosphoric acid, results in a sample very poor in starch, the unmanured plot and that without phosphoric acid being the worst. The best sample came from 27, the plot that had always received a large general dressing. The proportion of starch was good and the nitrogen low; the proportion of flinty corns was also low.

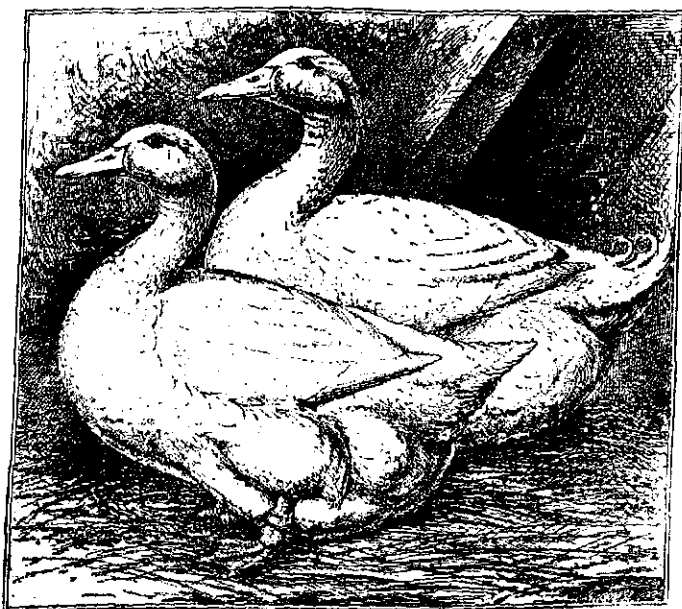
In looking over the various series of analyses one or two facts of interest are seen; the starch content and the proportion of mealy grains generally vary together, the relative mealiness and flintiness being dependent on starch rather than on the nitrogenous compounds. It may be noticed also that the fat is generally highest in the samples from the unmanured plots, and that the fat and the crude fibre generally vary in opposite directions, the crude fibre being lower where the fat is higher, and *vice versa*. Speaking generally, the nitrogen and fat are lower, the crude fibre and the ash are higher, in the barleys grown after barley than in the barleys grown after roots.

General Conclusions.—When barley is grown after roots that have been fed on the land a dressing of salt is detrimental to the value of the barley, and sulphate of potash, though increasing the starch content of the grain, does not give any commercial return.

A dressing of 3 cwt. of superphosphate per acre is decidedly profitable, and can be recommended as producing a slight increase in yield and a marked improvement in quality.

A. D. HALL.

DUCKS AND DUCK-BREEDING.

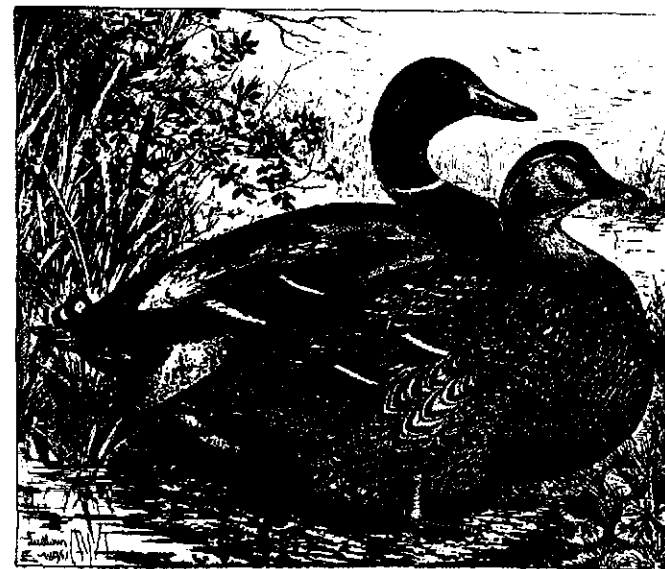


AYLESBURY DUCKS.

In this article it is proposed to deal with what may be termed the economic breeds of Ducks, for though there are many other varieties, including some of great beauty, in addition to those described below, they are ornamental rather than useful.

Some old writers speak of the Aylesbury duck as the White English, designating the Rouen as the "common" duck. But in the early part of the nineteenth century the name Aylesbury was given to the white variety, owing to the fact that it was extensively bred in the Vale of Aylesbury, until recent years the chief seat of the duck breeding industry. For nearly a century the variety has supplied ducklings to meet the demand for those delicacies

in the early months of the year, and for this special trade it has practically no rivals among the pure breeds of our own or any other country. The chief reason for its superiority in this respect is its rapid growth. Ducklings can be produced ready for killing within seven to nine weeks from the day of hatching, and weighing four to five-and-a-half pounds. As the season when prices for ducklings rule high is early, quickness of growth is an important factor to the breeder, especially as ducks are heavy feeders. The bones in this breed are very light, and there is comparatively little



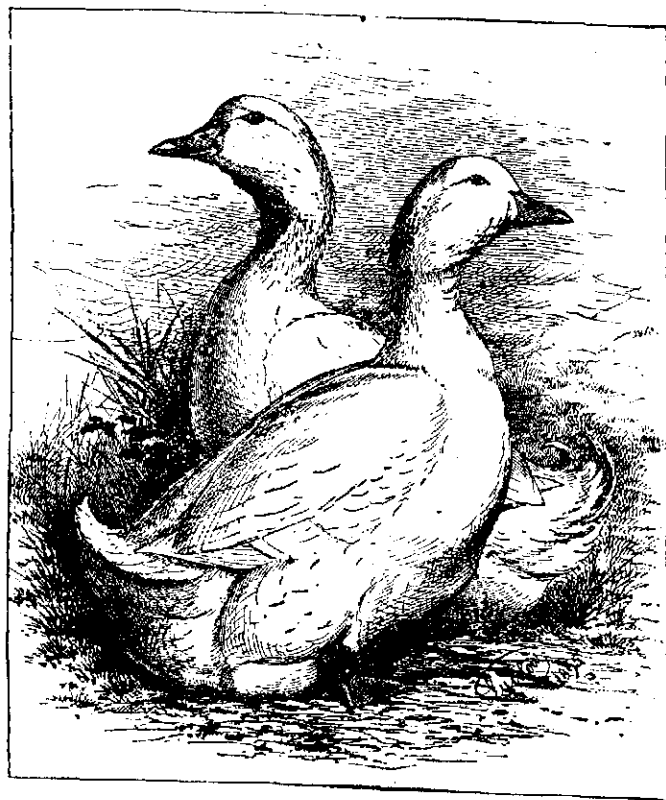
ROUEN DUCKS.

offal, the flesh being well placed and light in colour. Adult drakes weigh about nine pounds, and ducks eight pounds, but for breeding purposes a pound less in each sex is no disadvantage, provided that the frame is large and well developed. The ducks are excellent layers of large-sized eggs, of which they frequently produce considerably over a hundred and twenty per annum.

THE ROUEN DUCK.

The name given to this variety of duck would appear to

indicate that it originated in Normandy, but there is no direct evidence to this effect. In economic qualities the value of the Rouen is very great, but it does not equal the Aylesbury in so far as early maturity is concerned. It is much slower in development, and during the early period of growth is engaged in the building of frame rather than the



PEKIN DUCKS.

production of flesh. Hence it is not suitable for the duckling trade, but it provides larger specimens than the Aylesbury. It is, therefore, chiefly kept for the summer and autumn duck trade. The flesh is excellent, very full in flavour, and, when the bird is fully grown, very abundant. The flesh is much darker than that of the Aylesbury, but is richer than that of any of the other species. This duck is a good layer of large-sized eggs, but it does not come into profit so early as

the breed just named. Fully matured specimens weigh: drakes, 10 lbs., ducks, 9 lbs.

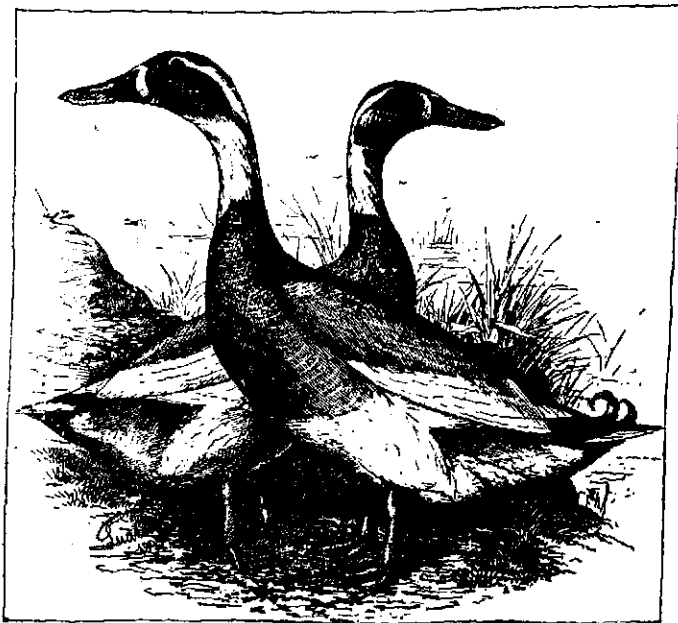
THE PEKIN DUCK.

This breed was first introduced into Britain in 1872, direct from China, but was not then brought publicly forward, and it was not until two years later, when other importations by way of America took place, that it fell into the hands of poultry-breeders, who at once perceived that it differed from any variety of duck then known, and possessed special characteristics. The attractive appearance, prolificness as layers, natural vigour, and apparently large size of the new birds speedily won popularity, and for a time it seemed that they would take the place so long occupied by the Aylesbury. Close-breeding and want of fresh blood had somewhat enfeebled the last-named variety, reducing the fertility of the eggs and the vigour of the ducklings. Their wonderful laying powers soon made the Pekins popular, and they supplied an influence much needed for crossing with the Aylesbury, which, while for a time affecting the purity of the last-named breed, has been of permanent benefit, so far as vigour is concerned. It cannot be said that of late years the Pekin has maintained its position, for it has proved to be not nearly so meaty as was supposed, and flesh qualities are now regarded as of greater importance than egg production. Though often larger in frame than the Aylesbury, it does not carry the same quantity of flesh, and an adult specimen generally scales one to two pounds less in weight. The reason for this is that Pekins do not readily lend themselves to fattening, and in America, where they are extensively bred, but where the quality of flesh in table poultry is not equal to that met with in Europe, it is found that they require two to three weeks longer to attain to killing age as ducklings than do the Aylesburys, while as adults they are only moderately fleshy, as can be seen at the dead poultry shows. As with fowls that are specially prolific as layers, excess in that direction is not accompanied by great meat production. Hence the flesh is neither so abundant nor so good as that

of the Rouen and Aylesbury. Their chief value is as egg producers. But for crossing with the Aylesbury they are very valuable, and the progeny of such a cross are often larger and quite as rapid in growth as the pure Buckinghamshire breed.

THE INDIAN RUNNER DUCK.

Within the past decade a variety of duck to which the name "Indian Runner" has been applied has met with a considerable amount of favour. But for something like fifty



INDIAN RUNNER DUCKS.

years ducks of this type have been kept in Cumberland. Its origin is somewhat doubtful. All that we really know on this point appears to be that a drake and a trio of ducks were originally brought from India by a sea captain, who landed them at Whitehaven and presented the lot to some farmer friends in West Cumberland. A few years later another consignment was imported, and it is claimed that from these two importations all the present stocks have descended. Attempts have been made to trace the port of

embarcation, and to discover where similar ducks can be obtained, but in vain. The term "India" may mean East or West, and does not materially help us. Upon the farms of Cumberland ducks of this type are to be freely met with, and they are greatly in favour because of their wonderful laying powers, which are greater than of all other races of ducks. The eggs are about the same size as from hens. The birds are usually hardy. For table purposes they are small, adults weighing $3\frac{1}{2}$ to $4\frac{1}{2}$ lbs., while ducklings would be about 2 lbs. lighter; their flesh, however, is excellent, and if a trade in small ducklings could be created they would meet a need. As the name indicates, they are excellent foragers. In appearance the Indian Runner is peculiar. Combined with the long, upright body, as in the Pekin, it has a very fine long neck, and its head and bill are also long and fine. The body is not so deep as in the breeds already described, much more of the leg being seen. There are two colours: (1) the fawn, and (2) the brown and grey; the former is generally favoured. The head, breast, back, wings, and tail in drakes of these varieties are fawn or brown and grey respectively, with white neck and sides in each case, but the ducks are pencilled.

THE MUSCOVY DUCK.

This variety has been known for more than three centuries, and it appears to have received at various times two other names, the Peruvian and the Barbary duck. The name is said to have been given in honour of some merchants in the sixteenth century, called the "Muscovite Company," but the general impression is that the term is a corruption of Musk Duck, so called by reason of the odour of the bird before it is cooked. The breed has, however, never become popular, firstly, because it is not pleasing in appearance, and, secondly, it has so bad a temper that other fowls can scarcely be kept where it is. The birds are, on the other hand, wonderfully tame, and will answer the call of anyone with whom they are familiar, but they are great wanderers, and sometimes remain

away several days. For this reason they cannot be kept in confinement, but must have freedom. They grow to a very great size, and drakes will often scale 12 lbs. when matured. As layers they are somewhat uncertain.

THE CAYUGA DUCK.

Several attempts have been made to popularize the Cayuga duck as an economic fowl, but without success, its small size and dark flesh being serious disadvantages on our markets. It is excellent in meat properties, the darker coloured flesh and full flavour enabling it to take the place of the wild duck. As a layer, except where enfeeblement has resulted from close breeding for exhibition purposes, it is very good indeed. Crossed with the Pekin, it makes a very meaty bird for the table. The body is long and wide, with a flat back and very deep breast; the thighs are short and plump, and the legs short, strong and small; the neck is long, and the head and bill long and rather narrow; the plumage is bright metallic black; the legs and feet black or smoky-brown, and the bill blue-black; adult specimens weigh $6\frac{1}{2}$ to $7\frac{1}{2}$ lbs.

BREEDING.

The breeding of ducks is especially suited to those who have only a limited amount of space at command, but it is also a branch which can be followed by the farmer. As is well known, this industry is largely developed in Buckinghamshire and Bedfordshire. Within the last few years the area has extended to a considerable extent, and success has been achieved in other parts of the country, notably where the soil is light and of a gravelly nature. As a general principle, it should be realized that the breeding stock must have access to water in which to disport themselves, and the progeny are much stronger if the parents have liberty. Consequently, in the duck breeding centres small occupiers who hatch and rear the ducklings do not keep the stock birds, but purchase eggs for hatching, and this plan can be generally recommended, as it enables many to undertake the rearing who would not otherwise be able to do so.

HATCHING AND REARING.

By nature, ducks are not good mothers, and the best layers are late in desiring to sit. It would, therefore, be very risky to depend entirely upon them. As a rule, hens are employed for this work, but the eggs should be moistened every day when the hen is feeding. Otherwise there is danger, especially in a dry season, of death in the shell. Eight or nine eggs can be covered by a large bodied hen. Incubators are also largely employed, and the eggs should be moistened daily as already recommended. The period of hatching is twenty-eight days.

Ducklings do not need brooding so long as chickens. They must, however, be kept in a warm place if taken from the mother when hatched under natural conditions, or live in a brooder for about a fortnight, though during mild weather the time may be shortened to ten days. They should be divided into flocks of about twenty-five each, and accommodated in small houses or in separate compartments of a larger shed. Under the last-named arrangements the divisions should consist of boards about two feet in height. For twenty-five birds a house six feet by four feet is quite large enough, even when nearly at a killing age. In front of the house or shed a small yard must be provided for feeding, and, where movable houses or sheds are employed, wire netting, two feet wide, held by stakes thirty inches long will prevent their egress. Ducklings which are intended for early killing are not given their liberty, and they thrive better for the short period of life if denied access to water in which they can swim, but some breeders allow them to have an occasional bath. Where it is intended to grow the ducklings as breeding stock, freedom of range and access to water are essential to vigour of constitution, but in that case the growth is much slower. For the former purpose, especially during colder weather, they are kept in the house or shed for the greater part of the day, only going into the yards three times a day for feeding, when the straw upon which they rest is shaken up or renewed. Their place of abode must be kept

clean and be well ventilated, otherwise great loss would occur through disease. It is desirable, where possible, to use different ground each year, or, on small holdings, to give the runs a rest for several months.

FEEDING.

Ducks are rather gross feeders, and recent experiments in America have supported experience on this side that nitrogenous food is essential to ensure a plentiful supply of eggs and fertility. Their natural food consists largely of slugs, etc. Hence, meat is desirable. During the breeding season old ducks should not have food of a fattening nature supplied to them. The most suitable food is barley meal mixed with an equal portion of thirds or fine sharps, and with this should be mixed some cooked lean meat. Butcher's offal, when not fatty, is excellent for the purpose. The food should be given warm, and of the consistency of stiff porridge. Where the birds are at liberty, they only require two meals per diem, early in the morning and about an hour before dusk. Near by must be water for them to drink, or they will not feed properly.

In feeding ducklings, as great a variety of food as possible should be supplied. Barley meal, cheap oatmeal, boiled rice, each with about one-fourth of fine sharps, will afford change of diet. But with these should be mixed cooked lean meat or tallow greaves. In the duck districts the last named are largely employed, but in many districts carcasses of animals can be obtained. If the ducklings are to be grown as breeders, the food recommended is continued until they are fully matured. Indian meal is often used on account of its low price, but it is deficient in albuminous elements, and must be largely fortified in that direction. Hence it cannot be recommended, and is not as cheap as many appear to think. Where the ducklings are to be killed at an early age, the system referred to is only continued for five weeks, when it is changed with the object of filling up the frame.

FATTENING.

The final stage of preparing ducklings for market is one of very rapid development. By this time they have grown considerably, and will nearly fill up their house. The food which yields the best result is rice properly cooked and mixed with about one-fourth its bulk of tallow greaves or meat. At this period more fatty material is essential to soften the flesh. Barley meal, buckwheat meal, and Indian meal are often used instead of the rice, but they do not yield the same result. In preparing the rice, of which that from Burma is the best, and when in the rough, one gallon of the rice should be added to four gallons of water and about 4 lb. of the greaves or meat. This is gently simmered until the rice has absorbed all the water, when it is soft, yet not a mush. In order to aid digestion the birds must have a plentiful supply of coarse grit or fine gravel, without which much of the food will be lost and the ducklings will not fatten, the cost of production being thus greatly enhanced. Green food is also valuable, and any garden stuff is good for the purpose. The birds are fed three times a day, and the object is to encourage eating, so that quick growth may be secured. During warm weather nettles are often boiled and mixed with the food, as these weeds keep the blood cool. Upon rice given as recommended ducklings are produced weighing from 4 to 5½ lb. at eight to nine weeks old. Rapid growth is essential to success in the duckling trade. The birds must be killed before they are nine weeks old, for then there is a change of feather, which, when completed, reduces their market value, as they are no longer regarded as ducklings. The chief demand for ducklings is from February to July.

KILLING AND PLUCKING.

When sufficiently fattened the birds are starved for twenty-four hours and killed by dislocation of the neck. Plucking

should take place immediately, whilst the body is warm. If killed at the right age the feathers come out easily and cleanly. During the cooling process the birds should be placed under boards and weighted, to compress the body and force the meat on to the breast. They must not be packed until quite cold, otherwise quality is lost. Feathers should be carefully sorted, and are of considerable value if divided into (1) down, (2) back of neck, and (3) wing.

E. BROWN.

THE INFLUENCE OF MANURES ON THE PRODUCTION OF MUTTON.

Results obtained in the Fourth Season (1900) at the Northumberland County Demonstration Farm of Cockerle Park.

This experiment, started in the early spring of 1897, has now reached the end of its fourth season, and in the December issues of this Journal for 1898 and 1899 an account will be found of the results for the first three years. As the scope, objects, and conditions of the experiment have already been set forth in detail, it is now only necessary to say that the main point of novelty in connection with the work consists in this:—that whereas hitherto the effects of manures on grass-land have usually been gauged by the weight of herbage which they have produced, they are here determined by the influence which the manurial substances have—through the medium of the pasture—exerted upon the live weight of the sheep with which the plots have been stocked.

In order to make it possible to provide grazing room for a sufficient number of animals each plot has an area of 3 acres, over and above which there is a corresponding set of sub-plots, each $\frac{1}{10}$ acre in extent, on which the herbage is converted into hay. In this way the effects of the manures are determined in terms both of animal increase and crop produce.

When the experiment was started it was uncertain whether sheep would thrive and remain sound on such a small area as a three-acre plot, but the experience of the past four years has shown that there was no need to apprehend any such difficulty. Of 359 sheep used during the four seasons for

stocking the eleven plots, two have died and six have been removed owing to ailment, while one other, although not removed, exhibited symptoms in the last month of the experiments in 1900 that made it desirable to exclude it for that period from the calculations. In each case animals from the reserves have been at once substituted for those that had to be removed. There is no intention of attempting to maintain that the sheep thrive as well under the confinement of these 3-acre plots as on a larger area with occasional changes; all that is asserted is that the restricted feeding-range of the animals does not in any way interfere with health, and has but little influence on their growth. Of this ample proof is furnished by the reserve sheep, which have had practically unrestricted grazing ground, and yet they exhibit a gain that is but fractionally better than the animals on the best of the plots.

Manuring.—The manures which have been applied to each plot from the beginning of the experiment up to the present time are specified in detail in Table I. The cost of the dressings applied since 1897 is calculated on the basis of the prices of that year.

It will be seen that this season Plot 4, which in 1897 got 5 cwt. of basic slag per acre, received a further dressing of an equal quantity of the same manure, so as to bring up the total application of phosphoric acid to 200 lbs. per acre, the amount originally given to Plot 3. On Plots 5, 7, 8, and 9 the superphosphate, and on Plot 10 the dissolved bones, have been similarly repeated, while a supply of nitrogen equal in amount to that contained in the bones was given to Plot 9 in the form of sulphate of ammonia. A plot, No. 11, hitherto held in reserve, was added, and got basic slag at the rate of 15 cwt. (300 lbs. of phosphoric acid) per acre.

For 1900 the basic slag was applied on November 9th, 1899, the superphosphate and dissolved bones on March 24th, 1900, and the sulphate of ammonia on April 20th of the same year.

Sheep.—130 half-bred wethers (out of a Cheviot ewe by a Border Leicester ram) were purchased in the south of Scotland, and reached the farm in the middle of May. They were fasted for a night, weighed, numbered, and divided into

eleven lots. At the beginning of the season it was decided, in the light of past experience, to put six sheep on Plots 2 and 6, eight sheep on Plots 1 and 11, and nine sheep on each of the others. The sheep were selected so that the average weight of each lot was the same, and so that sheep of corresponding weights—above average, average, and under average—were put upon each plot.

Throughout the season the sheep grew with regularity, there were no deaths, and only one animal—on Plot 2—had to be removed owing to illness, and another substituted. In this case, as also in the case of a sheep on Plot 1, which was ill for a part of the last month, but was not removed, due allowance has been made in the calculations.

In 1900 the experiment lasted from May 23rd until October 10th, that is for twenty weeks, as in 1898 and 1899. The sheep were weighed at the end of each period of four weeks, after having been fasted for twelve hours.

The average weekly gains per head, for each month, of all the animals on the plots (including No. 11) are given in the following statement, which also exhibits the rate of growth during each of the past seasons :—

Period.	Average Weekly Gain in 1897.	Average Weekly Gain in 1898.	Average Weekly Gain in 1899.	Average Weekly Gain in 1900.
	Lbs.	Lbs.	Lbs.	Lbs.
During the 1st four weeks	2'26	3'43	2'90	3'70
" 2nd " "	2'01	3'41	2'32	1'89
" 3rd " "	1'10	1'77	1'62	2'10
" 4th " "	0'32	1'25	1'77	1'41
" 5th " "	...	0'23 loss	1'35	0'81
Mean for whole Season.	1'42	1'87	1'95	2'00

The spring of 1900 was more backward than that of 1899, and as a consequence the plots were nearly three weeks later in being stocked than in the previous year. The first month was favourable, and the sheep made the largest weekly increase yet recorded in the course of the experiment, but the late spring involved late autumn grazing, and the falling-off in

TABLE I.
INFLUENCE OF MANURES ON THE PRODUCTION OF MUTTON IN THE TREE FIELD AT COCKLE PARK.
RESULTS PER ACRE FOR THE GRAZING SEASONS OF 1897, 1898, 1899, and 1900.

In 1897 each plot was grazed by eight Sheep for 16 weeks (June 21st to Oct. 11th). In 1898 eight Sheep were, on May 16th, placed on Plots 2, 4, 5, 7, 8, 9, 10; six on Plot 6; and ten on Plots 1 and 3. On June 27th another Sheep was added to those on Plots 1 and 7, while two were added to those on Plots 3, 9, 10. The Grazing Season of 1898 extended to 20 weeks (May 16th to Oct. 3rd). On May 4th, 1899, six Sheep were placed on Plots 2 and 6; eight Sheep on Plots 1, 4, 5, 7, 8, 9, 10; and twelve Sheep on Plot 3. No alterations were made during the Season, which extended to 20 weeks (May 4th to Sept. 21st). On May 23rd, 1900, six Sheep were placed on Plots 2 and 6, eight on Plots 1 and 11, and nine on each of the remaining plots. On June 20th three additional Sheep were put on Plot 3; on July 18th one was put on Plot 4, and two on Plot 8. Deducting wool the Sheep cost per head 29/- in 1897, 25/- in 1898, 32/6 in 1899 and 34/6 in 1900.

Plots.	Treatment per Acre in 4 years.	Cost of Live weight increases in 4 years.			Live Weight increase in 4 years in Plot 6.		Butcher's valuation per Sheep at the end of each Season.				Net Gain (+) or Loss (-) per Acre in 4 years as determined by:		Live Weight gain per Sheep per week during the Season.	
		1897 1898 1899 1900			1897 1898 1899 1900		1897 1898 1899 1900				(a) Weight.		(b) Butcher.	
		lbs.	lbs.	lbs.	lbs.	lbs.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1	Total of 33 cwt. Dec. Col. Cake eaten by Sheep in 1897 and 1898 (= 4 lbs. Nitrogen), nothing since.	32 6	80	144	106	90	410	22 8	71 3	36 0	31 0	34 0	1 9	1 9
2	4 Tons Common Lime for 1897, nothing since.	52 0	32	64	47	60	203	21	6 7	32 0	124 0	31 0	36 0	1 5
3	10 cwt. Basic Slag (100 lbs. Ph. Ac.) for 1897, nothing since.	22 0	77	171	211	131	590	403	127 6	113 0	34 0	38 0	1 7	1 7
4	5 cwt. Basic Slag (100 lbs. Ph. Ac.) for 1897, and again for 1900.	22 0	44	153	153	130	409	297	20 11	30 0	35 0	38 0	1 7	1 7
5	7 cwt. Super. (100 lbs. Ph. Ac.) for 1897, and again for 1900.	36 4	56	104	103	137	400	218	68 1	34 0	33 0	39 0	1 7	1 7
6	Unreated throughout.	—	37	53	46	44	182	—	36 0	36 0	32 0	32 0	—	—
7	7 Cwt. Super. and 14 Cwt. Sulph. Potash (= 50 lbs. Potash) for 1897, Potash repeated for 1899 and the Super. for 1900.	53 8	72	121	107	117	437	255	79 8	32 0	33 0	38 0	1 7	1 7
8	7 Cwt. Super. and 4 Tons Ground Lime for 1897, Lime repeated for 1899, and the Super. for 1900.	56 4	69	119	114	139	461	279	87 2	33 0	32 0	39 0	1 7	1 7
9	7 Cwt. Super. and 97 lbs. Sulph. Ammonia (= 20 lbs. N) for 1897, 70 lbs. Sulph. Ammonia (= 14 lbs. N) for 1899, the Super. repeated for 1900 with 84 lbs. Sulph. Ammonia (= 16 lbs. N).	59 0	79	94	109	128	410	233	71 3	33 0	34 0	36 0	1 7	1 7
10	6 Cwt. Dis. Bones (= 100 lbs. Ph. Ac.) for 1897, and again for 1900 (100 lbs. Ph. Ac. and 10 lbs. N).	61 2	59	117	106	134	416	234	73 1	34 0	33 0	38 0	1 7	1 7
11	15 cwt. Basic Slag (100 lbs. Ph. Ac.) for 1900.	33 0	—	60	53	89	—	—	—	—	—	—	—	—

TABLE II.

INFLUENCE OF MANURES ON THE PRODUCTION OF HAY IN THE TREE FIELD AT COCKLE PARK.

RESULTS PER ACRE FOR THE SEASONS OF 1897, 1898, 1899, AND 1900.

The Herbage was weighed as soon as cut, and one-third taken as Hay. For the first two seasons the Hay plots occupied the same ground, they have since been changed each year.

Plots.	Treatment per Acre in four years.	Cost of Treatment in four years.		Weight of Hay in —				Increased yield in four years.	Value of Increase at four years per ton.	Net Gain (+) or Loss (-) in four years.	Plot.
		s. d.		1897 1898 1899 1900				Cwt.	s. d.	—	—
		—	—	1897	1898	1899	1900				
1	Crushed Cake and Cake Residue	—	—	234	181	184	204	643	54 4	7	3
2	4 Tons Common Lime for 1897, nothing since	22 0	—	204	164	174	174	67	26 3	-25 9	2
3	10 Cwt. Basic Slag (100 lbs. Ph. Ac.) for 1897, nothing since	22 0	—	224	324	304	284	111	90 9	174 9	3
4	5 Cwt. Basic Slag (100 lbs. Ph. Ac.) for 1897, and again for 1900.	22 0	—	16	32	24	24	974	71 7	149 7	4
5	7 Cwt. Super. (100 lbs. Ph. Ac.) for 1897, and again for 1900.	36 4	—	234	214	174	29	924	64 0	126 2	5
6	Unreated throughout	—	—	224	134	74	61	194	—	—	6
7	7 Cwt. Super. and 14 Cwt. Sulph. Potash (50 lbs. Potash) for 1897, Potash repeated for 1899, Super. repeated for 1900.	51 8	—	174	17	204	26	614	47 7	-4 1	7
8	7 Cwt. Super. and 4 Tons Ground Lime for 1897, Lime repeated for 1899, Super. repeated for 1900.	56 4	—	244	204	184	304	94	66 9	-9 7	8
9	7 Cwt. Super. and 97 lbs. Sulph. Ammonia (20 lbs. Nitrogen) for 1897, 70 lbs. Sulph. Ammonia (14 lbs. N) for 1899, Super. repeated for 1900, with 84 lbs. Sulph. Ammonia (16 lbs. N).	59 0	—	274	214	184	34	101	77 7	-15 7	9
10	6 Cwt. Dis. Bones (100 lbs. Ph. Ac. and 10 lbs. N) for 1897, and again for 1900 (100 lbs. Ph. Ac. and 10 lbs. N).	61 2	—	25	234	174	294	964	70 6	+9 4	10
11	15 Cwt. Basic Slag (100 lbs. Ph. Ac.) for 1900 only	33 0	—	—	—	—	234	—	—	—	11

the final month, as compared with last year, was very marked. In spite of this falling off in the live-weight increase, the majority of the sheep came off the experimental plots in very good condition, and fifty were selected for the fat market.

The rainfall at Cockle Park during the season was:—

	Inches.
Four weeks ending June 16th - - - - -	1.750
" " July 14th - - - - -	3.885
" " August 11th - - - - -	3.905
" " September 8th - - - - -	2.785
" " October 6th - - - - -	0.975
Total rainfall for 20 weeks - - - - -	13.300

As in previous years, an experienced salesman and butcher valued the sheep at the end of the season. He drew out those which were fat, and from eight of the plots selected representative animals, which he slaughtered and reported on. A summary of the results of the experiment for 1900, and also for the three previous seasons, will be found in Tables I. and II.

The main features presented by each plot are noticed in the following notes. In all cases, unless otherwise stated, the quantities are given in terms of an acre.

Plot 1. *Residue of 5½ cwt. decorticated cotton-cake consumed in 1897 and 1898.*

The analysis made of the cotton cake showed that 5½ cwts. contained 42 lbs. of nitrogen, while it may be assumed to have contained 18 lbs. of phosphoric acid and 9 lbs. of potash. The effects of the residues have been very marked. In last year's report it was mentioned that the sheep on Plot 1 made a live-weight increase of 106 lbs. per acre as compared with 48 lbs. on the unmanured plot, while this season the respective figures are 80 and 44.

Taking both the first and the residual value of the cake into account, we find that at the end of the fourth season the net profit on the plot stands at 38s. 9d., or nearly 10s. per acre per annum. Possibly this result is somewhat helped by the fact that Plot 1 is naturally slightly better than Plot 6, though the difference in this respect is comparatively insignificant.

During the past season the sheep on Plot 1 thrive well for

the first two months, but they fell off considerably after August 15, and at the end of the grazing period there was only one ready for the butcher. One sheep fell ill in the beginning of October, and at the last weighing was found to have lost 7 lbs. In calculating the increase for the last monthly period, the average gain made by the seven healthy sheep was taken as being the gain that should have been made by the sick animal.

The salesman valued the healthy sheep at 34s., and remarked that one was very good, that the remainder were useful "stores," and that the wool indicated rather a scanty food supply for the previous fortnight.

The hay crop on the $\frac{1}{6}$ -acre sub-plot was inferior in quality to that on most plots, but was decidedly better than the crops on Plot 2 and 6.

Plot 2.—*Four tons of common lime in 1897.*

At the end of the third season practically no benefit had been derived from this, the most costly of the applications of 1897, and instead of a profit being realised, as on other plots, there was a deficit of 50s. 5d. per acre. In the fourth season a slight improvement was noticeable, more especially in the early months, and as compared with Plot 6, Plot 2 has somewhat improved its position. But, in face of the expenditure, and of the results obtained on the other plots, it cannot be said that lime has added to its reputation by its effect on Tree Field, and even if we accept the butcher's valuations, which are much more favourable to this plot than the weighing machine, the loss still stands at over 30s. per acre. The coarse and valueless aspect of the herbage on Plot 2 is a source of great surprise to the majority of visitors, who associate the use of lime with "sweet" pasture and a general improvement in the land and stock. But on the poor clay soil of the Tree Field, deficient both in organic matter and phosphates, lime has been given an impossible task, and it is in demonstrating the uselessness of liming pastures promiscuously that this plot is so serviceable as an object lesson. The value of lime when used as an auxiliary to a phosphatic manure will be noted further on.

One of the six sheep on Plot 2 had to be removed on August 22, when another was substituted, and the average gain made by the five healthy sheep was credited to the plot for the period that the sick animal had been off its feed.

The salesman valued the sheep on Plot 2 at 36s. They were in a thriving condition, and though none were fit to kill, they were, as a lot, better finished than those on the fast plot, and they were much better than the sheep on the unmanured plot.

The hay crop on the sub-plot was poor both in quantity and quality, consisting chiefly of *Agrostis*.

Plot 3.—10 cwt. of basic slag (200 lbs. phosphoric acid) in February, 1897.

Plot 4.—5 cwt. of basic slag in February, 1897, and again in November, 1899.

These plots may be conveniently considered together. It will be observed that by the spring of 1900 each plot had received the same quantity of manure, which, in the one case, was supplied as a single dressing in 1897, and, in the other case, in two dressings at an interval of three years.

The two original questions as between these plots were: first, in what quantity may basic slag be profitably employed? and second, which will pay best in the end, 10 cwt. applied in 1897, or 10 cwt. applied half for the crop of 1897 and half for the crop of 1900? The first three seasons gave to the former query a much more emphatic answer than was expected. The larger dressing proved to be very much the more profitable, and at the end of 1899 the net profit, as compared with the untreated land, amounted in the one case to 78s. 4d., and in the other to 30s. 3d. per acre. The answer to the second question cannot be forthcoming till the end of the sixth season, but already there are indications that the supplementary dose given to Plot 4 is producing an effect.

White clover, which was so conspicuous a feature of Plot 3 in former seasons, was not much in evidence in the spring of the present year, and it looked as if the supremacy of this section of Tree Field had come to an end, but the month of May found this plot earlier and better than any of its

rivals. For the first two months it more than held its own, and at the end of the third month it was still, so far as weight of mutton went, the best plot in the field. Later on, however, it fell away and finished with a total live-weight increase of 8 lbs. less than was made by Plot 4, and of 28 lbs. less than was obtained from Plot 8.

Plots 3 and 4 were both stocked with nine sheep to start with. On June 20th three additional animals were put on Plot 3, and on July 18th one additional sheep was put on Plot 4. No subsequent changes were necessary.

The herbage on these plots presented a most interesting contrast, and in the month of July it was difficult to realise that so great a difference could have followed from so comparatively slight a cause as the application of 10 and of 5 cwt. per acre of the same manure three years previously.

Plot 4 presented the characteristic appearance of land that has recently had slag, and a thick sole of white clover was conspicuous through the closely-eaten grass. Plot 3 at a little distance was much more like a meadow ready for the mower than a sheep pasture, and closer inspection showed that the dense carpet of white clover, which was so prominent in previous years, had largely disappeared, and that in its place there was a thick growth of natural grasses. The very strong growth made by the grasses (especially by crested dogstail) accounts for the comparatively poor results got from Plot 3 in August, September, and October. As the sheep were unable to keep the grasses down in the early summer, many of them ran to seed, so that the herbage was latterly rough and somewhat inferior. To do full justice to the pasture which Plot 3 produced, it would have been necessary to graze it partly with cattle; but this, of course, would have interfered with the character of the experiment.

When we remember that in one case this is the fourth crop grown since the manure was applied, and that in the other the slag used last autumn will not exert its full effect until 1901, the financial results obtained on both plots in the past season are most satisfactory, and the profits made compare favourably with those of previous years. The net profit is still very much in favour of the heavy dressing of slag.

being now 105s. 6d. on Plot 3, as compared with 48s. 11d. on Plot 4.

When submitted to the valuer the sheep from Plot 4 were pronounced to be in very much better "bloom" than those from Plot 3, the values affixed being 38s. and 36s. respectively. The former were more uniform, were in higher condition, and eight were selected as fat, whereas only three of the twelve from Plot 3 were fit to kill.

The difference already noted in the herbage was marked in the hay sub-plots. There was little clover and an abundance of grass on Plot 3; while on Plot 4 clovers were numerous, and grasses relatively fewer. The comparative luxuriance of the clovers on Plot 4 must not be entirely attributed to the action of the basic slag applied in November, 1899. The manure may have helped to maintain the vigour of the *Leguminosæ*, more especially in the later part of the season, but even without this supplementary dressing it was plain from the appearance of the grass land in spring that Plot 4 would, later in the season, contain much more clover than Plot 3. The striking difference must be attributed to the disappearance of clover from 3, rather than to the fresh appearance of clover in 4. The result of the heavy phosphatic manuring of Plot 3 was to stimulate a more luxurious crop of clover than the soil could long support, and the fourth season has witnessed a reaction. The clover has dwindled away, but the soil, opened up by the clover roots and enriched by the clover residues, has yielded an abundant crop of grass. Should this fresh crop be permanent the slag will have worked a lasting improvement on the field.

Plot 5.—7 cwt. superphosphate of lime (100 lbs. soluble phosphoric acid) in the spring of 1897, and again in the spring of 1900.

Throughout the experiment the live-weight gains recorded on this plot have approximated to those obtained on Plot 4, so that phosphate in the form of slag or of super. appears to be equally effective. On the whole the slag has done slightly better than its rival, the total gains for the four years being 409 lbs. on Plot 4 and 400 lbs. on Plot 5.

As slag is a cheaper source of phosphate than superphosphate, Plot 4 has a very decided advantage when the profits are considered. But had there been no slag in the question a return of mutton worth 68s. 1d. for an expenditure of 36s. 4d. in superphosphate (and this apart from any residual value) would have been entirely satisfactory.

Nine sheep were put upon Plot 5 in May, and no additions were made. The stock did exceedingly well, especially during the last three months, and the valuer considered them the best finished lot that he examined. They were not quite so big as the sheep on Plot 4, but were worth 1s. a head more for the fat market. Seven were taken as being fit to kill. The herbage in the sub-plot was of first class quality, well mixed and well grown. On the whole there was very little difference to be seen between Plots 4 and 5. The former was rather greener, and especially in the month of July it appeared to carry more food for stock, but both the weights and appearance of the nine sheep on Plot 5 showed that individually they were doing rather better than their ten neighbours on Plot 4.

Plot 6.—*Unmanured.*

The results obtained from this plot were very much the same as in former years. The six sheep made an average increase of 22 lbs. each, equal to a gain of 44 lbs. per acre for the plot.

Although the sheep gained in weight they increased little, if at all, in value. They were thin-fleshed, dark-skinned, and dull-eyed, and were worth, according to the butcher, 32s. a head, or 2s. 6d. less than they cost (deducting wool) in the month of May. At that time, however, sheep were dear, and 2s. 6d. would barely cover the fall in market value between May and October.

The hay sub-plot bore eloquent testimony to the poverty of the land in its natural state, the crop consisting of thin hard-stalked grasses and a few weeds. A much heavier crop might have been cut on the pastured areas of several of the plots than on the fenced hay-plot of No. 6.

Plot 7.—7 cwt. superphosphate for 1897 and 1900, and 1½ cwt. sulphate of potash (50 lbs. potash) for 1897, and again for 1899.

This plot, it will be seen, has been treated in the same way as Plot 5, except that it has received liberal dressings of potash. The heavy dressings of potash have not benefited the land to anything like the degree that phosphates have. Comparing Plots 5 and 7, we find that in four seasons the latter has produced 37 lbs. live-weight increase more than the former. This increase, worth 11s. 7d., has been got at an outlay of 15s. 4d. on manure, so that up to the present the potash has not paid its way. There is no doubt, however, that it has exerted an influence on the pasture, the appearance of which led to the expectation of a profit this year. It was one of the earliest plots to be ready for stock, and in the height of the season the quality of the pasture was considered to be the best in the field. Indeed, considering the appearance of the herbage, the gains made in July and August were unexpectedly small.

The butcher valued the sheep at 38s. each. Seven were very good and fit for market, while two were inferior. As a lot, they were decidedly poorer than those of Plot 5.

The hay sub-plot was very similar in appearance to sub-plot No. 5, but, as in former years, it did not yield so well.

Plot 8.—7 cwt. superphosphate for 1897 and 1900, and 10 cwt. ground lime for 1897, and again for 1899.

This is a plot in which the interest increases each season, and this year it merits special notice, as it has produced the greatest aggregate increase of all, being 20 lbs. per acre ahead of its nearest rival, Plot 4.

It is with Plot 5, however, that we must compare it in order to ascertain the influence of ground lime. In 1897 Plot 8 was 13 lbs. ahead of Plot 5; in 1898, 15 lbs.; in 1899, 11 lbs.; and in 1900, 22 lbs.; so that this year the lead has been much more marked than previously, and from the appearance of the grass during the past summer it looks as if Plot 8 were going to increase its lead still further in future. So far, with 61 lbs. live-weight increase to its credit, the plot

has scarcely paid for the ton of ground lime, but it may safely be affirmed that the lime has already justified its application.

The improvement in the pasture in the month of July was so marked that two additional sheep were put on the plot at the time of the second weighing, and so well did the land carry this extra stock that at the end of the season the average gain per head was greater than in the case of any other plot.

By the salesman the sheep were valued at 39s., and, taken as a lot, they were pronounced to be the best, although so closely followed by the sheep from Plot 5 that no difference was made in the money value. Of the eleven, ten were fit for the fat market.

Confirmation of the opinion that the ground lime has justified its application by its influence on the quality, if not on the weight, of produce is given by the salesman's valuation. Adopting his estimates we find that the ground lime has already paid for he makes the profit at the end of the fourth season to be 17s. 2d. on Plot 5, and 19s. 1d. on Plot 8.

Plots 2 and 8 present an instructive contrast. A dressing of 4 tons of ordinary burned lime applied to the former plot has in four seasons yielded a live-weight increase of 21 lbs.; while one ton of ground lime on the latter has improved the produce by 61 lbs. over plot 5. In the former case the visible improvement in the pasture is slight, in the latter it is striking.

The main reason for this difference in the effect of lime is that where used alone its action is limited by the want of phosphates—in which the soil is very deficient—whereas in the presence of a phosphatic dressing it is able to exert its full, or nearly its full, effect. On the other hand, phosphates used alone have not been able to exercise their maximum influence because of the want of lime, though here the limiting action of a deficient supply of an essential element of plant food is not so conspicuous, simply because the deficiency is not so great. We have here an excellent illustration of the "Law of Minimum," the leading principle of which is that it is useless to strengthen the manurial chain if we neglect to attend to its weakest link.

Plot 9.—7 cwt. *superphosphate* for 1897 and 1900, with 97 lbs. *sulphate of ammonia* for 1897, 70 lbs. for 1898, and 84 lbs. for 1900 (*total nitrogen* = 50·8 lbs.).

The use of sulphate of ammonia has not been profitable. The net gain of 31s. 9d. made on Plot 5, where *super.* was used alone, has been reduced to 12s. 3d. per acre, where sulphate of ammonia has been added to the phosphate. Nor has there been any gain in the quality of the pasture; on the contrary, the herbage was scarcely so good as on Plot 5.

A light dressing of sulphate of ammonia may prove useful in encouraging early growth for some such special object as "early lamb," but in general its use on poor pastures cannot be recommended.

The salesman valued the sheep at 36s. 6d., and remarked that, though thriving, they wanted quality. Four only were fit to kill.

The hay sub-plot, aided by the ammonia, carried decidedly the heaviest crop of the series, but its feeding properties may be inferred to be deficient.

Plot 10.—6 cwt. *dissolved bones* for 1897, and again for 1900. (*Total phosphoric acid* 200 lbs., *total nitrogen* 33·8 lbs.)

The same quantity of phosphoric acid has been applied to Plots 9 and 10, but the former has had a half more nitrogen. On the whole Plot 10 has done slightly better than its neighbour—a result entirely due to the last three months, but neither in the quality of the grass nor in the yield of mutton is there much to choose between them.

The salesman valued the sheep at 38s., the average being brought up by one particularly good animal. The others were a little, but not much, better than those of the last plot. Six were taken as being fit to kill.

There was considerably less hay from this sub-plot than from sub-plot 9. In quality the hay from both the plots was much alike.

Plot 11.—15 cwt. *basic slag* (300 lbs. *phosphoric acid*) in November, 1899.

In 1897 this plot received $\frac{1}{4}$ cwt. sulphate of ammonia,

1 cwt. nitrate of soda, and 10 cwt. of common salt per acre, and was grazed by cattle. In 1898, and again in 1899, it was unmanured, and was grazed by sheep. Having been manured in Nov. 1899, it was this season stocked with 8 sheep for sixteen weeks, its treatment, in this respect, being the same as that of Plot 3 in 1897. The live-weight increase obtained was 89 lbs. per acre, small in comparison with the yields of the older plots, but satisfactory when compared with the yield obtained from Plot 3 in its first season. Plot 11 contains some alluvial soil, and is naturally a little better than Plot 6. The yields obtained in 1898 and 1899, which are given in Table I., indicate the extent of this difference in quality.

Until the end of July the effects of the slag applied in the previous November could scarcely be detected, but thereafter white clover began to assert itself, and in the later months the clover made considerable progress.

The sheep were not submitted to the valuer, as they had been removed from the plot a month before his visit to the farm. The hay on the sub-plot, though tolerably abundant, was of poor quality.

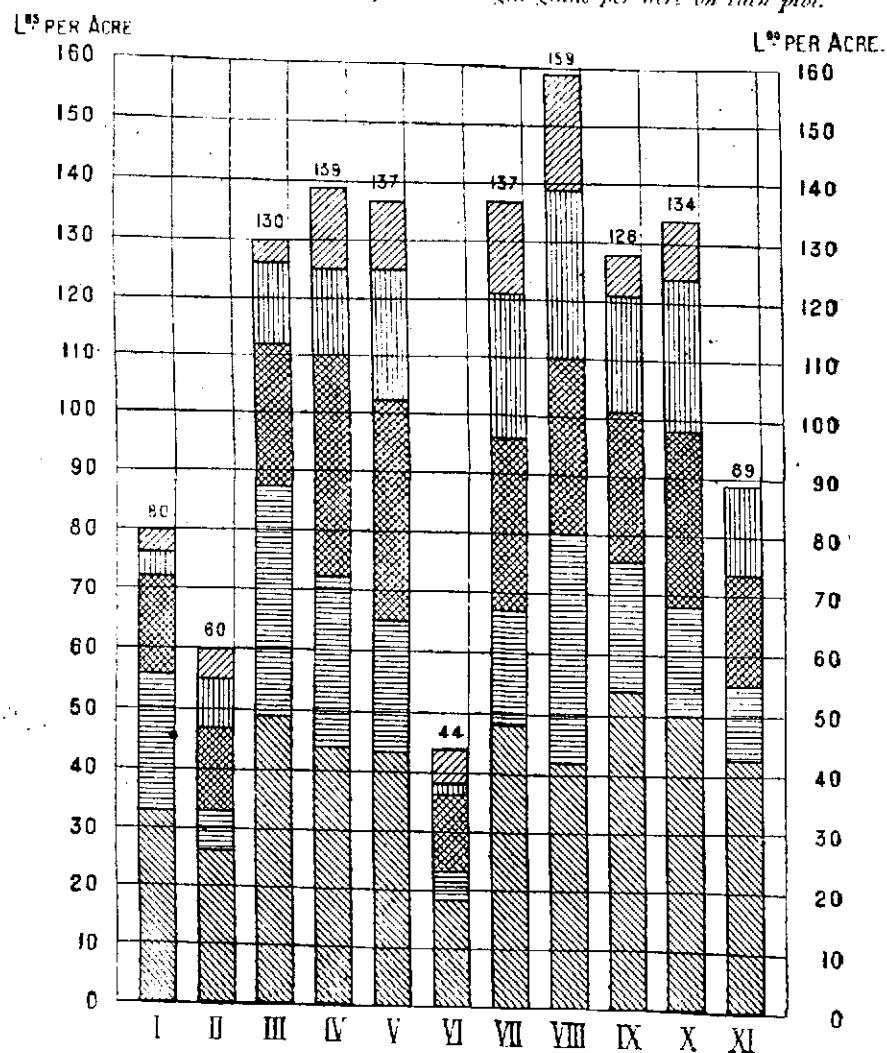
Variations in the plots from month to month.

The figures in Tables I. and II give the sum total of the results on Tree Field, but they convey in a restricted and inadequate fashion the lessons that may be learned from an inspection of the plots. As a consequence of the different treatment which they have received, the various plots are developing very marked characters. The herbage is different in composition, it is differently acted upon by the weather, and at all seasons of the year there is such a dissimilarity that it is difficult to realise that four years ago the 34-acre field was practically a uniform pasture.

The diagram on the next page may serve to convey some idea of the peculiarities which distinguish the different plots. It shows by means of columns how the total live weight gain per acre for each plot has been made up in the season 1900. Each column is composed of five blocks, representing the five periods of four weeks over which the experiment lasted, and the height of each block shows the gain made during the particular month which it represents.

TREE FIELD, SEASON 1900.

Diagram showing the Monthly Live Weight gains per acre on each plot.



Periods of four weeks.	Plot I. Cake Residue.	Plot II. 4 Tons Lime	Plot III. 10 Cwts. Slag.	Plot IV. 5 + 5 Cwts. Slag.	Plot V. 7 Cwts. Super.	Plot VI. Nil.	Plot VII. Super. + Potash	Plot VIII. Super. + Lime	Plot IX. Super. + Sulph.	Plot X. Diss. Bones.	Plot XI. 15 Cwts. Slag.
1 st PERIOD.	33	26	49	44	41	18	43	42	54	50	43
2 nd PERIOD.	23	7	38	28	22	5	19	33	21	18	12
3 rd PERIOD.	16	14	25	38	37	13	29	30	26	30	18
4 th PERIOD.	4	8	14	15	23	2	25	29	20	26	16
5 th PERIOD.	4	5	4	14	12	6	16	20	7	10	—
Total live weight gains.	80	60	130	139	137	44	137	159	128	134	89

It will be noticed that although approximately the same totals have been attained by several of the plots, the totals have been reached by quite different stages. On Plots 3 and 9, for example, the larger half of the gain was made in the first two months, while on Plots 4 and 5 the last three months contributed the larger share. Plots 4, 5, 7, and 10 kept close together all through the season, and Plot 8, which was disappointing in the first month, afterwards made, not only the largest, but, what is quite as important, the most uniform gain, thus showing that the stock were on sound, healthy food.

There may be a disposition to undervalue these minor variations, and to attribute them to accidental circumstances, but a careful examination of the pastures from month to month, and of the gains made by the individual sheep, leads us to consider them of importance. The gains made by sheep at grass are very regular and follow closely the actual condition of the pasture, and it may safely be asserted that marked differences—as, for example, between Plots 7 and 8 in the second month—were due to some specific cause.

Effects of Manures on Season of Growth.

The results obtained on several of the plots, both this year and last, indicate that manures may affect the value of a pasture, not only by increasing the total quantity of grass, but by altering the time of growth. All the plots that have had phosphates "come" earlier in the spring and continue to grow later in the autumn than the unmanured plot. Such a change in the season of growth necessarily follows any marked improvement such as that which has been produced by the application of phosphates to Tree Field. But further than this, between Plot 5, which has had superphosphate, and Plots 7, 8, and 9, which have had sulphate of potash, lime, and sulphate of ammonia respectively, in addition to superphosphate, there are noticeable differences in the season of growth, which are apparently due to the manuring.

This will be seen from the following tabular statement, which gives the average live weight yield per acre, and also the percentage of the yield, obtained in (a) the first month,

(b) the second and third months, and (c) the fourth and fifth months of the seasons 1899 and 1900,* for Plots 5, 6, 7, 8, and 9:—

Plot.	Treatment per Acre.	Average Live weight increase per Acre, Seasons 1899, 1900.	Percentage of Increase obtained in		
			1st Month.	2nd & 3rd Months.	4th & 5th Months.
5	Superphosphate	lbs. 120	28.8	45.2	26.0
6	Nothing	46	42.3	42.9	14.8
7	Super + Sulphate of Potash	122	33.9	34.3	31.8
8	Super + Ground Lime	136	25.7	41.6	32.7
9	Super + Sulphate of Ammonia	118	36.0	38.3	25.7

Contrasting Plots 5 and 6, it will be observed that not only is the average yield nearly three times as great where phosphates have been used, but that the season has been greatly prolonged, so that the sheep on Plot 5 were enabled to make 26 per cent. of the increase in the last period, as against 14.8 per cent. made by the animals on the unmanured land.

From the grazier's standpoint Plot 6 displays about as bad a state of affairs as can well be conceived. The increase is very small, and two-fifths of the entire gain is made in the first month. The mean monthly gain in the second period is just half as much as in the first; and in the third period it is one-third of that in the second. A sheep naturally gains less as the season progresses, and as the herbage becomes drier, but such a rapid decrease in the rate of growth as is here shown indicates that the animal is thriving very badly, and it is little wonder that when presented to the salesman at the end of each season, the sheep from Plot 6 are almost always valued at less than they cost, in spite of their increase in weight.

* The results of seasons 1897 and 1898 have not been included. In 1897 the grazing period extended to four months only, and in neither year were the sheep fasted before being weighed. Thus the weights got in the later months will not bear comparison with the weights of the earlier months as they do in 1899 and 1900. At the end of the first month of 1899 the sheep were weighed unfasted, but in preparing the statement a loss of 5 per cent. of the total live weight has been assumed as representing the result of "fasting," and corrections in the actual weights recorded at the end of the first month have been made.

The effect of adding potash to superphosphate, as shown by comparing Plots 5 and 7, is somewhat remarkable. The herbage is distinctly earlier—the plots themselves, as well as the gains made by the sheep, show this—then there comes a sudden drop, so that the percentage of increase in the second period is reduced from 45 per cent. without, to 34 per cent. with potash. Finally there is a recovery, and Plot 7 does considerably better than Plot 5 in the later months. The great fall in the second period on Plot 7 is chiefly noticeable at the second weighing, the sheep doing badly from the middle of June till the middle of July. No peculiarity has been noticed in the pasture*, and the falling-off may be accidental, but, as it has been marked both in 1899 and 1900, this is not likely. It may be pointed out, as probably more than a mere coincidence, that the decrease takes place in the month in which meadow hay makes a large part of its growth, and that for some reason, as yet undiscovered, potash frequently reduces the yield of hay. It has, for example, done so on sub-plot 7 of Tree Field (see Table II.), and on the meadow hay plots in an adjacent field (Palace Leas). In the latter case, both when used alone and when used in combination with phosphates and nitrogen, potash has reduced the hay crop in thirteen out of sixteen experiments made in the past four seasons. In 1899 and 1900, to which the figures in the above table refer, the hay crop on the Palace Leas plots has, on the average of eight tests, been reduced by 12 per cent., and in no instance has it been increased.

Turning to the effects produced by ground lime, we find a very favourable state of matters disclosed by the figures in the above table. Not only has the total yield been increased, but the rate of increase is well maintained, so that nearly one-third of the total gain is made in the fourth and fifth months. There is no sudden falling off at any part of the season. The mean monthly rate falls from 25.7 in the first to 20.8 in the second, and 16.3 in the third period. The practical result of this is that the sheep not only weigh well,

* This season the pasture was not quite so abundant on Plot 7 as on Plot 5 in the month of July, but the quality of the herbage on the former plot was considered better.

but are well finished. This season the nine sheep from Plot 5 were particularly good, and were valued at the same figure as the eleven animals from Plot 8, but the butcher expressed a slight preference for the latter. Last year the sheep from Plot 8 were worth 5s. a head more than those from Plot 5.

A very interesting contrast is presented by Plot 9. Here, as the reader will have anticipated, the nitrogenous manure has quickened the growth in spring, and in the first month considerably more mutton has been produced than on Plot 5. Had fresh pasturage been available the sulphate of ammonia might have been distinctly useful to the stock, but under the conditions of the experiment it has proved anything but serviceable. There is a very decided falling off in the second period, and it is not followed by a recovery in the later months, as in the case of Plot 7, so that the sheep when placed before the butcher wanted "bloom," and were valued at a lower rate than their weights would have led one to expect. A reference to the column headed "Net Gain or Loss," in Table I., will show that the differences between the butcher's valuations and those obtained by weighing have in four seasons amounted to 14s. 7d., 14s. 11d., and 11s. 9d. respectively on Plots 5, 7, and 8; while on Plot 9 the difference has been 18s. 9d. The butcher knows nothing respecting the treatment, or the live weight, of the animals placed before him, and he affixes a value depending on the size and quality of the sheep. These values indicate that, in his opinion, the sheep from Plot 8 are worth more per pound live-weight, and the sheep from Plot 9 are worth less, than those fed on Plot 5.

Without attempting to draw general conclusions, it may be said that the third and fourth seasons of the Tree Field experiment clearly indicate that manures may modify the value of pasture by affecting the season of growth, as well as by increasing the weight of produce. Under the influence of different manures a late pasture may be made earlier, or a short-lived pasture may be induced to persist far into the autumn. There is nothing new in this assertion; most farmers who have had experience in the manuring of pastures will have remarked it, as certainly as they have noted that increased production

of meat follows manuring. But just as the Tree Field experiment has afforded an exact means of determining the live-weight increase due to the action of manures, so it promises to throw light on the specific effects of certain fertilisers on the quality, the earliness, and the persistence of pastures. Exact information on these points is much wanted, and the future developments of the Tree Field plots promise to be instructive.

While the season's grazing with sheep is the method of testing the results that is the main feature of the experiment, it may be mentioned that at the end of the summer a considerable amount of food is still present on the plots, and, in this respect, all are not alike. This "roughness" is utilised by store cattle, with which the plots are stocked in proportion to apparent requirements, and a note is kept of the duration of the respective periods of grazing. The results for 1900 cannot yet be given, as the cattle are still on the plots, but in the three past seasons the 30½ acres have each autumn maintained eighteen breeding cattle for fully two months, and that they found food enough is proved by the fact that they came off in excellent condition. Allowing 1s. per head per week for grazing, the plots are credited with the sums indicated in the accompanying statement.

Plots.	Number of Days Grazed by 18 Cattle.			Credit per Acre at 1s. per Head per week.
	1897.	1898.	1899.	
1	7	3½	6	14 2
2	3½	3½	6	11 2
3	7	10½	4	18 5
4	7	8	4	16 3
5	7	5½	4	14 1
6	3½	3½	2	7 8
7	7	8	6	18 0
8	7	5½	6	15 10
9	7	10½	6	20 2
10	7	5½	6	15 10

WM. SOMERVILLE.

T. H. MIDDLETON

SHEEP AND WOOL IN THE UNITED STATES.

Under the title of "Sheep and Wool: a Review of the Progress of the America Sheep Husbandry," the United States Department of Agriculture have issued an exhaustive report by Mr. J. R. Dodge upon the general development and present position of the sheep breeding and woollen industry of that country. From this report the following particulars are taken:—

Sheep were introduced by the earliest settlers in America, and, the women of the household being generally weavers and spinners, the emigrants brought looms and spinning wheels with them. The first sheep thus came from England or Holland, and were of coarse-wool breeds. It is said that they were first landed in Virginia in 1609. For some time settlement was slow and increase of sheep moderate, but by 1650 there were reported to be some 3,000 in both Virginia and Massachusetts. All the colonies encouraged wool production and manufacture to a greater or less extent, and progress was general in the eighteenth century. When friction arose with the mother country, and during the Revolution, patriotism led the inhabitants to turn their attention more and more to home-spun clothes, so that by 1810, under the influence of the merino excitement and a forecast of war, the number of sheep was estimated to be greater than the population.

During the first half of the present century the production of wool appears to have been the main object of breeders' efforts. Between 1800 and 1810 many Spanish merinos were imported into the United States, the Infantado breed being especially popular, and this is said to be the progenitor of most American flocks. Saxon merinos were largely imported between 1824 and 1848. Early in the sixties the dawn of the worsted era was observed. There was a great scarcity of English combing wool, and manufacturers

urged the importation of mutton breeds, which were brought in from Canada and England. About 1868 some Rambouillet sheep were imported for crossing with the American merino. From about this period breeders began to work for longer fibre and larger carcase, in the direction of mutton and combing wool from the distinctively wool-producing merino. From this have resulted the various Delaine merinos, which have received great attention during the last thirty years. At the same time combing wool has been developed along another line by the increase of pure and crossbred English sheep, and east of the Mississippi the mutton breeds have gradually gained the predominance. The first English sheep to invade this district were South-downs, Cotswolds, and Leicesters, followed by Dorsets, and later by Lincolns.

For the last thirty years at least there has been a strong tendency towards increase of mutton production. Thirty years ago more than four-fifths of all the sheep in the country were estimated to be either pure-bred or grade merinos. Now the mutton breeds predominate in all the older States east of the Rocky Mountains, and even west of the ranges there is a considerable percentage of crossbreds. In the United States as a whole it is estimated that at least 70, possibly 80, per cent. of the flocks are now medium crossbred wools, the remainder being merino or its grades. This substitution of mutton sheep for merinos is an interesting feature, and is perhaps best appreciated by a consideration of the following figures of the number of mutton sheep received at the principal western markets at different periods.

Market.	Number of Sheep received.			
	1870.	1880.	1890.	1899.
Chicago - - -	349,853	335,810	2,182,667	3,682,832
Kansas City - - -	—	50,611	535,869	953,241
Omaha - - -	—	—	156,186	1,086,319
St. Louis - - -	94,477	205,969	358,496	432,566

Here is an increase in thirty years from less than 500,000 to more than 6,000,000, and over five millions were

slaughtered in these four cities. Other towns in the West slaughter considerable numbers; the great seaboard cities also kill large quantities, besides consuming refrigerated carcasses from the West.

There has also been during the period a change in the distribution of the merinos. The mutton breeds have invaded the States which used to be the strongholds of the fine wool breeds—Vermont, New York, Ohio, Michigan—and have nearly driven them out of Indiana and Illinois. The merinos have been driven westwards, and the development of the mutton industry has hastened their migration to the ranges of the Rocky Mountains, as well as led to cross breeding with English sheep.

A noticeable feature of the mutton trade has been the demand for Colorado lambs, chiefly Mexicans improved by cross breeding, the lambs being fed for a few months in winter with corn and lucerne. These fetch high prices at Chicago and yield remunerative profits. The annual output of these lambs from Colorado has been estimated at 350,000, while other districts turn out as many more.

As regards the domestic wool supply of the United States, about two-thirds of the present mill consumption is supplied from sheep within the country. If imported manufactures are taken into account, the domestic supply is now fully half the entire consumption of wool products. Between 1880 and 1890 the proportion of domestic wool was larger, being nearly six-tenths of all needed.

Prior to the establishment of factories the consumption is stated to have averaged not more than 3 lbs. per head of the population. Fifty years ago the requirement had risen to 4 lbs.; and, as wealth increased and the uses of wool became extended, it rose until it is now about 8 lbs. per head.

The enumeration of sheep was not made by census until 1840, when the number reported was 19,311,000. Prior to this date no accurate estimates are available, though it is supposed that in 1310 there were some ten million sheep in the country. In 1850 the number given was 21,773,000, and 22,471,000 in 1860. Between 1860 and 1870, however, a very

rapid advance was made, to possibly 42,000,000; followed by a decline during the later years of the decade to 31,000,000. The records of the Department of Agriculture after this period became more reliable. From 31,851,000 in 1871 the number increased fairly steadily at first, and afterwards more rapidly, to a maximum of 50,627,000 in 1884. This was followed by a drop to 44,759,000 in 1887. For the next few years there was not much variation in the numbers, but a decline occurred from 47,274,000 in 1893 to 36,819,000 in 1897, since when there has again been a rise, and the number in 1900 was 41,883,000.

The records of the wool produced show a great improvement in average. The total production was estimated at 153,000,000 lbs. in 1871, and 290,000,000 in 1900; having been 308,000,000 in 1885 and 309,748,000 (the maximum) in 1895. The census enumerations show an average per sheep of 3.5 lbs. in 1870, and 4.8 lbs. in 1890; and this would appear to be a truer indication of the weight of a fleece than is arrived at by dividing the annual production by the number of sheep existing on the 1st of January in each year; for the total annual production includes a considerable quantity of shorn or pulled wool from the millions of sheep and lambs slaughtered. The steady increase in the weight of fleece is attributed to a stronger infusion of merino blood in clothing-wool flocks, and the improvement in Mexican and other low grade sheep by the use of sires of English mutton breeds. Better care and feed have also increased the weight of fleece.

The great majority of the sheep in the United States are now in the West; the States with over a million (on 1st January, 1900), being Texas, Ohio, Michigan, Montana, Wyoming, Colorado, New Mexico, Arizona, Utah, Idaho, Oregon, and California. The maximum number (3,973,000) is found in New Mexico, which is closely followed by Montana with 3,884,000; Wyoming and Ohio, with over a million less, coming next.

A great change has occurred in the distribution of sheep in thirty years. In 1870 the mountain range country was just emerging from the control of the Indians, and, with

the Pacific coast and Texas, contributed only 22 per cent. to the Department estimates of 1871; now this western range section has about 65 per cent. of the total, or more than 27,000,000 sheep. Then Texas was beginning to make progress in sheep husbandry, which was so rapid that in 1884 the number there was nearly 8,000,000, the highest ever recorded in any State. In 1900 there were only 2,417,000.

These facts indicate the relative decline of sheep husbandry in the farming States. The free pasturage of the great range country handicapped the industry on farm lands, especially the wool growing branch. Just as wheat-growing gradually receded westward, and cattle-raising declined, first east of the Alleghanies, and afterwards appreciably in the Ohio Valley, so wool-growing almost disappeared from the farms, while mutton-production lingered in the blue-grass section and other regions of fat pasturage, and the raising of early lambs retained a footing among farmers skilled in this branch of meat-making. A few of the skilled and experienced breeders of Vermont, New York, Pennsylvania, and Ohio continued the development of pure-bred merinos for the improvement of the flocks of the range country and of South America and Australia. With increasing demand for mutton, the flocks of the farming States were gradually modified by a larger infusion of the blood of the English breeds. Thus the balance of distribution was disturbed, notwithstanding some advantages in high breeding and nearness to mutton markets.

The central west was long a stronghold of wool-growing. It gave way to powerful far-western competition slowly, holding its position tenaciously, and yielding only as other industries and interests demanded recognition and commanded better profit. The statement on the next page compares the present distribution with that in 1871 in this district.

In 1871 this district had 52.6 per cent. of the total; it has now only 20.2 per cent.; and the numbers had been higher prior to 1871, Ohio having 7,000,000 a few years earlier. The increased value is only in part due to the increase in the country generally as between 1871 and 1900; the average

Number and value of Sheep in Central West in 1871 and 1900.

States.	1871.			1900.		
	Number.	Average value.	Total value.	Number.	Average value.	Total value.
Kentucky - -	904,300	8.10	7,426,600	549,832	12.5	6,872,900
Ohio - - -	4,641,000	9.4	43,725,400	2,839,690	15.5	44,015,900
Michigan - -	3,072,800	9.3	28,676,000	1,389,073	14.9	20,696,000
Indiana - -	2,103,000	7.6	16,022,800	677,995	16.7	11,321,400
Illinois - -	1,424,000	8.3	11,819,200	637,719	16.5	10,621,400
Wisconsin - -	1,056,000	10.2	10,763,200	744,656	15.2	11,318,800
Minnesota - -	140,000	9.3	1,302,000	419,218	13.3	5,575,700
Iowa - - -	1,822,700	7.1	13,041,100	619,476	16.8	10,407,100
Missouri - -	1,578,200	6.7	10,573,900	597,619	12.8	7,649,400
Total - -	16,742,000	8.7	145,532,000	8,475,188	14.9	125,417,200

value for the whole of the United States was 9.7s. in 1871 and 12.2s. in 1900; so that whereas the value in the central west was considerably below the average in 1871, it was much above it in 1900.

THE EXTERNAL TIMBER TRADE OF THE UNITED KINGDOM.

The imports of wood and timber of all kinds into the United Kingdom have during recent years exhibited a considerable extension, and for the past five years the average annual value has amounted to no less than £22,668,000. This sum includes furniture woods, such as mahogany, walnut, etc. (ash, beech, birch, elm, oak, and wainscot, it may be noted, are not classified as furniture woods), as well as joiners' and cabinet work, which were valued at £2,634,000, in which amount 62,600 tons of mahogany accounted for £558,300; 152,300 tons of other furniture woods and veneers for £942,400; and house frames, fittings, joiners' and cabinet work for £1,133,600. Exclusive of these items, which are of a more or less special character, the value of the imports of hewn and sawn timber and staves appears to be steadily increasing and to have risen by about £5,000,000 during the past 20 years; thus the average for 1879-83 was £14,962,000; for 1884-88, £13,485,000; for 1889-93, £16,439,000; for 1894-98, £18,922,000; and 1895-9, £20,034,000.

The quantities and values of hewn and sawn timber and staves imported in 1899, distinguishing the exporting countries, are shown in the table on the next page.

It will be seen that in 1899 the imports of fir or pine alone amounted in value to about £19,000,000, representing 8,804,600 loads, or about 440 million cubic feet. The largest quantity is received from Sweden, the imports from which source amounted to 2,322,600 loads, valued at £5,009,000. Russia came next with 2,141,800 loads, valued at £4,792,000; and then Canada with 1,767,500 loads, valued at £4,373,000; the imports from these three countries accounting for more than three-fourths of the total imports of fir.

Of hewn oak the quantity imported was 170,569 loads, 97,681 loads coming from the United States, 24,260 loads from Germany, and 19,385 loads from Canada. Teak is imported principally from Burmah, 47,177 loads out of a total of 53,930 loads having come from this source; Bengal and other parts of British India sent 4,472 loads, while

<i>Quantities Imported in 1899.</i>							
From :—	Hewn Timber.				Sawn Timber.		Staves.
	Fir.	Oak.	Teak.	Unenumerated.	Fir.	Unenumerated.	
	Loads.	Loads.	Loads.	Loads.	Loads.	Loads.	Loads.
Russia . . .	439,337	17,944	—	13,524	1,702,443	28,769	33,732
Sweden . . .	434,674	763	—	9,889	1,887,939	15,549	9,660
Norway . . .	318,678	154	—	1,888	507,699	9,139	23,904
Germany . . .	212,216	24,260	—	3,395	97,364	3,457	20,712
France . . .	769,865	—	58	566	1,808	13,374	260
United States . . .	60,371	97,681	—	21,083	479,743	58,207	30,927
Canada . . .	53,861	19,385	—	38,159	1,713,670	41,202	6,161
British East Indies . . .	—	—	51,649	—	—	—	—
Other Countries . . .	55,659	10,382	2,223	7,193	69,301	9,779	860
Total . . .	2,344,681	170,569	53,930	95,607	6,459,972	179,576	126,216
<i>Value of Imports.</i>							
From :—	Hewn Timber.				Sawn Timber.		Staves.
	Fir.	Oak.	Teak.	Unenumerated.	Fir.	Unenumerated.	
	£	£	£	£	£	£	£
Russia . . .	732,600	93,371	—	23,458	4,051,279	56,293	146,090
Sweden . . .	609,471	4,264	—	14,917	4,399,248	30,973	23,090
Norway . . .	457,702	655	—	2,887	1,333,238	28,502	63,517
Germany . . .	484,004	112,779	3	8,544	256,098	9,380	219,512
France . . .	600,670	—	695	1,704	4,733	37,804	1,232
United States . . .	192,806	527,874	—	87,433	1,339,310	273,575	122,645
Canada . . .	275,706	119,620	—	140,296	4,097,296	118,151	21,716
British East Indies . . .	—	—	625,946	—	—	—	—
Other Countries . . .	47,164	102,386	27,660	24,770	121,415	44,236	6,510
Total . . .	3,401,023	959,949	654,304	304,099	15,602,637	606,914	659,312

Siam, the contribution from which exhibited a considerable decline, sent only 1,268 loads, as compared with quantities varying during the previous five years from 5,132 loads to 14,673 loads annually.

Staves, of which 126,216 loads were imported, were furnished chiefly by Russia (33,732 loads), the United States (30,927 loads), Norway (23,900 loads), and Germany (20,712 loads). These staves, it may be noted, are shaped lengths of wood for making the sides of casks, varying in length from 31 to 72 inches, and in breadth from 3 to 7 inches.

With regard to the prices of timber as ascertained from the declared value, the price per load of hewn fir was 29s. in 1899, or about 5d. less than in 1898; whilst the average value of sawn fir was returned at 48s. 4d., which was higher than in any year since 1889. The comparative value of the timber imported from different countries varied very considerably in the case of hewn fir, the lowest declared value being for French pine, which only averaged about 15s. 7d. per load, but of which we received 769,865 loads, or more than was supplied by any other country. Sweden and Norway came next in point of cheapness, but the average value of fir from Scandinavia was nearly double that of France, being 28s. to 29s., whilst Russian pine was returned at 33s. 4d. per load. The pine received from Germany, United States, and Canada, though less in quantity, was much higher in value, 212,216 loads supplied by Germany averaging 45s. 8d. per load; 60,371 loads from the United States 63s. 10d. per load; and 53,861 loads from Canada 102s. 5d. per load.

The variation in value noticeable in the imports of hewn fir was absent in the case of sawn or dressed fir, the prices ranging from 46s. 7d. in the case of Sweden to 55s. 10d. for the United States. The imports from Norway, Germany and France had an equal average value of 52s. 7d. per load.

With regard to hewn oak the value averaged 112s. 7d. per load, or about 6d. less than last year. Of the countries from which this timber is principally imported, Canada had the highest average value of £6 3s. 5d. per load, but a consignment of 9,428 loads from Austria was valued at £96,044, or £10 3s. 10d. per load. United States oak averaged £5 8s. and German only £4 13s. 0d. per load. Teak values appear

to have risen in 1899, the declared value amounting to £12 2s. 7d. per load, or over 7s. above last year's average and higher than in any year since 1886.

In order to afford some idea of the extent to which the various countries have contributed to the timber supply of the United Kingdom during the past five years, reference may be made to the following table, which shows the aggregate value of the timber imported from each country. Sweden, Russia, and Canada contributed together about 68 per cent. of the total, the average annual imports from the first-named country being valued at £4,611,100, from Russia at £4,595,300, and from Canada at £4,377,600, whilst those from the United States were valued at less than one-half this sum or £2,170,700.

	1895.	1896.	1897.	1898.	1899.
Russia - - £	3,667,188	4,376,691	5,002,158	4,807,293	5,103,091
Loads	1,939,868	2,164,179	2,314,417	2,196,637	2,235,769
Sweden - - £	3,594,896	4,365,794	5,087,660	4,917,181	5,089,963
Loads	1,958,844	2,275,510	2,411,441	2,316,416	2,358,574
Norway - - £	1,357,399	1,603,176	1,862,804	1,766,153	1,886,501
Loads	717,138	794,515	879,758	802,844	861,462
Germany - - £	861,535	1,029,491	1,170,615	1,076,176	1,091,220
Loads	310,947	377,172	451,768	378,507	361,404
France - - £	507,444	537,194	613,904	440,488	646,948
Loads	627,667	645,912	764,374	525,098	785,931
United States - £	1,508,842	1,881,445	2,639,343	2,225,093	2,598,643
Loads	478,057	520,243	844,012	692,987	748,017
Canada - - £	3,149,803	4,140,986	5,460,545	4,364,021	4,772,785
Loads	1,276,917	1,598,539	2,132,530	1,741,504	1,872,438
British East Indies £	443,250	536,901	745,449	619,983	625,946
Loads	44,613	54,570	64,072	52,901	51,649
Other Countries £	361,560	404,522	497,673	375,766	373,148
Loads	113,447	112,035	114,530	127,338	155,397
Total - - £	15,471,967	18,926,200	22,999,742	20,592,754	22,188,238
Loads	7,467,498	8,602,675	9,976,902	8,834,232	9,430,641

With regard to the quantities received, the total has averaged 8,862,500 loads during the past five years, of which Sweden supplied 2,264,200 loads, or 28 per cent.; Russia, 2,170,200 loads, or 24 per cent.; Canada, 1,724,400 loads, or

19½ per cent.; Norway, 811,100 loads, or 9 per cent.; and France, 669,800 loads, or about 7½ per cent.

To complete this review of the external timber trade of the United Kingdom, reference may be made to the export of British produce, and to the re-export of some of the foreign imported wood and timber. The export of British produce is chiefly in the form of manufactured goods, which amount in the aggregate to an average of £471,000 per annum. This total was made up of various unenumerated kinds of manufactured wood, which averaged £377,000 per annum in the five years 1895-99, and of staves and empty casks, the annual value of which during the past five years has been about £94,000. Compared with the value of staves imported, the exports, it will be observed, amount to about one-sixth.

The export of unmanufactured timber of British growth is insignificant; during the past five years it has ranged from 597 loads in 1895 to 1,768 loads in 1899, with a declared value of from £3,993 to £9,481.

The quantity of foreign timber re-exported is not large, but its average value in the past five years has been about £400,000 annually, the principal items being teak, sawn fir, and mahogany.

AGRICULTURAL AND MISCELLANEOUS NOTES.

EXPERIMENTS IN THE TREATMENT OF APPLE TREES.

The second Report of the Woburn Experimental Fruit Farm* contains a full account of a useful series of experiments with different methods of treatment applied to apple trees. Dwarf trees of Bramley's Seedling, Cox's Orange Pippin, and Potts' Seedling, all on the Paradise stock, were employed, arranged so that each experiment embraced a row of eighteen trees, six of each of the three varieties. Some of the experiments were also repeated with Stirling Castle, and others with standard trees of Bramley, Cox, and Lane's Prince Albert. All these trees were planted in 1894-95, the dwarfs being then three years old and the standards four. In each experiment the "normal" treatment was altered in some one particular. The normal treatment as regards the branches was moderate pruning in autumn and a shortening of the main growths in summer. The summer shortening has been omitted during the last three years, and the extent of the autumn pruning has been gradually reduced, till, in the present year, the normal pruning consists of little more than shaping the trees and removing unnecessary branches.

With regard to the question of cutting back the branches of a tree after planting it, the general conclusion drawn from the experiments is that but little difference is caused whether the trees are cut back at once or not till a year after planting, but such difference as there is, with the doubtful exception of the increase in weight, is in favour of

* Report on the working and results of the Woburn Experimental Fruit Farm, by the Duke of Bedford and Spencer U. Pickering, F.R.S.

immediate cutting back, especially if early fruiting is desired. It is only in the second year after planting, that is in the year after the cutting back, that the trees in which this operation has been postponed show any advantage over those cut back at once; and this advantage, it is explained, is certainly in part, and possibly entirely, due to the prevention of fruiting entailed by postponing the cutting back. The bad effects of omitting to cut the trees back on planting, or to prune them subsequently, were chiefly shown in the straggling and bad shape of the resulting tree, but the weight of the leaves, and also the girth of the stems, showed that these trees were not so vigorous as they should have been. The amount of fruit borne, however, was in excess of the average. When the trees were cut back, but not subsequently pruned, they showed to a certain extent the straggling character just mentioned, but they did not show any general loss in vigour or growth.

In the case of the experiments in pruning subsequent to cutting-back on planting, the results indicate that nothing is gained as regards the size and vigour of the tree, and that probably something, though not much, is lost by modifying the normal treatment of moderate pruning in the autumn, and when necessary shortening the branches a little in summer. None of the methods of summer pinching or pruning tried at Woburn produced results which recommended such treatment from a horticultural point of view.

The check on the vigour and growth of a tree by cutting or injuring its roots was found to be in marked contrast with a similar interference with the branches. Trees which had been root-pruned every year were in 1898 little more than half as big as the normal trees, and those root-pruned every other year were about two-thirds of the normal. The crops borne by these trees, however, were heavy in proportion to their size. Such frequent root-pruning is not, it is observed, a practice which should be adopted.

Some experiments on replanting showed that trees which had been carefully lifted every other year and replanted at once experienced no ill-effects from the operation; but in a case where the trees, after being lifted, had been left in a shed

for three days before re-planting (which would reproduce to a certain extent the conditions experienced when trees are sent out from a nursery) material injury was suffered, these trees, after four years, being 28 per cent. smaller than similar ones which had not been lifted.

Experiments instituted to determine the effect of growing grass round trees have furnished striking results. The grass-grown trees are, it appears, scarcely bigger than when planted five years ago, and the actual increase in weight which they have shown during this time is about eighteen times smaller than in the case of similar trees in tilled ground. The effect of weeds is stated to have been distinctly less than that of grass, and that of careless planting, combined with weeds and total neglect, scarcely greater. The grassed or weed-grown area extended in the majority of cases to about 6 feet beyond the stems of the trees, but in the case of two of the varieties of standards the extent was only 3 feet. In these instances recovery began in 1897, and in 1900 it appeared to be complete, so far as the vigour of the tree is concerned, although the loss of growth experienced before 1897 has not been recovered. In the case of the other trees where the ground is more completely grassed over, there have been some signs this year that recovery has commenced. The majority of the roots of those trees which have been recovering since 1897 are still within the grassed area, and the effects produced are therefore not attributed to a competition for food between the roots of the grass and those of the tree, but to the large increase in the evaporation from the soil which is known to be produced by grass; the trees being thereby made to suffer from drought, with consequent deprivation of other nourishment as well. It is believed also that the grass acts by preventing the access of air to the roots of the tree.

In the case of carelessly planted and neglected trees, some of them, after the first year, were tended and the ground round them cleaned. The effect on the trees was immediate, and there is now little to choose between them and the trees which have been well treated throughout. Further experiments are in progress with a view of elucidating the effect of careless planting, without neglect.

Mulching the ground with clean straw, which would diminish the evaporation, and hardening the surface by rolling, which would have the opposite effect, did not seem to have any marked influence, though the results indicated that this would be dependent on the peculiarities of the season. Repeated digging of the soil, instead of hoeing, was equally without effect.

Various methods of planting trees were tried, but no decided effect was produced; though wherever the method of planting favoured an increased supply of moisture to the roots, there was a general tendency for the leaf-size to be unaffected and for the wood formation to be slightly increased; wherever the reverse was the case, the leaf-size was perhaps increased and the wood formation diminished. The effects of peat and compost were favourable both to leaf-size and wood formation, owing it is believed to an increase in the porosity and moisture of the soil. Sets of trees planted respectively in November, January, and March, did not show anything in favour of either of these different times for planting purposes.

The effect of the manures in all the experiments was practically *nil*. The normal dressing consisted of artificial manures equal to about 12 tons of dung per acre. In many of the experiments this quantity was doubled, halved, or omitted altogether; each one of the main constituents (potash, phosphorus and nitrogen) was omitted in certain plots, ammonia was substituted for nitrate, dung was used alone or in addition to the artificial manure, and both the minerals and the nitrate were applied at various seasons of the year, but none of the dressings had any effect either on the leaf weights or the size of the trees, or up to the present on their fruiting.

The conclusion is therefore drawn that the soil of the Woburn farm has contained up to the present all the nourishment necessary for fruit trees; but as that soil is not exceptionally fertile, the authors of the report conclude that there must be thousands of other fields which would behave in exactly the same way, and that any manure put on them for many years would be as much wasted as it apparently has been at Woburn.

MANURIAL EXPERIMENTS WITH STRAWBERRIES AND BUSH FRUITS.

The second report of the Woburn Experimental Fruit Farm, referred to above, contains an account of some manurial experiments with strawberries and bush fruits which have been carried out at the Farm.

The experiments with strawberries have extended over three years only, and are not yet complete. They have been carried out on six plots containing 288 plants each, which were planted in 1896, two feet being allowed between the plants in each direction. Two of the plots received respectively 12 tons and 30 tons per acre of London dung; another was given artificial manure equivalent to 12 tons of dung per acre, and of the remaining three, two received artificials equivalent to 30 tons of dung per acre, and the other was left unmanured as a control plot. The experiments were undertaken with the object of ascertaining the respective merits of natural and artificial dressings, and the effect of altering the amount applied. The results, so far, have shown on the average practically no increase from the dressings, the mean crop from the dressed plots during the three years having only been 5 per cent. in excess of that from the undressed plot. The plots with natural manure showed in two of the years an excess over those with artificial manure, a result which would point to the conclusion that the natural manures have had some effect, though the plots which were dressed heavily yielded no excess in crop over those which were dressed lightly. With artificial manures, the indications of the effect of increasing the amount were fairly balanced in opposite directions in different seasons, the mean results for the three years having shown a slight but insignificant balance in favour of the smaller dressing. The conclusion drawn from the results of the experiments is therefore limited to stating that the probability is that natural dung increases the crop to a certain extent, whereas artificial manure does not, and that a moderate dressing of the former gives almost as good a result as a heavy one.

Similar experiments made with gooseberries, black, red,

and white currants, and raspberries, furnished results of a similarly ambiguous character. The manured plots have shown an average of only 11 per cent. in excess of the unmanured; those receiving dung have shown an excess of one-half per cent. over those receiving artificial manure, and those receiving large amounts of manure have shown an excess of 1.5 per cent. over those receiving only two-fifths of the amount. The only evidence of any effect from the manure consisted in an increased luxuriance of foliage and size of berries in the case of those gooseberries which have received natural manure. It is stated in the report that it would be premature to draw any rigid conclusions at present from these results, as a period of three years is but a small portion of the total useful life of such plants, but it is to be noted that the general absence of effect of manures in these experiments is in accordance with observations made in every other case at the Woburn Farm.

EXPERIMENT IN SHEEP-BREEDING.

An experiment with the object of ascertaining the most suitable cross for Welsh mountain ewes for the production of fat lambs was carried out during the past year on the farm at Lledwigan attached to the Agricultural Department of the University College of North Wales, Bangor.

Seventy-nine Merionethshire ewes purchased in October, 1899, were divided into three lots and marked with numbered ear tags. Lot 1, consisting of 29 ewes, ran with a Wiltshire ram, a white-faced horned sheep said to be directly descended from the old Wiltshire sheep) which for some years has been extensively used in North Wales for crossing with mountain sheep. Lot 2, consisting of 27 ewes, ran with a Shropshire ram, and Lot 3, consisting of 23 ewes, with a Leicester ram.

The rams were turned in on October 3rd, and remained with the ewes until the end of November. Some of the ewes proved barren or cast their lambs, and a few lambs died after birth. There was, however, no difference between the various

lots in this respect. The Wiltshire cross lambs were dropped between February 28th and March 30th, the Shropshire cross between March 3rd and April 3rd, and the Leicester cross between March 1st and April 7th. Every lamb was marked with a distinctive mark at birth. The ewes were grazed on the same pasture after the removal of the rams in December, and except for about three weeks during the severe weather in the spring received no artificial food. The lambs were sold at the beginning of July on the understanding that they were to be removed as soon as they became ready for the butcher, the whole to be cleared by the end of August. At this time there were 26 of the Wiltshire cross, 24 of the Shropshire cross, and 20 of the Leicestershire cross. They went sent to market in three drafts of 35, 19, and 16 head respectively on July 9th, August 6th, and September 5th.

The average live weights of the lambs at these dates were as follows :—

Variety.	July 9.		August 6.		September 5.	
	Number of Lambs.	Average Live Weight.	Number of Lambs.	Average Live Weight.	Number of Lambs.	Average Live Weight.
Wiltshire cross	14	lbs. 69.9	6	lbs. 71.1	6	lbs. 70.8
Shropshire cross	5	68.5	11	68.9	8	61.5
Leicester cross	16	65.9	2	60.7	2	56.5

It was found on adding together the total live weights of all the lambs sold of each variety that 26 Wiltshire cross lambs averaged 70.4 lbs. live weight; 24 Shropshire cross lambs averaged 66.4 lbs. live weight; and 20 Leicester cross lambs averaged 64.4 lbs. live weight.

In breeding lambs for the butcher the first consideration, Professor Winter points out, is to get them really fat. Then, provided the lambs are of good quality, the heavier they are within certain limits the higher the price obtained. Further, lambs which have, so to speak, lost their bloom, never sell so well as those possessing the characteristic appearance of fat lambs. It is also very important to have lambs ready for the butcher early in the season, as prices

usually become lower as the summer advances. Where the lambs are cleared off early the ewes may be fattened and sold at better prices than can be obtained in the late autumn, when they become almost unsaleable.

The results of the Lledwigan experiment viewed from the foregoing standpoints showed that the advantage rested with the Wiltshire cross. They not only weighed heavier, but they handled better and had a better appearance than either of the other crosses. Further, the greater number of them were ready for the butcher early in the summer, and would, it is stated, have produced a considerably higher price than the Shropshire and Leicester crosses had they been sold separately. The Leicester crosses fattened quickly, but did not weigh as well as the Wiltshires. The Shropshire crosses were slower in fattening, but attained to greater weights than the Leicesters. The experiment is to be repeated.

FINGER AND TOE.

A circular recently issued by the Agricultural Department of Cambridge University contains some useful observations by Professor Somerville on the disease known as Finger and Toe, or Club Root.

Of the disorders affecting turnips, swedes, cabbages, and similar cruciferous plants, Finger and Toe is the most serious on account of its highly infectious character. It is caused by a microscopic fungus which attacks the root at a very early stage, and thus induces swellings, ultimately resulting in decay and putrefaction. The spores of the fungus eventually escape into the soil, where they remain ready to attack other plants of the *Cruciferae* family. The growth of a healthy turnip crop is impossible upon infected soil, but in the course of years the spores gradually die, so that while it may be impossible to grow turnips successfully once in four years, there may be no such difficulty if the interval between two cruciferous plants is extended to eight years.

This measure will not, however, be successful if charlock or other cruciferous weeds are not kept thoroughly in check, as they contract the disease and pollute the ground exactly in the same way as a crop of turnips.

Finger and Toe is not only easily transmitted from a diseased crop to another cruciferous crop that may follow on the same field, but it is also a perfectly simple matter to establish the disease on a healthy field if diseased turnips or diseased soil be spread upon it. "Infection in this way," Professor Somerville says, "takes place much more frequently than farmers are generally aware. Diseased roots, for instance, may be carted from one field and consumed upon another, and if this second field comes under turnips, or similar crops, within the next few years the crop is practically certain to be more or less attacked. Spread of the disease by means of infected soil may take place in a variety of ways. If a crop is diseased only in certain patches, very often the headlands soil from these places may be carried on agricultural implements, or on the feet of men or horses, and dropped at other parts of the field. In this way new centres of infection are sure to be created. Then, again, the soil that accumulates in the root shed may be carted out and spread on an arable field, with disastrous results. Farmyard manure is often accountable for the spread of the disease. When turnips or swedes are being consumed by cattle in the yards, bits of the roots and the cleanings of the troughs not infrequently get amongst the litter, and if the crop has been at all diseased the manure is thereby infected. Should the manure be afterwards conveyed to arable land, and much of it is used directly for dressing cruciferous crops, it cannot fail to prejudicially affect the health of the plants."

It is well known that Finger and Toe never appears in crops growing on soil which holds a high percentage of lime, and it has long been the practice to treat infected land with dressings of lime, usually applied in the autumn of the year immediately preceding the season when a turnip crop is to be grown or a year earlier. During the past six years Professor Somerville has carried out a series of experiments to ascertain whether the disease could not be more satisfac-

torily checked by applying lime even earlier than is usually the case. These experiments have clearly indicated that the best results are got by applying lime to the land before it is ploughed in the autumn of the season in which the diseased crop has been grown, for when put on in this way it not only comes into immediate contact with the disease, but it has the whole period of the rotation in which to operate on the disease.

The main points to be observed in combating Finger and Toe are summarised in the circular as follows :—

1. Exercise great care in disposing of diseased roots, which should, if possible, be consumed either where they grow, or on a field of permanent pasture.
2. Avoid working the land when out of condition. Neglect of this precaution predisposes the crop to attack.
3. If possible arrange the rotation of cropping so that turnips and similar crops do not come on the same land oftener than once in eight years.
4. Where a field is markedly diseased, apply about three tons of slaked lime per acre as soon as the turnip crop has been removed. In very bad cases use more, and in mild cases of attack use less. If only certain spots in a field are affected, these should be dressed with six to eight tons of lime per acre, so that the disease shall with certainty be banished before it contaminates a larger area. Gas lime or chalk, or even magnesian lime, up to two or three tons per acre, may be used instead of common lime.
5. Even where no disease is visible it is a good plan in the case of all soils not rich in lime to apply twenty-five to thirty cwt. per acre of slaked lime after each turnip crop. This moderate outlay will be recovered in the general improvement of the crops, and it will at the same time act as a safeguard against disease establishing itself.
6. Finger and Toe attacks cruciferous weeds, such as charlock and shepherd's purse, and through their agency land is often kept infected much longer than would otherwise be the case. It is therefore desirable that the disease should not have this opportunity of propagating itself.

PICKLING OR STEEPING WHEAT FOR BUNT.

The Board of Agriculture have received from the Cheshire County Council a copy of a report on certain grain experiments carried out at the Agricultural and Horticultural School, Holmes Chapel, in 1900. Among these experiments there was one of some interest in pickling or steeping wheat affected with bunt. A sample of wheat was procured which contained a large percentage of grains affected with bunt (*Tilletia caries*), and it was decided to carry out an experiment to see if steeping the seed with copper sulphate would

cure the disease. Sufficient seed to sow a plot one-tenth of an acre in extent was steeped in a solution consisting of 1 lb. of copper sulphate dissolved in 1 gallon of water, which is enough to steep 4 bushels of wheat.

On November 24th, 1899, two plots, one-tenth of an acre each, were sown at the rate of $2\frac{1}{2}$ bushels per acre, one with pickled seed, and one with seed that had not been pickled. No difference could be detected in the growth of the plants on the two plots until harvest time, when many diseased heads were seen in the unpickled seed plot. The plots were cut on August 30th, and threshed on September 12th. The number of heads examined from the pickled seed plot was 6,000, not one of which was diseased, and, when threshed, no bunted grains were found. From the unpickled seed plot 3,000 heads were examined, of which 140, or 4.66 per cent., were diseased, and there was a fair number of bunted specimens in the threshed grain.

The following directions are given in the Report for pickling or steeping seed with sulphate of copper :—"The solution should be mixed at the rate of 1 lb. of sulphate of copper dissolved in 1 gallon of water; this will steep 4 bushels of wheat. The grain should be spread out on a smooth floor, and the solution poured over it; the grain should then be turned over once or twice with a shovel, and left spread out thinly until sufficiently dry to sow."

DESTRUCTION OF CHARLOCK.

Experiments in spraying charlock in corn crops were carried out in the early summer of this year at three centres in Carnarvonshire, under the direction of the Agricultural Department of the University College of North Wales, Bangor.

At each centre three plots, each one-eighth of an acre in size, were dressed with sulphate of copper solutions of the following strengths :—Plot I., 50 gallons per acre of a 2 per cent. solution. Plot II., 50 gallons per acre of a 3 per

cent. solution. Plot. III., 25 gallons per acre of a 4 per cent. solution.

The spraying was carried out by two members of the college staff, and each centre was visited at intervals on three different occasions. The dressings were applied at two of the centres on May 23rd., and at the third centre on June 6th.

It appears that none of the solutions employed in these experiments were entirely successful at any centre, for all failed to destroy the charlock. On Plots I. and II., which received 50 gallons per acre of a 2 per cent. and of a 3 per cent. solution respectively of sulphate of copper, the dressings destroyed a large proportion of the weed, possibly about 60 per cent. of it, at two of the centres, and checked the growth of the remainder, the 3 per cent. solution being most effective. The results obtained on Plot III. showed that even when a strong solution is used, it must be applied in greater quantity than 25 gallons per acre if it is to be successful.

The results are reported to have been, on the whole, rather disappointing. Although the conditions were very favourable at two of the centres, the dressings were only partially effective. In experiments conducted in 1899, 50 gallons of a 2 per cent solution of sulphate of copper give the best results, but only succeeded in destroying part of the charlock. In 1900 the results were very similar. Where the wild turnip occurred the results were the same as in 1899, further tending to prove that the charlock plants are attacked because the dressings adhere to their rough leaves, whereas the smooth-leaved plants are but little affected. The corn at the different centres was discoloured more than was the case last year, but at no centre did the crop appear to ultimately suffer. The grass and clover seeds growing in the corn at two of the centres were also unaffected by the dressings; indeed, at one place they appeared to have been improved.

But although the results were not so favourable as some obtained elsewhere, it is claimed that they show that the operation is one which will do much more than repay the outlay, and justify the belief that if the spraying be carried out for a number of years the charlock will ultimately be got rid of.

SOIL ANALYSIS.

The Board of Agriculture have been asked to give publicity to the following recommendations drawn up by a Committee of the Agricultural Education Association* with the view of securing a certain uniformity in the conduct of soil analysis. The object the Committee have in view in seeking for such uniformity is: (1) To enable analyses executed and published by any investigator to be intelligible to his fellow workers, and, therefore, on occasion to be serviceable in their research; (2) To ensure that the large number of soil analyses now being carried out at various institutions in this country shall be mutually comparable and available for tabulation and general discussion; (3) To put on record a method of procedure that will serve as a guide to investigators beginning such work.

The Committee point out that these recommendations deal with those determinations about which there is a general consensus of opinion, such determinations, in fact, as would generally accompany a record of results of field experiments, etc. The Committee do not wish to formulate any recommendations as to the interpretation of soil analyses, recognising that the interpretation is still largely uncertain, and must depend to a great measure on the judgment and local knowledge of the analyst; and, further, their recommendations do not deal with analytical processes or details of manipulation to be adopted in the determination of any given constituent. These are matters dependent on the skill and discretion of the individual, and for them the individual is responsible.

In these preliminary enquiries the Committee found that no agreement existed among chemists, either of this or other countries, on such points as the preparation of the soil for analysis, the nature of the solvent to be employed, the time of its action, etc., and as there is no absolute criterion by which they can be decided, they must be regarded as

*The Agricultural Education Association is a body consisting of representatives of Collegiate and other institutions connected with agricultural education and research.

"conventions" to be settled by considerations of expediency and mutual agreement. But as the results obtained will very largely depend upon the conventions adopted, the Committee have attempted, after discussion and investigation, to so far define a common plan of action as will render the results obtained more generally serviceable, without hampering the individuality of each worker. The recommendations are as follow:—

(1) *Taking Sample.*—Under ordinary conditions the sample shall be taken to a depth of 9 inches, but in case of shallow soils, to such lesser depth as marks a natural line of demarcation. The Committee approve of the use of the auger as one method that may be adopted for taking samples; several cores should be taken and mixed for analysis.

(2) *Drying.*—The sample shall be air-dried for analysis, the drying may be accelerated by heating to a temperature not exceeding 40° C., but in all cases the soil should be finally left for a day or two, spread in a thin layer, and exposed to the air, at the ordinary temperature of the room.

(3) *Sifting.*—A sieve with round holes, 3 mm. in diameter shall be used to separate the fine earth for analysis from the stones and gravel. Gentle pressure with a wooden or caoutchouc pestle, or other means, may be adopted to break up aggregates of clay and silt, but care should be taken not to crush any of the stones or lumps of chalk. For determination of the "available constituents," the "fine earth" should be used without grinding. For the other determinations, 100 grams or more of "fine earth" shall be sifted through a woven sieve of 40 meshes to the inch, or a sieve with round holes of 1 mm. in diameter; what is retained by the sieve is to be ground till it will pass through, and the whole mixed. Perforated zinc, with holes one-eighth inch and one twenty-fifth inch diameter, is commercially obtainable, and forms a convenient material for the construction of the two sieves. Considerable diversity of opinion exists concerning the sieve to be used for obtaining "fine earth" for analysis. The Rothamsted chemists employ a woven sieve of one-quarter inch mesh; the 3 mm. round-holed sieve was originally suggested by Wolff; the Berlin *Laboratorium für*

Bodenkunde employs a 2 mm. round-hole, but also analyses the finest particles separated by washing; Grandeau and the French *Comité Consultatif des Stations Agronomiques* use a 1 mm. woven sieve; and Petermann, in his examination of the Belgian soils, does the same. The Committee suggest 3 mm. as a convenient size; lumps of earth can be readily reduced to that diameter, whereas sifting down to 1 mm. involves either so much crushing of lumps of earth as results in considerable fracture of the stones, or else wet sifting. The quarter-inch square mesh sieve passes in some cases a large proportion of hard stones, that are further reduced with much difficulty, and yield unweathered material not likely to be serviceable for plant nutrition for many years. The further grinding is recommended to obtain material from which a small sample for analysis can be fairly drawn.

(4) *Determination of Moisture.*—The sample shall be dried in the steam-oven to constant weight.

(5) *Determination of Loss on Ignition.*—The result shall be so expressed as not to include the carbon dioxide expelled from the carbonates, or the moisture previously determined.

(6) *Determination of Nitrogen.*—Unless otherwise specified, the nitrogen shall be determined by Kjeldahl's method.

(7) *Determination of Carbonate of Lime.*—The carbon dioxide evolved on treatment of the fine earth with acid is to be calculated as carbonate of lime. This is regarded as a convenient measure of the "available basicity" of the soil, without discriminating between carbonates of lime and magnesia.

(8) *Determination of "Total" Mineral Constituents.*—The fine earth is to be boiled with strong hydrochloric acid in an open flask for a short time, in order that the acid may attain constant strength, and digested at the ordinary water bath or steam oven temperature for 40–48 hours, the flask being loosely stoppered. In this solution the phosphoric acid and potash are determined, and other mineral constituents as desired. The object of the Committee is to obtain as thorough an extraction of the soil as is possible short of ultimate analysis. The time of the

extraction is made sufficiently long to minimise errors due to variations in the actual time, the strength of the acid, or the temperature. Unignited soil is taken, since ignition effects a drastic and variable alteration of the constitution of the soil—*e.g.*, no constant proportion is found between the potash extracted from ignited and unignited soil. Hydrochloric acid is taken as the most generally effective solvent; even peaty soils are found to yield as much phosphoric acid to hydrochloric acid as to nitric acid, or aqua regia.

(9) *Determination of Available Phosphoric Acid and Potash.*—Unless otherwise specified, Dyer's method shall be followed, the quantities used being 200 gms. unground fine earth, and 20 gms. citric acid in 2,000 c.c. water, no further addition of citric acid being made.

(10) *Expression of Results.*—Unless otherwise stated, results shall be expressed as percentages calculated on the fine earth in an air-dry state.

ADULTERATION OF FOOD IN 1899.

The report of the Local Government Board for the year 1899-1900 contains particulars of the results of the analysis of samples of food and drugs taken by the local authorities in 1899 under the powers conferred on them by the Sale of Food and Drugs Act, 1875. The total number of samples examined by the public analysts amounted to 53,056, or one to every 547 of the population of 1891, and about 3,500 more than the number taken in 1898. In London nearly twice as many samples are obtained in proportion to the population as in the provinces—*viz.*, one for every 325, as against one for every 619 persons outside the metropolis. No sample was taken in the county of Radnor, or in the boroughs of Congleton, Penzance, Glossop, Barnstaple, Louth, Kendal, and Tyne-mouth. Within the jurisdiction of six counties and seven

boroughs, with a total population of over 600,000 persons, only 139 samples were taken for analysis during the year, and in 65 other districts the number procured fell short of one per annum for every thousand of the population. In this connection it may be noted that the Select Committee on Food Products Adulteration, after an exhaustive inquiry into the subject in the years 1894-96, expressed the opinion that a proportion of samples much in excess of one per thousand of the population should each year be taken for analysis in the district of every local authority.

Of the 53,056 samples analysed, 4,970, or 9·4 per cent., were found to be adulterated. Proceedings were instituted in 3,110 cases, and fines amounting in the aggregate to £6,258 were imposed in 2,608 instances. The percentage of samples found adulterated was slightly higher than last year, but for five years in succession it has been under 10 per cent., whereas the average for the five years 1877-81, when the Act was first put into operation, was 16·2 per cent.

Milk was the subject of analysis in 21,964 cases, of which 2,314, or 10·5 per cent., were condemned, as compared with 9·9 per cent. in 1898. London, in the previous two years, had shown an improvement in its rate of milk adulteration, but the percentage, which had been 14·6 in 1897, and 12·9 in 1898, rose in 1899 to 15·4. Only 9 of the 32 "great towns" of the Registrar General's weekly returns had a more unsatisfactory rate of milk adulteration than London in 1899. The practice of adding large quantities of water to milk seems to have almost entirely died out, the adulteration being for the most part limited to the addition of small quantities of water, so as to reduce good milk to the level of that yielded by poor cows, and to the abstraction of cream. In the case of condensed milk, 109 samples were examined, of which only two were classed as adulterated. Legal proceedings were taken against the vendors of 1,438 samples of milk, and penalties were imposed in 1,171 cases.

In the case of butter or of compounds sold as butter 10,478 samples were examined, and 1,018, or 9·7 per cent. were condemned. A large number of samples of margarine were also taken; and many of them were found to have been

sold contrary to the provisions of the Margarine Act, 1887. The percentage of butter adulteration was affected by the samples taken by agents of the Royal Lancashire Agricultural Society and of the Butter Association, who devoted themselves to butter, and only submitted for analysis samples which their long experience led them to believe to be spurious. The result in 1899 was that of 88 samples submitted for analysis on behalf of the Royal Lancashire Agricultural Society, as many as 63 were condemned; and of 37 analysed for the Butter Association, 32 were condemned. Only 35 samples were sent for analysis by private purchasers, 16 of which were reported against; so that out of a total of 160 samples of butter analysed on behalf of non-official associations or persons, as many as 111, or nearly 70 per cent. were reported against. In more than one of the analysts' reports attention is drawn to the growing practice of selling as genuine dairy butter margarine made up to resemble exactly fresh butter. To avoid detection, the retailer agrees not to sell the article to anyone but a known customer, with the result that strangers—and therefore inspectors—are supplied with genuine butter, while purchasers who are known to the seller receive margarine, for which the price of butter is charged.

A number of samples of butter were condemned on account of the presence of water in undue amount, and it is apparently a common practice to avoid pressing out in a proper manner the water introduced in the process of butter manufacture. The fraudulent retention of water in butter intended for sale is obviously a profitable operation; one sample which was condemned contained nearly 30 per cent. of water. Legal proceedings were taken in respect of 730 samples, and 666 penalties were imposed amounting to £2,657, including 3 fines of £50 each; 2 of £30; 2 of £25; 24 of £20; 57 of from £10 to £20 each; and 107 of from £5 to £10. The remainder averaged about 30s. each.

Amongst other articles analysed may be mentioned bread, of which only 3 out of 597 samples were condemned, and flour, of which 9 out of 720 samples were found adulterated. Only 5 samples of lard were reported against, although 1,462 samples

were analysed, and out of 511 samples of confectionery and jam all but 14 were passed as genuine. With regard to oat-meal, 2 out of 307 samples were condemned, and this was also the case with 6 samples of cheese out of 642.

WAGES OF AGRICULTURAL LABOUR IN 1899.

A report* recently issued by the Labour Department of the Board of Trade contains information, compiled, as in the case of previous years, from returns furnished by the chairmen of Rural District Councils in England and Wales, as to the current rates of weekly cash wages in January and June, 1899, of ordinary agricultural labourers, exclusive of piece-work earnings, of extra payments for hay and corn harvests, and of all extra allowances in cash and kind.

The returns do not include men exclusively engaged with the charge of animals, such as cattlemen, carters, horsemen, and shepherds, who are generally paid higher wages and obtain more perquisites; but it has been assumed for the purpose of calculation, as in previous reports, that where the predominant rates of wages of ordinary labourers have changed in a district, a similar change has taken place in the wages of all classes of agricultural labourers.

The particulars of increases and decreases in wages in England and Wales in the years 1897, 1898, and 1899 are summarised in the following table:—

	Changes in 1899 as compared with 1898.		Changes in 1898 as compared with 1897.		Changes in 1897 as compared with 1896.	
	Total Number of Labourers affected.	Increase (+) or Decrease (-) in Weekly Cash Wages.	Total Number of Labourers affected.	Increase (+) or Decrease (-) in Weekly Cash Wages.	Total Number of Labourers affected.	Increase (+) or Decrease (-) in Weekly Cash Wages.
		s. d.		s. d.		s. d.
Increases -	195,191	+ 0 8	214,297	+ 0 8	82,453	+ 0 7½
Decreases -	248	- 0 4½	2,740	- 0 4½	4,932	- 0 6
	195,439	+ 0 8	217,037	+ 0 8	87,385	+ 0 6½

* Report and Statistical Tables relating to Changes in Rates of Wages and Hours of Labour in the United Kingdom in 1899. Cd. 309. Price 1s. 6d.

These figures show that the improvement in the rates of wages which began in 1896 has continued. The districts in which an increase in wages took place in 1899 contained 195,191 labourers, or 19,106 less than the corresponding number for 1898, but the number in the district in which wages fell was only 248 in 1899 as compared with 2,740 in the previous year. The change in the districts affected amounted to an increase of £6,469, which is equivalent to a general rise of 8d. per head per week, the same figure as in 1898. Calculated on the total number of agricultural labourers in England and Wales, the rise per head in 1899 amounted to 2d. per week, which, added to the rise of 4d. per week in cash wages between 1895, and 1898, gives a net increase of 6d. per head in the four years.

By far the greater number of changes took place in the principal corn-growing counties, namely, in the Eastern and Midland Counties. Out of the 195,191 labourers in districts in England and Wales affected by changes, 121,474, or 62.1 per cent., lived in the Eastern and Midland Counties. Calculated on this number the aggregate rise amounted to £4,116 a week, equal to 8½d. a head, compared with a rise in these counties amounting to £5,454 per week, also equal to 8½d. per head, calculated upon the 157,150 labourers in such districts as were affected by changes in 1898. The next group of counties in point of number of changes of wages was the Southern and Western group. In these counties 51,704 labourers were living in districts in which an increase of wages took place, the aggregate rise calculated upon this number amounting to £1,600 per week, equal to 7½d. per head, compared with £1,345 per week, or 7d. per head, calculated upon the 46,687 labourers in such districts in these counties as were affected by changes in 1898.

In the Northern Counties of Northumberland, Cumberland, Durham, and Westmorland, 7,256 labourers were living in districts in which there was a rise, the increase calculated upon this number amounting to 8d. per head per week. In the counties of Yorkshire, Lancashire, and Cheshire, the rise was 7½d. per head per week if calculated upon the 12,536 labourers living in the districts in which a change took place.

In Wales the wages were ascertained of the hired labourers (yearly or half-yearly) who are mostly single men and who live and board in the farm-houses, and also of the married labourers who live in cottages, and whose wages are paid weekly, either entirely in cash, or partly in food. As it was found impossible to compute the number of hired men in the different classes who had been affected by changes, the changes of the married men were, as in former reports, assumed to apply to the hired labourers. In 1899, 2,909 labourers were living in districts in which there was a change, the increase calculated upon this number amounting to £106 per week, or 10½d. per head. In 1898 the number of labourers in such districts was 5,938 and the aggregate increase amounted to £166 per week.

With regard to Scotland, reports received by the Labour Department of the rates of wages agreed upon at the hiring fairs in 1899 by a number of representative employers indicate that there was an upward movement, though, generally speaking, the rise was not sufficient to affect the predominant rate of wages paid. At the hirings which took place during the first six months of 1899 wages were well maintained, and there was little change later in the year. At the early autumn fairs, notably in the counties of Forfar and Perth, a rise of about 20s. for the year was paid, but as the hiring season advanced wages returned to their former level.

HARVEST WAGES IN 1900.

The Labour Department of the Board of Trade have received returns from 126 farms in the Eastern, Midland, and Southern and South-Western Counties giving the cash earnings for the corn harvest of 1900, of 1,945 agricultural labourers, exclusive of the value of food or drink which may have been given in addition. Generally speaking, the returns show that the rates of harvest wages were frequently slightly higher than last year.

The average duration of harvest on the farms reported on was twenty-five days. The weather during harvest was

generally favourable, and as much of the corn was light and stood well, self-binding machines were largely used. In some districts, however, particularly in the north, harvest operations were interrupted by rain, and a good deal of corn was laid and twisted owing to storms early in August.

The following Table shows the average cash earnings for corn harvest of the men on the farms referred to.—

It will be observed that the harvest earnings are highest in the great corn-growing counties on the eastern side of England (Cambridgeshire, Essex, Norfolk, Suffolk, and Lincolnshire), the average cash earnings per man being £7 10s. 8d. The payments in these counties, generally, varied from about £6 10s. to £8, though some men at piecework in the fen districts earned more.

Counties.	No. of Farms to which returns relate.	No. of men employed at Harvest on the Farms reported on.	Average duration of Harvest.	Average Cash Earnings for Harvest, per man.
			Working Days.	£ s. d.
Eastern Counties . . .	45	813	25	7 10 8
Midland Counties . . .	42	602	28	6 0 7
Southern and South-Western Counties . . .	39	530	23	4 11 0
Total	126	1,945	25	6 5 1

In addition to cash payments, beer or cider is frequently given, and sometimes light refreshments such as tea, bread, butter and cheese.

The method of payment at harvest varies in different districts. It is, however, in the chief corn-growing centres, where the harvest is mainly undertaken by piecework, or for a lump sum for the whole harvest based upon the piecework system, that the largest amounts are earned. The counties where harvest is largely done by piecework are Essex, Norfolk, Suffolk, Lincolnshire, Cambridgeshire, Bedfordshire, Huntingdonshire, and parts of Northamptonshire, Warwickshire, Nottinghamshire, Hertfordshire, Berkshire, Oxfordshire, Sussex, Kent, Hampshire, Worcestershire, Gloucestershire, Wiltshire, and Dorsetshire.

THE PRICE OF BREAD.

The principal Co-operative Societies that make and sell bread have been asked by the Labour Department of the Board of Trade to state the price of a 4-lb. loaf of the quality mostly sold by each society at the 1st of June and September, 1900, and September 1st, 1899. From these societies 340 returns have been received, representing 327 towns in England and Scotland.

The returns have been arranged in thirteen districts in the following table, in which the highest, lowest, and mean prices are given for each district, and for the whole of Great Britain.

District.	1st Sept., 1899.			1st June, 1900.			1st Sept., 1900.		
	Highest	Lowest	Mean	Highest	Lowest	Mean	Highest	Lowest	Mean
ENGLAND AND WALES	d.	d.	d.	d.	d.	d.	d.	d.	1
N. Counties and Yorkshire	6	4	5½	6	4	5½	6½	4½	5½
Lancashire and Cheshire	6	4	4½	6	4	4½	6	4	5½
N. Mid. Counties	5	4	4½	5	4	4½	5	4	4½
W. do. do.	5	4	4½	5	4	4½	5½	4½	5
S. do. do.	5	4	4½	5	4	4½	5½	4	4½
Eastern Counties	5	4	4½	5	4	4½	5½	4½	5½
London	5½	4½	5	5½	4½	5	5½	5	5½
S. E. Counties	5½	4½	5	5½	4½	5	6	5	5½
S. W. Counties, Wales and Monmouth	5	4	4½	5	4	4½	5½	4½	4½
ENGLAND AND WALES	6	4	4½	6	4	4½	6½	4	5½
SCOTLAND.									
N. Counties	6	4½	5½	6	4½	5½	6	4½	5½
Eastern Counties	5½	4	4½	5½	4	4½	5	4	4½
Lanarkshire	5	5	5	5	5	5	5	5	5
Other Southern Counties	5½	5	5½	5½	5	5½	5	5	5½
SCOTLAND	6	4	5	6	4	5	6	4	5½
GREAT BRITAIN	6	4	4½	6	4	4½	6½	4	5½

It may be added that the above returns have been confirmed, so far as regards the more important towns, by special

inquiries through the local correspondents of the Department as to the prices charged by private traders for bread of the quality most usually consumed by workpeople in their districts at the beginning of September.

The general result of the inquiry is to show that the present mean price of bread in all the 327 towns covered by the returns is 5½d. per 4lbs., or ½d. more than the price at June 1st, 1900, and September 1st, 1899. The rise was not, however, equally distributed. Of the 216 towns in England and Wales, 130 show a rise of ½d. and 6 rises of ¾d. and 1d., as compared with June, while the remaining 80 towns show no rise at all. In Scotland only 19 towns out of a total of 111 show any rise at all since June, 1900, the mean rise for all districts being ¼d. only. The present mean price of bread in Scotland is the same as in England and Wales, but in June of this year, and in September of last, prices in Scotland were ½d. per 4 lbs. higher than in England.

EXPORTS OF BRITISH AND IRISH AGRICULTURAL PRODUCE.

The exports of British and Irish agricultural produce during the three years 1897-99 have shown a considerable increase in value as compared with the average of the period 1894-96. The exports of the articles enumerated in the accompanying table have amounted to upwards of £6,800,000 annually, while in 1894-6 they may be estimated at about £5,350,000, allowing for certain items not at that time separately shown.

Description.	1897.	1898.	1899.
Live Stock - - - - -	£ 1,088,208	£ 1,060,061	£ 958,757
Meat - - - - -	426,098	384,006	359,529
Dairy Produce and Margarine - - -	440,380	456,038	450,490
Other Animal Products - - -	3,273,195	2,464,087	3,170,255
Cereals and Flour - - -	618,163	758,427	610,163
Potatoes, Hops, and Seeds - - -	295,731	326,398	363,858
Provisions and other Products - -	960,360	1,046,863	992,820
Total - - -	7,102,135	6,495,880	6,905,872

The first item on the above table, viz., live stock, includes an increase in the value of the horses exported, which amounts to more than a quarter of a million sterling annually when compared with the preceding triennium. The annual shipments in the past three years have included nearly 600 stallions valued at £69,000, over 7,500 mares valued at £267,000, and 26,700 geldings worth £472,000. Germany has been our principal customer for stallions, but the numbers sent to that country appear to be declining; on the other hand, in 1899 a much larger number of animals, viz., 282, were sent to the United States and Canada than in previous years. The best prices for mares and geldings are apparently obtained from France, to which country an average number of 4,885 animals have been exported annually in the past three years, valued at nearly £60 each. In the case of Belgium, however, which took the largest number of animals, values ruled much lower, 3,886 mares averaging about £22 each, and 15,740 geldings only £12 each. To Holland there were also exported 6,580 geldings, chiefly of the poorest description, valued at only £8 each.

Cattle occupy a much less prominent place than horses in the export of live stock, the annual average during the period under review having been 3,205 head valued at £110,750. Approximately one-half of the total is made up of beef cattle sent to the Channel Islands for food. For the remainder, which may be assumed to be breeding stock, the principal demand has been made by Argentina, which has maintained a steady importation of this class of stock for some years past. A considerable extension in the trade with the United States and Canada has taken place since 1897.

An average of 9,800 sheep or lambs, valued at £113,400, has been exported annually in 1897-99, largely to Argentina, though the number varies considerably.

Of home grown meat there was an average exportation of 111,000 cwts., rather more than one-half being sent to various British possessions. Nearly three-fourths of the total shown under the heading of dairy produce must be credited to condensed milk, of which the quantity shipped in 1894

was 71,000 cwts., whilst in 1899 185,700 cwts. were exported. About one-half was taken by Cape Colony and Natal, whilst a large proportion of the remainder was sent to other British possessions. Margarine has been exported in declining quantities in recent years, while the export of butter of home manufacture is another diminishing item. The total included in the table under the heading "Other Animal Products" is made up principally of wool, hides, skins, and grease. The most important item in this total is undressed British sheep's wool, the export of which during the past three years ranged between 12,300,000 lbs. and 40,100,000 lbs., the latter figure, which was reached in 1897, being the highest ever recorded, and due mainly to tariff changes in the United States, to which country the bulk of the shipments were sent. Raw hides have been shipped from this country to the amount of just over 200,000 cwts. annually during the past three years.

In the case of British sheepskins, a distinct increase has taken place in the quantity exported, so that whereas the average number for the three years 1894-96 was only 3,838,000, valued at about £227,500, the number in 1897-99 was 6,723,000 valued at £337,800. Practically the entire quantity was consigned to the United States. The annual shipments of grease, tallow, and animal fat in the same period were 750,000 cwts., Holland and Germany being the principal purchasers.

The only two items of importance under the head of cereal products are flour and malt. Of the former about 453,000 cwts., valued at £220,000, were exported, largely to the Channel Islands, Gibraltar, and Malta, while with regard to malt, the total quantity shipped annually in the past three years was 125,700 quarters.

Potatoes, the only British grown vegetable shipped in sufficient quantities to be recorded, were exported to the extent of about 320,000 cwts. annually in 1897-99. The shipments to the United States, which were formerly considerable, declined in 1898 to 500 cwts., but rose again in 1899 to 110,000 cwts.

Seeds are shipped in large quantities to Germany, Holland,

Denmark, and other parts of the Continent, and also to Australia, the average consignments in 1897-99 amounting to over 218,000 cwts. annually, valued at £211,400. Provisions of various unenumerated kinds, including provisions hermetically sealed, were exported to the amount of over £700,000 annually.

AGRICULTURAL COLLEGES AND EXPERIMENT STATIONS IN THE UNITED STATES.

According to information collected by the United States Department of Agriculture, there were, in 1899, 64 educational establishments known as "land grant" colleges, of which 61 maintained courses in agriculture. The term "land grant" has reference to an endowment of land amounting in the aggregate to 9,359,241 acres, which, by an Act of Congress of July, 1862, was appropriated out of the public lands and distributed amongst the different States for the endowment and maintenance of colleges "for the benefit of agriculture and the mechanic arts." This endowment was further supplemented in 1890 by another Act, which places an annual sum, increasing until the year 1901, and equal to about £5,000 for each State or territory, at the disposal of the colleges.

The aggregate value of the permanent funds and equipment of the land-grant colleges and universities in 1899 was estimated to be as follows:—Land-grant fund of 1862, £2,138,113; other land-grant funds, £300,329; other permanent funds, £3,008,790; land grant of 1862 still unsold, £846,427; farms and grounds owned by the institutions, £1,154,814; buildings, £3,335,266; apparatus, £407,471; machinery, £286,187; libraries, £386,446; miscellaneous equipment, £416,185; total, £12,280,028. The income of these institutions in 1899, exclusive of the funds received from the United States for agricultural experiment

stations, was as follows:—Interest on land-grant of 1862, £130,140; interest on other funds, £135,805; United States appropriation under Act of 1890, £233,496; State appropriation (annual or regular), £349,903; State appropriation (occasional), £126,746; tuition fees, £121,030; incidental fees, £36,947; miscellaneous, £114,690; total £1,248,757. The value of the additions to the permanent endowment and equipment of these institutions in 1899 is estimated as follows:—Permanent endowment, £294,026; buildings, £94,174; library, £24,519; apparatus, £25,188; machinery, £24,028; miscellaneous, £30,805; total, £492,740. The number of persons in the faculties of the colleges of agriculture and mechanic arts amounted to 1,984. In the other departments, the faculties aggregate 1,015, making a grand total of 2,999 persons in the faculties of the land-grant institutions. The students in 1899 numbered 33,956. Of these the numbers taking courses were—agriculture, 4,407; mechanical engineering, 3,355; civil engineering, 1,463; mining and electrical engineering, 2,038; architecture, 410; household economy, 1,573; veterinary science, 646; military tactics, 10,416. The graduates in 1899 were 2,232, and since the organisation of these institutions, 39,084. The average age of graduates in 1899 was twenty-two years two months. The total number of volumes in the libraries was 1,463,845. Of the land granted to the State under the Act of 1862 985,833 acres remain unsold.

Agricultural experiment stations are now in operation under the Act of Congress of March 2nd, 1887, in all the States and Territories. Agricultural experiments have been begun in Alaska with the aid of national funds, and an experiment station is in operation in Hawaii under private auspices. In each of the States of Alabama, Connecticut, New Jersey, and New York a separate station is maintained wholly or in part by State funds; and in Louisiana a station for sugar experiments is maintained partly by funds contributed by sugar-planters. Excluding the branch stations established in the several States, the total number of stations in the United States is 54. Of these, 52 received the appropriation provided for in the Act of Congress above-men-

tioned, amounting to about £3,000 each. The total income of the stations during 1899 was £238,195, of which £150,000 was received from the National Government, the remainder, £88,195, coming from the following sources:—State Governments, £50,063; individuals and communities, £2,521; fees for analyses of fertilisers, £15,686; sales of farm products, £14,440; miscellaneous, £5,485. In addition to this, the Office of Experiment Stations had an appropriation of £8,333 for the past fiscal year, including £2,083 for the Alaskan investigation. The value of additions to equipment of the stations in 1899 is estimated as follows:—Buildings, £5,671; libraries, £2,249; apparatus, £3,524; farm implements, £2,247; live stock, £3,389; miscellaneous, £4,692; total, £21,772.

The stations employ 678 persons in the work of administration and inquiry. The number of officers engaged in the different lines of work is as follows:—Directors, 71; chemists, 148; experts in animal husbandry, 9; agriculturists, 68; horticulturists, 77; farm foremen, 21; dairymen, 23; botanists, 52; entomologists, 48; veterinarians, 26; meteorologists, 17; biologists, 7; physicists, 7; geologists, 5; mycologists and bacteriologists, 20; irrigation engineers, 5; in charge of sub-stations, 16; secretaries and treasurers, 24; librarians 9; and clerks, 43. There are also 48 persons classified under the head "Miscellaneous," including superintendents of gardens grounds, and buildings, apiarists, herdsmen, etc. 308 station officers do more or less teaching in the colleges with which the stations are connected.

During 1899 the stations published 445 annual reports and bulletins, containing 16,924 pages. Beside regular reports and bulletins, a number of the stations issued press bulletins, which were widely reproduced in the agricultural and county papers. The mailing lists of the stations aggregate 523,970 addresses.

AGRICULTURAL EXPORTS OF THE UNITED STATES.

The average annual value of the agricultural produce exported from the United States during the five years 1895-99 amounted, according to the Customs Returns of that country, to £144,765,000. Of these exports about 88 per cent. went to European countries, the United Kingdom receiving 53·4 per cent., or nearly four times the amount sent to Germany, which ranked next in importance; France took 6·2 per cent.; and Holland, Belgium, Italy, Spain, and Denmark together received about 13 per cent. The largest market outside Europe was afforded by Canada; that country having taken 3·6 per cent., or £5,202,300.

More American farm produce is sold to the United Kingdom than to all other countries combined. During 1895-99 the average annual value of such produce sold to British customers was £77,262,900. Breadstuffs, meat products, and raw cotton form the bulk of the trade. The yearly shipments of breadstuffs averaged £23,371,500 in value; of cotton, £21,668,300; and of meat products, £17,957,500.

Among breadstuffs sent to the United Kingdom wheat and wheat flour were the chief items: the shipments of wheat in the grain amounted to £9,689,000, and those of wheat flour to £7,207,700. Indian corn, or maize, ranked next, with a value of £4,453,750; oats were shipped to the value of £928,300; and barley to the value of £454,600.

Of the meat products bacon was decidedly the most important, the average annual shipments to British ports amounting in value to £6,232,100. Next to bacon came fresh beef with a value of £4,364,200, and lard valued at £2,665,800, while the hams shipped were valued at £2,635,600. In addition to the meat products there was exportation of live stock of the annual value of £7,541,500, consisting largely of cattle for slaughter. There was also an export of dairy products worth £1,068,300 a year.

After breadstuffs, cotton, meat products, and live animals, the most important agricultural export to the British market during 1895-99 was tobacco. The shipments of this

product had an average yearly value of £1,753,300. Oilcake and meal formed an item of £697,500, and fruit and nuts one of £641,900, whilst the value of the seeds shipped was £278,500. Glucose and grape sugar worth £565,000 and hops worth £420,400 were also items of importance.

THE DAIRYING INDUSTRY OF NEW SOUTH WALES.

The quantity of butter imported into the United Kingdom from New South Wales does not at present approach in magnitude the receipts from Victoria and New Zealand, but the rapid growth of its consignments lends particular interest to certain details relating to the development of the dairying of the oldest Australian colony, which are contained in the official account of the Wealth and Progress of New South Wales. The natural characteristics of many parts of the colony, and especially the central districts, are, it is stated, very favourable to the pursuit of this branch of farming. Most of the native grasses have been found particularly suitable for dairy cattle, and the mildness of the winter season enables dairymen to avoid the heavy expense of stall feeding, as, though a certain amount of winter fodder is grown, it is given to the cattle in the fields. The area of land devoted to green food and artificially sown grasses has been largely extended during the past few years, and in March, 1899, amounted to 429,136 acres, but this acreage is still believed to be below present requirements. The number of breeding cows at the end of 1898 was estimated at 676,500, of which 416,053 were dairy cows. A comparatively large increase has taken place in the number of milking cattle, as many stock owners, principally in the neighbourhood of the coast, are turning their attention to dairying instead of fattening for market. Constant attention to the peculiarities of the climate and the needs of the inhabitants, as well as the judicious crossing of strains, is stated to have developed a breed of cows peculiar to

Australia, especially in the districts south of Sydney; but from the classification of cattle generally Shorthorns and Herefords appear to be the favourite breeds, nearly 62 per cent. of the total number belonging to these varieties. The yield of milk per cow, though naturally a very variable quantity, has been estimated at approximately 290 gallons annually, which in 1898 would give a production for the whole colony of 120,655,000 gallons. About three-fourths of this quantity was employed in making butter and cheese, principally the former, the out-turn of which has rather more than doubled in the past decade. This development has been brought about principally by the extension of the factory system, and in this connection it is interesting to note that whereas in 1890 the quantity of factory-made butter was 71,872 cwts. in 1898 it had increased to 236,808 cwts., whilst, on the other hand, the butter made on farms had decreased in the same period from 93,611 cwts. to 44,296 cwts. When the system was first introduced the factories were mostly co-operative, and the processes of cream separation and butter-making were carried on together. This arrangement is gradually dying out, and central butter factories, fed by numerous separating establishments or creameries, are taking their place, as it is found that in this way the butter produced is of more uniform quality, whilst there is a reduction in the cost of manufacture. The average quantity of milk required to make a pound of factory butter is stated to be 2·6 gallons, as compared with about 3 gallons for hand-made butter, and in addition to the economy thus effected factory butter realises from $\frac{1}{2}$ d. to 1d. per pound more in the home markets.

With regard to the export trade, the extension of the factory system led some ten years ago to a production in excess of local requirements, and in 1890 an exportation of 2,512 cwts. took place, which increased to 37,301 cwts. in 1894. In 1895 there was no export owing to the unusual severity of the season, and in 1896 the export was small. In 1897, however, the trade recovered to nearly its former figure, while in 1898 the domestic export was 79,907 and in 1899, 69,652, cwts. Later figures are not yet available, but the imports into the United Kingdom indicate that the

increase has been well maintained, the entries of New South Wales butter into British ports in the first nine months of the present year having been about $2\frac{1}{2}$ times greater than in the corresponding period of 1899.

The manufacture of cheese in the colony has not, hitherto, made so much progress as that of butter, the production, which in 1898 was 28,976 cwts., having shown rather a tendency to decline than to increase.

It is not considered probable that cheese-making will command the attention which has latterly been paid to the butter industry, as New South Wales is at a considerable disadvantage in regard to freight, distance from market, and climatic suitability when compared with Canada, which country would be its principal competitor. Some attention has been given to the manufacture of condensed milk, small quantities of which are exported, though the production does not apparently suffice for home consumption.

EXPORTS OF DAIRY PRODUCE FROM NEW ZEALAND.

The New Zealand Trade Review have recently published a summary of the exports of butter and cheese for the year ending 30th June last, together with corresponding figures for previous years. The total quantities and values of the exports for the past five seasons are as follows:

Years ending June 30th.	Butter.		Cheese.	
	Quantity.	Value.	Quantity.	Value.
	Cwts.	£	Cwts.	£
1895-6	61,945	250,885	67,262	121,993
1896-7	88,683	357,187	78,384	151,298
1897-8	97,727	404,043	69,833	136,146
1898-9	109,388	451,269	62,114	127,209
1899-1900	161,205	693,666	103,257	224,238

It will be seen that the trade of the past year showed a considerable improvement, and with regard to

the present season it is stated that the bulk of the output has already been disposed of by contract at better prices than have hitherto been secured.

Of the exports of butter about 84.4 per cent. is shipped from the North Island. In the case of cheese rather more than half the exports go from the South Island.

DAIRYING AND POULTRY REARING IN ITALY.

The manufacture of dairy produce is rapidly becoming an important industry in the northern provinces of Italy, where there are already a considerable number of co-operative dairies equipped with modern machinery and utensils. The introduction of improved methods of dairying has also been stimulated by special schools and experimental stations supported by the State, and by the inauguration of conferences. In 1895 it was estimated that the total production of butter and cheese in the kingdom amounted to 313,300 cwts. and 1,462,700 cwts. respectively. In the five years 1895-1899, the annual exports of fresh and salt butter increased from 86,800 cwts. to 126,100 cwts.; and those of cheese rose from 153,700 cwts. to 205,300 cwts. in the same period.

Poultry rearing for commerce is carried on by the peasantry all over Italy, the system of rearing being generally of a simple and primitive character, though there are a few establishments engaged in the business on a large scale. The exports of Italian live and dead poultry have almost doubled during the past ten years, and in 1899 amounted to 203,800 cwts. The exports of eggs have increased to even greater extent, the shipments last year having been 665,100 cwts. as against 300,800 cwts. in 1890. The larger portion of these goods is ultimately consigned to the United Kingdom.

[Notizie sulla agricoltura in Italia, Ministero di Agricoltura, 1900.]

POULTRY REARING IN BELGIUM.

The Consul-General of the United States who is stationed at Antwerp has supplied information to his Government on the subject of poultry-raising in Belgium, with particular reference to the "Poulet de Bruxelles," which has a widespread reputation for the succulence of its flesh.

He states that the excellence of the bird is due to the proper treatment of the sitting hen, and to the careful feeding of the young chicks until they are sufficiently developed for eating purposes. The choice of eggs for sitting purposes is considered a matter of great importance. The best breeders seldom take eggs more than eight days old, and care is taken that the eggs given to one hen are of the same age. They are kept at a very even and moderate temperature before being placed under the hen, and then they are turned daily in order to prevent the yolk, which is lighter than the white of the egg, from adhering to the shell. Eggs of an average size are also selected, the larger ones being rejected, as they often contain double yolks. Eggs which have been more or less shaken in transit are allowed to stand a day or two before being put under the hen, and great care is also taken to keep them perfectly clean.

The nest is made of straw or chopped hay, which is perfectly clean, dry, and odourless. As a rule, the sitting hen is located in quiet places where the light is subdued, and her food and water are placed within reach of the nest, in order to shorten the time that she is off the eggs.

The food given to the young chicks usually consists of hard-boiled eggs and wheat flour mixed in milk, a little water being added. To this paste is added a small onion finely cut up, together with lettuce when green food is scarce. The mixture is ordinarily quite stiff; food which is too moist is considered harmful for the young brood. After the first few days, a small quantity of whole grain is mixed into the paste; but if rapid development is desired the simple paste is continued alone. The grain given is wheat, rice, millet, buckwheat or corn, raw or cooked. Cooked potatoes are also

often given as a change of diet, and it is also customary to vary the grain diet as much as possible.

Great care is taken to keep the young brood in a dry and warm locality, in order to prevent inflammation of the intestines and similar troubles. As a rule, the birds are confined on wet days and allowed to run about as much as possible only in fine sunny weather. In winter a more generous diet is given to enable them to withstand the cold. The daily grain ration for the fowls is from $2\frac{1}{2}$ to 3 ounces.

A BELGIAN AGRICULTURAL SOCIETY.

Agricultural Societies were first established in Belgium by the Government in 1848, and in order to adapt them to more modern conditions, they were reorganised in 1889. They consist of groups of farmers whose duty is to watch over the agricultural interests of their district, and to furnish information and an annual report to the authorities. The Board have recently received from M. Paul de Vuyst, one of the Inspectors of Agriculture of the Belgian Ministry of Agriculture, an interesting report on the local agricultural society of Herzele, which is an excellent type of the more practical of these local associations. Briefly stated the work of the Herzele agricultural society has included the inauguration of agricultural experiments; co-operation in the purchase of farming requisites; the application of co-operative principles to certain branches of farming; the establishment of mutual insurance societies and credit banks, and the formation of boards of arbitration and conciliation for the settlement of disputes.

Plot and field trials, and important dairy experiments, have been conducted by the society, and a department for the control and sale of seeds has been established. The important co-operative dairy founded by the society at Borsbekeles-Alost has already been referred to in this Journal (Vol. vi.,

p. 24). It is proposed to employ the electric light machinery of the dairy for lighting the roads, and to supply electric power to the farms, in the district. A co-operative distillery, also driven by electricity, has been recently built, and a bee-keeping society is now in process of formation. The first local breeders' syndicate was founded by the society in 1892, and at the present time there are fourteen of these syndicates affiliated to the central body. The society has organised a council of arbitration for settling differences which may arise between tenants and land-owners. A branch has also been formed to deal with more purely social questions, and *inter alia* to further the work of the various sections of the Herzele society. The work of the various branch associations is supervised by the central society, and in 1899 the affiliated branches comprised eight cattle insurance societies, two co-operative societies for the purchase of agricultural requisites, a branch for the examination and sale of farm and garden seeds, four co-operative dairies, one Raiffeisen bank, one electric light society, one co-operative distillery, one experiment association, and fourteen breeder societies.

WAGES OF FARM SERVANTS IN DENMARK.

The State Statistical Bureau at Copenhagen has recently issued the results of an inquiry, undertaken in July 1898, at the request of the Ministry of Finance, into the wages and earnings of farm servants and day labourers in agriculture and forestry in 1897 in Denmark. The information now published is based on returns received from a number of employers, as well as from seventy agricultural societies in the country.

In the case of farm servants engaged by the year or half year, as distinct from day labourers, it appears that the average yearly cash wages in Denmark in 1897 were

£12 11s. 1d. for men and £7 15s. 7d. for women. Where the engagements were half-yearly the wages usually amounted to a slightly larger sum in the year than in the case of the yearly engagements. Thus for men hired by the half-year the wages for the summer season were £8 10s., and for the winter £4 4s. 5d., while for women they were £4 16s. 8d. and £3 3s. 4d. respectively. The following figures show the average annual cash wages of farm servants engaged by the year in 1897, 1892, and 1872.

	Men.			Women.		
	£.	s.	d.	£.	s.	d.
1872	7	0	0	3	16	8
1892	11	1	1	7	0	0
1897	12	11	1	7	15	7

The foregoing figures are the cash wages exclusive of the value of the servants' board. In 1897 a year's board for a man was valued at £11 19s. 1d., and for a woman at £10 18s. 1d., so that the average yearly earnings in cash wages and board were £24 10s. 2d. for males and £18 13s. 8d. for females.

In the following statement the average yearly cash wages are shown of different classes of farm servants engaged by the year in Denmark in 1897, together with the estimated value of their daily board.

Males.			Females.		
Class of Servant.	Cash Wages per Year.	Value of Board per Day.	Class of Servant.	Cash Wages per Year.	Value of Board per Day.
	£ s. d.	d.		£ s. d.	d.
Bailiffs	17 13 4	7½	Dairymaids—		
Men in charge of cattle	17 10 0	8½	Head	15 7 9	9½
Shepherds	13 12 3	7½	Ordinary	9 10 0	7½
Horsekeepers	13 5 7	7½	Milkmaids	8 16 8	7½
Wagoners	13 14 5	8½	Housekeepers	12 7 9	9½
Farm Labourers—			Cooks	8 3 4	7½
Foreman	14 2 3	7½	Housemaids	7 3 4	7½
Others	11 2 3	7½	Maids (other)	6 15 7	7
Oddmen	10 6 8	7½	General Servants	6 20 0	6½
Apprentices	8 4 5	8½			
Boys	5 18 11	6½			

It is to be noted that married men in the several classes of bailiffs, men in charge of cattle, shepherds, horsekeepers,

and foremen labourers often receive, in addition to cash wages and board, free cottages and other emoluments.

In the case of day labourers, a distinction is made between those regularly employed and casual day labourers. As a general rule, day labourers boarding themselves are chiefly found on the large farms, while on the small farms it is the practice to provide board for these labourers. In Jutland, however, it is usual to board the day-men on the large farms. Including piecework and the value of other allowances, such as free cottage, free oil, free grazing for a sheep with lamb, and cartage of coal, the average daily earnings in 1897 of a man employed in agriculture as a regular day labourer, boarding himself, were 1s. 11½d. in the spring and summer, 2s. 6d. during harvest, and 1s. 6½d. in the winter months. If boarded by the employer, his average daily earnings were 1s. 3½d., 1s. 10½d., and 10½d. respectively, according to the season.

The average daily wages in 1897 for male casual day labourers boarding themselves were 2s. 4½d. in the early spring and summer, 2s. 11½d. at harvest and 1s. 7½d. in winter; when boarded by the employers the average wages at these seasons were 1s. 6½d., 2s. 1½d., and 11½d. respectively. These figures are exclusive of the value of any other earnings in kind, but emoluments in kind apart from board are not often given to casual labourers.

Women working as permanent day labourers in agriculture in 1897 received without board 1s. 3½d. during the spring and summer, 1s. 8½d. during harvest, and 1s. 0½d. in winter. With board, their daily wages were 10d., 1s. 0½d., and 7½d. respectively. Casual female labourers, and these constitute the greater number of women engaged as day labourers, were paid 1s. 6d. in spring and summer; 1s. 10½d. at harvest, and 1s. 3d. in winter, when boarding themselves, while when boarded by the employer the average wages were 1s., 1s. 4d., and 9d. respectively at these periods.

With regard to the number of hours worked daily it appears that the actual working day, exclusive of time for meals, was generally 10½ to 11 hours' duration in summer and 9 hours in winter. In summer work starts about 5.30

or 6 a.m. and ceases about 7 p.m.; in winter work begins usually about an hour or an hour and a-half later than in summer, and ceases about one and a-half to two hours earlier, while one or both of the intervals for breakfast and tea are dropped and the mid-day meal is restricted to half an hour or an hour at the most.

DANISH BUTTER AND EGG TRADE.

The Danish Agricultural Commission at the Paris Exhibition has prepared a volume, edited by Mr. Rudolf Schou, on the development of agriculture in Denmark during the last fifty years, from which the following information has been taken.

Fifty years ago cattle breeding and dairying were of comparatively small importance in Denmark. Even then there was, however, some export of butter, that going to Great Britain being sent via Kiel and Hamburg. In those days the trade was not organized, and delivery was very irregular. Increased production and improved means of transport effected a change: the butter was delivered weekly to the merchant, who paid for it according to a quotation fixed, after 1880, by a syndicate of merchants at Copenhagen, and direct shipments were made by steamboat to England. The greater portion of the butter, and especially the better qualities, then came from estate dairies.

The formation of co-operative dairies shortly after 1880 by the peasants soon brought about a great increase in quantity, while the quality was not long in equalling that from the estate dairies. It was at this period that the Danes began to turn their chief attention from the cultivation of cereals to the production of milk. There was no longer any butter of inferior quality; nearly all the milk in the country was used for butter, and the excess of exports, which in 1875-85 had been about 200,000—260,000 cwts., rose in 1895 to 1,115,000 cwts.

The prices fixed at Copenhagen, which had previously been

taken as a basis for the regulation of accounts between producers and merchants, became of more importance, as the English buyers took the butter—free on board in Danish ports—at the prices fixed at Copenhagen.

The extension of co-operative dairies in Denmark has been very rapid. The first was founded in West Jutland in 1882; in 1898 there were 1,013, besides 260 ordinary dairies and 271 estate dairies. Statistics concerning some of these enable it to be estimated that there are on an average something like 800 cows to each co-operative dairy, the members usually having 5-7 cows each. It is also estimated that in 1898 all the dairies together treated some 440,000,000 gallons of milk, and that the butter produced amounted to 1,500,000 cwts. Many of the co-operative dairies have further joined to form co-operative societies for the sale of the butter.

The large amount of margarine, principally of native manufacture, consumed in Denmark has also been an important factor in the development of the butter trade. Denmark further imports large quantities of butter from Sweden and Russia, the inferior sorts being consumed locally, especially at Copenhagen, and the superior qualities re-shipped to England.

Great Britain takes 97-98 percent. of the butter exported from Denmark. Of this about one-sixth goes direct to Scotland, a fifth to London and the south of England, and the remainder is landed at Grimsby, Hull, and Newcastle for consumption in the great manufacturing districts and large towns of the north. More than half the butter exported from Denmark is stated to be consumed in Lancashire and Yorkshire.

Towards 1870, and until 1881, the net exportation of eggs amounted to about 40,000,000 annually. The number then rose gradually until about 1892, when it attained 140,000,000. Since 1895, however, the increase has been rapid, and the excess of exports was doubled by 1899. During this last period the shipments to London have increased eight fold, from about 6,000,000 eggs in 1895 to 48,000,000 in 1899. The greater quantity, however, still goes to the north, Scotland taking 40 per cent. of the exports, and northern and central England a similar proportion. The great increase of late years is mainly due to the co-operative society for the

export of eggs, founded in 1895, and counting, in 1899, 22,000 members throughout the country. The following interesting table shows that the recent great increase in the exports has been accompanied by a rise in price, attributed to the improvements effected in the trade:—

Years.	Price per 20 Eggs.	
	Copenhagen Market.	Export Price.
Average, 1880-'84	s. d. 1 0½	s. d. —
" 1885-'89	1 0½	—
" 1890-'95	1 1½	1 2
1895	1 2	1 1½
1896	1 1½	1 1
1897	1 1½	1 1½
1898	1 2	1 2½
1899	1 2½	1 3½

It is anticipated that the exportation of eggs from Denmark will continue to increase, and that a trade in fattened fowls will shortly be added thereto.

BEEKEEPING IN IRELAND.

The annual report of the Congested Districts Board of Ireland states that the unusually long, dry, and warm summer of 1899 was a most prosperous honey season. Many of the beekeepers in the congested districts were beginners, yet the average produce per hive was remarkably high (nearly 66½ lbs.), and owing to the rapid growth of the industry the number of hives was much larger than in any former year. The production far surpassed all previous records and the statistics show that 59,936 lbs. of honey were sold by the beekeepers who work in connection with the Board. In the previous year the production of honey was 22,225 lbs. and the average only 54½ lbs. per hive. These figures, moreover, include only one-third of the honey produced in the congested districts.

No records are available showing the progress made in the

congested districts since the Board first lent its aid to the industry, in 1893; but the returns published by the Registrar-General for each county (including the congested districts) indicate that great advance was made between 1893 and 1898, the total produce in the counties of Cork, Donegal, Galway, and Kerry, having been 29,332 lbs. in 1893, and 89,101 lbs. in 1898.

There are now 14 local bee associations in the congested districts of Ireland. The Board supplies instructors and experts, facilities for purchasing appliances at moderate prices, and a supply of bee-keeping journals.

The Board's arrangements for the sale of honey enabled the beekeepers to receive 7d. for each full-weight section of first-class honey; but not more than 4½d. for short weight, or second class sections which were injured in transit. It is intended in future to purchase and classify the honey according to quality and not by weight, inasmuch as beekeepers do not take sufficient care to pack their honey properly so as to prevent the sections from being broken, along the capping of the cells, by rough usage on the railways. The prices realised in 1899 were, consequently, much lower than they otherwise would have been. The quantity of honey purchased from beekeepers was 12½ tons in 1899 at a cost of £694. The total expenditure amounted to £780 and the receipts were £831, yielding a profit of over £50.

Strong measures were taken in 1896, 1897, and 1898 to check "foul brood." In Donegal (Ardara), and in Mayo, Kerry, and West Cork, where the disease had occurred in those years, and remedies were adopted, it reappeared in 1899, but only in one case out of every ten dealt with, and it then showed itself in so mild a form that it was stopped without killing the bees, and the important lesson was learnt that wherever an affected apiary is left for twelve months without any stocks of bees the disease does not return. In all cases where a bee-keeper allowed the Board's expert to destroy a diseased stock, another was supplied without charge; but where in a few cases permission was refused the disease spread further from these centres.

AGRICULTURAL EDUCATION IN GERMANY.

The position of agricultural education in Germany forms the subject of an article in a work on German agriculture prepared for the Paris Exhibition by Dr. H. Thiel, Director of the Ministry of Agriculture. In this it is stated that higher instruction in agriculture is provided by agricultural institutes at eight universities—viz., Breslau, Giessen, Göttingen, Halle, Kiel, Königsberg, Leipzig, and Rostock; by agricultural high schools attached to three universities—viz., Jena, Bonn, and Berlin; by the Agricultural Department of the Munich High School, and by the Agricultural Academies at Hohenheim (Württemberg), and Weißenstephan (Bavaria). The number of students at establishments of this class in Prussia amounted at the end of 1898 to 1,123. At all the higher agricultural centres an examination is held at the end of a three years' course for a certificate for teachers of agriculture. At the end of the two years' course, which is largely attended by school teachers and by agents of large landowners, there is also an examination.

Courses are also held at many of the institutes for practical farmers. These last for one week only and comprise some twenty-five to thirty lectures on agriculture, natural science, law, and other subjects which have an actual interest for practical agriculturists. The evenings are frequently given up to discussion, which provides an opportunity for the further exchange of opinions between the representatives of science and practice.

Intermediate agricultural education is provided by sixteen agricultural schools in Prussia, which have about 2,000 scholars. They are intended to provide the sons of well-to-do farmers with instruction of a technical as well as a general character. The schools are not State schools, but receive grants from the State and certain corporate bodies. Besides the above there are six schools of a similar character in other parts of Germany.

Elementary agricultural education in Germany includes the instruction given in farm-schools (comprising both theory and practice) and schools for purely theoretical

instruction; these latter being subdivided into schools with both winter and summer courses and winter schools. The instruction in these schools is intended to spread technical knowledge among the peasant class, for the education of future farm-bailiffs, etc., and to provide instruction for town students who are desirous of devoting themselves to agriculture. The farm-schools have a course of $1\frac{1}{2}$ to 2 years and the winter schools of two terms. There are in Prussia, 26 farm-schools with about 1,000 scholars; 5 in Bavaria, 3 in Saxony, 2 in Weimar, and 6 others in different States, making a total of 42 for the whole of Germany. Of winter schools there are in Prussia 118 (with 4,000 students), 21 in Bavaria, 12 in Baden, 9 in Hesse, 8 in Württemberg, 6 in Saxony, 4 in Oldenburg, 10 in Alsace Lorraine and 7 elsewhere; or a total of 195 for the whole of Germany.

Besides these educational establishments of a general character, mention may be made of a number of schools for instruction in special subjects; such as management of grass land, gardening and fruit culture, dairying, domestic economy, farriery, bee-keeping, cattle-breeding, book-keeping, distilling and brewing, as well as rural continuation schools. Numerous travelling teachers, supported by agricultural unions or chambers, visit the smaller districts and give advice and information to the peasants.

CULTIVATION OF GRAIN IN GERMANY.

The report published by the Foreign Office on the trade of Germany for the year 1899 (Annual Series, No. 2523) alludes to the cultivation of cereals in that country. As compared with 1893, the area under wheat and rye in 1899 shows a decline; and in spite of an increase in population amounting to $8\frac{1}{2}$ per cent.—i.e., from 50,750,000 to 55,000,000—the cultivation of cereals has not kept pace with the requirements of the population.

Mr. Consul-General Schwabach, commenting on this subject, mentions that since the reimbursement of the duty

on corn without reference to the country of origin Germany has become an exchange for cereals. The imports, however, greatly exceed the exports; and although there is an ever-increasing demand for foreign wheat, there is a customs duty of 35 marks per 1,000 kilos (7s. 7d. per quarter).

Complaints are made that the prices obtained for home-grown wheat have for some time past been comparatively low. One reason for this Mr. Schwabach considers to be that the wheat grown in Saxony especially consists largely of English varieties, or of their progeny, which have replaced the German kinds on account of their being much more prolific. But these English sorts, although otherwise of excellent quality, are stated to be deficient in gluten; the consequence of which is that bakers have to mix other flour with it, and it is thus not so highly valued as foreign wheat, while a good deal of it is exported.

Mr. Schwabach thinks that a further cause of the low prices of inland wheat has probably been the suspension of the Berlin Produce Exchange, and the consequent diminution of enterprise and speculation in grain.

AGRICULTURE IN ICELAND.

The Foreign Office have recently issued a report relating to the trade of Iceland during the period 1897-99, and Mr. Vidalin, H.M. Consul at Reykjavik, gives the following information regarding the agriculture of the island.

The number of farm animals in 1897 was:—Cattle, 23,109; sheep, 754,115; and ponies, 42,470; the gross value of the stock being estimated at £568,000. The yield of hay, which is the only farm crop raised in Iceland, was nearly 170,000 tons, of which 110,000 tons were from grass grown on uncultivated land and the remainder was obtained from 44,100 acres of pasture and irrigated meadows. There is a small area under kitchen gardens.

Great progress appears to have taken place during the last few years in levelling, breaking up, and draining the

land, and in the erection of fences round the farmyards. The agricultural prosperity of Iceland has nevertheless greatly decreased since the closing of the British market for live sheep, and farmers have great difficulty in paying the mortgages on their land.

The value of exports to Great Britain fell from £152,000 in 1895 to £125,000 in 1897. Efforts are being made to find new markets, and shipments of live sheep have been sent to France and Belgium, but with unsuccessful results. The duties levied in France on imported live sheep are so high, that although the animals fetch better prices there it is more remunerative to send the sheep to England for slaughter. The number of sheep officially returned as exported from Iceland in 1897 was 26,181 to Great Britain, and 1,170 to other countries.

Wool is sent principally to Great Britain, Denmark, and to some extent to Norway. The wool exported to Denmark mostly goes to England, but last year, owing to the low prices prevailing in England, a good deal was sent to Poland, Germany, and Norway. The value of the wool exported in 1897 amounted to £53,000; viz., £37,000 to Denmark, £13,000 to Great Britain, and £13,000 to Norway and Sweden.

[Foreign Office Report, Annual Series, No. 2530. Price 1½d.]

BELGIAN BUTTER AND MARGARINE REGULATIONS.

A royal decree has been published, dated 31st October, 1900, containing regulations for carrying into effect the provisions of the Belgian Margarine Law of 4th May last*, which comes into force on the 1st January, 1901.

Margarine intended for sale must be mixed, in course of churning, with at least 50 parts of sesame oil, and at least one part of dehydrated potato starch for every 1,000 parts of fats and oils employed in its manufacture.

* Journal of the Board of Agriculture, Vol. VII., June, 1900, p. 71.

Margarine sold wholesale must be in receptacles surrounded by a bright red band 2—4 inches wide, with "Margarine" in black letters on every face, or, if the receptacle has a continuous curved surface, the word must be repeated four times, so as to be visible in every position.

Regulations are also laid down for the determination of abnormal butter, which may not be sold. Abnormal butter is defined as butter which cannot with certainty be declared adulterated, spoiled, or rancid, but which gives at least two peculiar results in six specified tests.

Vendors of margarine may not use the words milk, butter, cream, or derivatives of these words, on their packages, nor any designs or illustrations recalling anything connected with the milk or butter industry. Butter containing more than 18 per cent. of substances (water, lactose, casein) other than fatty and colouring matters and salt can only be sold as "Milky Butter." Butter and margarine made with milk of which the sale is prohibited, or with the addition of antiseptics or glycerine, are considered injurious and may not be sold. This applies also to margarine (in so far as it is prepared from fats of butcher's meat) which has not been made or imported in conformity with the provisions regulating the meat trade.

The "Cape of Good Hope Government Gazette" of 21st September last publishes the following **Regulations for the Importation of Horses into Cape Colony.** regulations relating to the examination for glanders and quarantine of horses, mules, or asses introduced by sea into the Colony, for the disease known as "glanders":—

1. No horses, mules or asses shall be allowed to enter the Colony by sea, until they have been examined by an officer, authorised by the Government to make examinations under the provisions of the "Animals Diseases Act, No. 27 of 1893," and have been certified by him to be free from glanders, or any other infectious or contagious disease.

2. Should the examining officer detect the presence of

glanders in any of the animals on board, all such affected animals shall be immediately killed, and their carcasses taken out to sea, sufficiently and properly weighted, and thrown overboard at a place indicated by the port authorities.

3. The remaining portion of any such shipment shall be allowed to be landed only on condition that they are removed to a quarantine station, approved of by the Government, and there subjected to a test with mallein by a duly qualified officer, under direction of a Government veterinary surgeon, and detained for such further period as may be necessary.

4. In the event of the test indicating the existence of glanders, all animals so shown to be affected shall also be destroyed.

5. All expenses of inspection, quarantine, destruction and otherwise shall be borne by the owner of such animals.

The Board of Agriculture have received a notification from the Foreign Office that by a decree, **Importation of British Hams into Italy.** which came into force on September 18th last, the importation into Italy of swine flesh, salted, smoked, or otherwise prepared for keeping, is permitted from the United Kingdom, provided it be accompanied by a sanitary certificate of the authorities of its place of origin.

The returns of the numbers of live stock in Queensland in 1899 showed a diminution in all classes of animals except pigs. This decline was particularly marked in sheep, which numbered 15,226,000 as compared with 17,553,000 in 1898, the number recorded last year being the lowest returned since 1889. In the case of cattle there was a decrease of 517,000 head, the number returned being 5,054,000. This also is the lowest return for horned stock recorded during

the ten years ended with 1899. Drought is said to be the principal cause for this contraction in the flocks and herds of the Colony. From 1898 onwards a state of drought prevailed throughout Queensland, and in the western districts there had been no improvement up to July of the current year. The net exports of live cattle and sheep in 1899 amounted to 188,000 and 263,000 head respectively; in addition 386,000 cattle and 480,000 sheep were preserved, frozen, or boiled down, while 254,000 cattle and 1,018,000 sheep were killed for food for home consumption. Forty-seven establishments were in operation in 1899 for the treatment of animal products, viz.:—13 meat preserving works, 25 boiling down and extract factories, and 9 bacon-curing factories. The quantity of meat extract produced in 1899 was 1,925,000 lbs; of tallow the output was 19,200 tons; of lard 222,000 lbs, and of edible fats 985,000 lbs. The wool clip amounted to 70,896,000 lbs. as compared with 86,589,000 lbs. in 1898. Bacon factories are stated to have made pig-keeping more profitable than formerly, and the number of swine returned in the past year, 139,000, is the largest yet recorded in Queensland.

In the report of H.M. Consul-General at Odessa, recently received at the Foreign Office, it is stated that the demand for agricultural machinery is increasing each season in the district of Theodosia, and during last spring about fifteen sets of steam threshing machines were sold, most of which were supplied by German makers. Hitherto this kind of machinery has been supplied almost entirely by British makers, as German machines were not suited to the country, but during the last two years German manufacturers have been copying those of the British makers, and in order to push their own goods on the market have sold them somewhat cheaper. For instance, in 1899 British makers increased their prices over those of the previous year by about seven per cent., whereas the German

Demand for Agricultural Machinery in South Russia.

makers have been selling at 1898 prices. Binders and reapers of American make are also being introduced, and a fair business has been done in this kind of machinery. The manual delivery reaper of Russian make is still, however, most in demand.

[Foreign Office Report, Annual Series, No. 2,522, Price 7d.]

The British Commercial Agent in Russia reports that according to official information to 14 September, 1900, the current year's beetroot crop in European Russia is estimated at 7,495,565 tons, against 7,026,513 tons in 1899, or an expected total increase of 6.7 per cent. on last year's crop. The area planted was 1,320,000 acres as compared with 1,208,000 acres in 1899. The quality of the crop in the majority of the districts is described as above the average.

H.M. Consul-General at Warsaw reports to the Foreign Office that land in Poland continued to rise in price throughout 1900. The industrial crisis and diminished confidence in industrial investments are stated to be the cause, as those who in ordinary circumstances would have invested their money in shares have preferred to buy land. A further reason for the rise is the continued parcelling up of large estates into small lots and their subsequent purchase by peasants.

Land and Labour in Poland.

The scarcity of farm labour, which had been a very serious drawback to agriculturists during the last few years, and had forced the latter to replace hand labour by machinery, was less felt in Poland in 1900 than for some time past. This was brought about by the great depression in all branches of industry, with the natural consequence that a great number of workmen were discharged and resumed agricultural work. In Lithuania the scarcity was, however, as much felt as in previous years. Besides the attraction of labourers to

factories, the chief causes of this scarcity are emigration to Siberia and America, and temporary migration during the summer months to Germany, where the rates of pay are higher.

The number of agricultural co-operative societies in Germany in the middle of this year was 13,636, including 9,793 agricultural banks, 1,115 co-operative purchase societies, 1,917 dairy societies, and 811 of other descriptions. To this total Prussia contributed 7,213, Bavaria 2,716, Wurtemberg 1,055, Hesse 646, Baden 511, and Alsace-Lorraine 409. The increase which has taken place in the number of these societies in recent years is very noticeable. In 1893 the number was 4,979; in 1896, three years later, it had increased to 8,986, and in 1899, after the same interval, it was 12,736, whilst, as has been stated, it was 13,636 in 1900.

[*Wiener Landwirtschaftliche Zeitung.*]

The comparative value of rape and clover for young growing pigs has been the subject of experiment at the Wisconsin Experiment Station. Two lots of pigs, each containing 21 pure-bred and high-grade Berkshires and Poland-Chinas, were selected for the test, the animals averaging a little over 100 lbs. each in weight when the test began. Both lots were given a grain ration of one part middlings and two parts maize meal with water. The pigs in Lot 1 were also turned into a field of rape, while those of Lot 2 were pastured on clover. The former were somewhat slow acquiring a taste for the rape, but at the end of a week of preliminary feeding they ate it greedily. The experiment covered four periods of two weeks each, and during the time the pigs in Lot 1 ate the rape from about

three-quarters of an acre. The average daily gain from Lot 1 was 1.27 lbs. and 1.22 lbs. from Lot 2. From the results of the experiment, which have been carried out for two years in succession, it is concluded that farmers feeding a large number of pigs cannot provide a better pasture for their sows and young pigs than by sowing small plots of rape at successive periods about three weeks apart during the spring and early summer.

Inquiries have been conducted, both by the Californian and by the New York Experiment Stations in reference to some complaints as to the unreliability of Paris Green as an insecticide, and the conclusions arrived at were reported in a recent number of the United States Experiment Station Record. Paris Green, it is stated, proved satisfactory when a standard quality was used, and its unreliability appeared to arise from adulteration; for instance, it was found that white powders, such as gypsum or flour, had sometimes been added to increase the weight, whilst in Paris Green of low quality there was a considerable percentage of free or arsenious oxide, which was injurious to foliage, and which rendered the substance dangerous and worthless as an insecticide. The standard recommended by the Californian Station requires that the sample shall only show a trace of foreign matter under the microscope; that the total combined non-soluble arsenious oxide shall exceed 50 per cent.; and that the sample shall contain practically no free arsenic or other soluble arsenical compound. The addition of lime to the water in which Paris Green is mixed was found to render insoluble the free arsenic which was present, in cases where the quantity of this substance was not large.

The conditions necessary for the thorough pasteurisation of milk and cream for direct consumption were first worked out for the United States at the Wisconsin Experiment Station by the development of suitable apparatus for the intermittent treatment of milk and cream. This permitted a satisfactory pasteurisation from the hygienic standpoint, and set the standard for American conditions. The viscosity of cream is materially lessened when treated by heat during pasteurisation, and the result is a thin cream unsatisfactory to the user. It was shown that this viscosity can be restored by the addition of a minute quantity of sucrate of lime.

Her Majesty's Consul General at Odessa is of opinion that the importation of thoroughbred animals of all kinds into Russia would be likely to receive encouragement from the Russian Government, and that high officials in the various public departments concerned would further the enterprise in order to help to raise the standard of native cattle. The Imperial Agricultural Society of Moscow endeavours to teach farmers the necessity of improving their stock, and exhibitions are held in various parts of the Russian Empire. The auctions which take place at these exhibitions would appear to offer good opportunities for the profitable sale of improved pedigree cattle, and English stock is held in high estimation in Russia.

[Foreign Office Report, Annual Series, No. 2,522. Price 7d.]

According to the *New York Journal of Commerce* of 2nd October last the Government of Chile has set aside the sum of £4,000 for the President of the National Society of Agriculture for the purchase in foreign markets of agricultural machinery, and its sale at cost price

to the members of the society. An excellent opportunity for manufacturers of such machinery and implements is thus afforded to introduce their wares to advantage. This experiment on the part of the Government may lead to the development of trade, and, if successful, it will be taken up in all probability on a larger scale. It would be advisable for manufacturers of agricultural machinery to send catalogues, with prices, etc., in Spanish, to the Presidente de la Sociedad Nacional de Agricultura, Santiago, Chile.

[Board of Trade Journal.]

According to a report of the French Consul at Basle, published in the *Moniteur Officiel du Commerce* of the 11th Nov., the busiest period for the cheese market (Emmenthal and Gruyère) is the last fortnight in August. Business has been somewhat retarded this year by the demands of the sellers, who, in spite of the abundant production, expected to maintain last year's prices, viz., 60s. to 63s. per cwt. After some delay the cheese was put on the markets of Berne and Lucerne at these rates with the usual discount. Emmenthal cheeses made during the past summer are now largely sold on these conditions. But these prices are only attained by the first sales. The second sales, which generally represent one-fourth, if not more, of the total production, fetch a lower price. The value of the export of cheese from Switzerland rose from £1,531,000 in 1897 to £1,574,000 in 1898 and to £1,607,000 in 1899. The principal markets are France, Germany, Italy, and the United States.

The "New Zealand Trade Review" of 29th September last provides the following figures of the exports of hemp from that Colony since 1895:—

**New Zealand's
Hemp Exports.**

Countries.	1895.	1896.	1897.	1898.	1899.	First Six Months of 1900.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
United Kingdom -	652	1,405	1,076	2,448	7,866	—
Australia -	1,049	1,256	1,376	1,809	1,563	—
United States -	105	307	317	571	852	—
Other Countries -	—	—	—	22	90	—
Total -	1,806	2,968	2,769	4,850	10,371	10,726

The exports for the first six months of 1900 exceeded those for the entire year 1899, and were higher in proportion than any of the last ten years. The returns for 1900 do not furnish particulars of countries of destination. The exports for the last half of 1900 will, it is anticipated, fall far short of those of the first half.

The cultivation of fruit in the Caucasus forms an important branch of the farming industry of the country, and abundant crops are produced. The climate is said to be specially adapted for cherries, apples, pears, figs, peaches, grapes, strawberries, and nuts.

**Fruit and Dairy
Farming in the
Caucasus.**

H.M. Consul at Batoum is of opinion that with a certain amount of diligence fruit growing might become a profitable undertaking in the Caucasus, the demand in Northern Russia being very great, and high prices paid for fresh fruit of good quality.

Dairy farming is another branch which is also capable of development. Butter, cheese, and other Caucasian dairy products are of such inferior quality that no ready sale is found, except among the peasants. Pasture being abundant and

fodder cheap, good milch cows could probably be reared with out much difficulty, but sound and healthy cattle would have to be introduced from other parts of the Empire for the purpose of improving the breed of the Caucasus, which has greatly deteriorated.

[Foreign Office Report, Annual Series No. 2,534. Price 1d.]

REPORTS ON FOREIGN CROPS.

CROPS IN THE UNITED STATES.

The preliminary figures published in the *Crop Reporter* for November, by the United States Department of Agriculture, relating to the yield per acre of some of the principal crops in 1900, taken in conjunction with the preliminary figures of acreage, issued earlier in the year, enable an approximate estimate to be made of the total production of maize, oats, and barley, in that country.

The yield of maize is estimated at 25.3 bushels, which on an area of about 83,309,000 acres would indicate a total production of 2,108,000,000 bushels, as compared with 2,078,000,000 bushels in 1899.

The yield of oats is put at 29.6 bushels per acre, against 26.2 bushels for the previous ten years, which, calculated for an area of 27,369,000 acres, represents a production of about 810,000,000 bushels. In 1899 the production amounted to 796,000,000 bushels.

Barley is estimated to have yielded only 20.4 bushels, the lowest figure with one exception since 1887, the average for the past ten years having been 23.3 bushels. The area under this cereal was reported to be 2,895,000 acres, which should produce about 59,000,000 bushels, as compared with over 73,000,000 bushels in 1899.

The area under winter wheat was reported to be 24,908,000 acres, and of spring wheat 18,668,000, or a total of 43,576,000 acres, which is rather over a million acres less than in 1899.

The expectation of a very exceptional apple crop has not been fully realized, though nine out of the 14 States having

three million apple-trees and upwards in bearing at the date of the last census have reported a production in excess of the ten years' average.

There has also been a large production of pears, California alone, out of the ten principal pear-producing States, failing to report a crop in excess of the ten years' average.

CROPS IN RUSSIA.

Her Majesty's Consul-General at St. Petersburg has forwarded through the Foreign Office a summary translation of a report issued by the Rural Statistical Section of the Russian Ministry of Agriculture on the grain harvest of European Russia for the current year. The report, which is based upon replies received from 7,100 agricultural correspondents, states that the general grain harvest in European Russia must be estimated as below the average. As regards winter-sown grain the yield of rye was slightly above, while that of wheat was considerably below, the average. The best crops of rye were secured within the zone of its more general cultivation, namely, in the central agricultural and Mid-Volga provinces; at the same time unsatisfactory returns of this grain were obtained in Bessarabia, Kherson, the Taurida, and the South-Western provinces.

The region of unsatisfactory rye crops, from 50 to 75 per cent. of the average, embraced 49 districts of 21 provinces. In 67 districts of 27 provinces this crop was below the average from 75 to 90 per cent. In the other parts of European Russia the rye crop was satisfactory, proving even good in the central agricultural zone.

Winter-sown wheat, on the contrary, yielded a bad harvest in those localities in which wheat forms the main object of cultivation, *i.e.*, in the South-Western and New Russia regions. Good crops of it were, however, obtained in the central agricultural provinces, and in some parts they were better than those of rye.

The yield of spring-sown grain is estimated as approaching

the average. Poor crops were gathered in Bessarabia, Kher-son, the Taurida, Podolia, and Kieff, in consequence of prolonged drought. On the other hand, these crops proved completely satisfactory in the Cis-Ural and Cis-Volga provinces.

On the basis of the trial threshings the yield of the grain crops in 1900 throughout European Russia, inclusive also of the Northern Caucasus and Poland, is estimated as follows. The figures for 1899 have been added for purposes of comparison.

	1900. Cwts.	1900. Quarters.	1899. Quarters.
Wheat	173,479,000	= 40,479,000	46,449,000
Rye	415,251,000	= 96,892,000	96,841,000
Barley	91,980,000	= 25,754,000	27,023,000
Oats	221,921,000	= 79,664,000	84,021,000

The *Trade and Industries Gazette*, in publishing the above figures, furnishes the estimates for the 50 Governments of European Russia, Poland, and the Caucasus separately. These estimates are reproduced below:—

Crop.	50 Governments of European Russia.	Poland.	Caucasus.	Total for 63 Govern- ments.
	Qrs.	Qrs.	Qrs.	Qrs.
Wheat, winter	7,953,000	1,935,000	3,643,000	13,531,000
Wheat, spring	25,338,000	—	1,610,000	26,948,000
Rye	89,425,000	6,798,000	669,000	96,892,000
Barley	21,706,000	1,899,000	2,149,000	25,754,000
Oats	73,015,000	5,004,000	1,645,000	79,664,000

In a later despatch the Consul-General states that the Central Statistical Committee of the Ministry of the Interior have also issued an estimate of the results of this year's harvest. The estimates for the 63 Governments of European Russia, Poland, and the Caucasus are for wheat, 49,410,000 quarters; rye, 105,127,000; barley, 27,855,000; and oats, 83,262,000 quarters.

CROPS IN HUNGARY.

The preliminary official estimates of the results of the Hungarian harvest of 1900 have been published in the *Wiener*

Landwirthschaftliche Zeitung. They indicate that the total yield of wheat this year in Hungary, including Croatia and Slavonia, amounted to 18,197,600 quarters from an acreage of 8,342,800 acres, and that rye, on an area of 2,551,000 acres, yielded about 4,615,250 quarters. The areas devoted to oats and barley are estimated to have been 2,595,800 acres and 2,632,000 acres respectively, from which the production is estimated at 7,917,000 quarters in the case of oats and 6,636,000 quarters in the case of barley.

CROPS IN ITALY.

According to the official preliminary estimates issued by the Ministry of Agriculture at Rome, the production of wheat in Italy this year amounted to 14,506,000 quarters, as compared with 16,706,000 quarters in 1899.

WHEAT CROP IN ARGENTINA IN 1899-1900.

The Argentine Ministry of Agriculture have published the official estimates of the yield of wheat for the season of 1899-1900, from which it appears that the area sown was 7,904,000 acres, as compared with 7,503,000 acres in the preceding year. The production is estimated to have been 2,653,000 tons in the four provinces of Buenos Ayres, Santa Fé, Cordoba, and Entre Rios, and 59,000 tons in the other provinces, making a total yield of 2,712,000 tons, as compared with an estimated total yield of 2,811,000 tons in 1898-99. The quantity required for home consumption and seed is put at 856,000 tons, thus leaving 1,856,000 tons available for exportation.

According to a statement published in the *Buenos Ayres Standard* of 29th October last, the area sown with wheat this season (1900-1901), in Argentina, is officially estimated at 8,358,000 acres.

CROPS IN THE NORTH-WEST TERRITORIES.

The annual report of the Department of Agriculture of the North-West Territories of Canada for the year 1899 gives the estimated area and yield of certain crops in 1898 and 1899. These statistics were collected for the first time in 1898, and are based upon returns furnished by the owners of threshing machines. The results are given in the following table :—

	Area.		Production.	
	1898.	1899.	1898.	1899.
	Acres.	Acres.	Bushels.	Bushels.
Wheat	307,580	363,523	5,542,478	6,915,663
Oats	105,077	134,938	3,316,259	4,686,036
Barley	17,092	14,276	449,512	337,421

The yield of wheat during the past year was about 19 bushels per acre, or about 1 bushel per acre more than in 1898, whilst oats yielded about 34½ bushels in 1899 as compared with 31½ bushels in the preceding year. The figures only refer to the grain actually threshed, and do not include areas which were sown, but which proved unproductive from excessive moisture, frost or hail.

THE NEW ZEALAND HARVEST OF 1899-1900.

The Agricultural Department of New Zealand have now published corrected returns of the yield of grain from the recent harvest. The figures relating to wheat and oats, together with those of previous years, are shown in the following table :—

Year.	Wheat.		Oats.	
	Area.	Yield.	Area.	Yield.
	Acres.	Bushels.	Acres.	Bushels.
1899-1900	269,749	8,581,898	398,243	16,325,832
1898-1899	399,034	13,073,416	417,320	16,511,388
1897-1898	315,801	5,670,017	354,819	9,738,391
1896-1897	258,608	5,926,523	372,597	11,232,803

The yield of wheat, though less than that of 1899, is substantially above that of previous recent years, and with the surplus left from the last harvest, will, it is stated, furnish a considerable balance available for export. The quantity which the Department estimate is required for seed and home consumption is 5,354,000 bushels, and the apparent surplus available for export is calculated to be over 7 million bushels. The actual quantity exported in the year ended 31st March last was 3,354,000 bushels of wheat and 3,300 tons of flour. The yield of oats is nearly as great as the heavy crop of the previous year, of which 4,647,476 bushels were exported in the year 1899-1900. The yield of barley was 1,585,145 bushels, and of maize 669,896 bushels.

CROPS IN ROUMANIA.

In the *Buletin Statistic al României* the Roumanian Ministry of Agriculture have published preliminary estimates of the area and production of the principal crops in that country for the current year. The figures are given in the table below, together with those of the previous two years :—

Year.	Wheat.		Barley.		Rye.		Oats.	
	Area.	Production.	Area.	Production.	Area.	Production.	Area.	Production.
	Acres.	Bushels.	Acres.	Bushels.	Acres.	Bushels.	Acres.	Bushels.
1900.	3,927,251	54,717,867	1,086,145	14,124,553	405,829	5,602,291	629,433	8,415,473
1899.	4,103,559	55,258,550	1,577,515	4,402,530	467,070	1,026,925	766,419	6,062,128
1898.	3,500,392	56,659,275	1,617,480	4,739,700	478,928	7,392,825	755,007	16,872,073

It will be remembered that the Roumanian harvest of 1899 was practically a failure, and though this fortunately has been followed by more encouraging results this season, yet compared with the estimates for 1898 the crops harvested were, except in the case of wheat, considerably short of the yields of the former year.

A better criterion of the results of the year's harvest is

afforded by a comparison with the estimated areas and yield of the five years 1895-9.

Crop.	Area.		Production.	
	1900.	1895-99.	1900.	1895-99.
	Acres.	Acres.	Bushels.	Bushels.
Wheat	3,927,300	3,780,700	54,717,900	50,521,900
Rye	405,800	528,200	5,802,300	7,342,200
Barley	1,086,100	1,546,800	14,124,600	21,242,500
Oats	629,400	719,600	8,415,500	11,360,200
Colza	616,100	116,500	7,467,100	1,278,600
Linseed	32,700	—	251,800	—

It will be seen from the above figures that the yield of wheat in the present year has exceeded the average by about 4,196,000 bushels, whilst that of rye shows a diminution of 1,540,000 bushels. Barley and oats have also yielded a crop inferior in point of quantity by 7,118,000 bushels in the case of barley and 2,945,000 bushels in the case of oats. The return obtained from colza, or rape, exhibits a large augmentation in production, chiefly due to a great extension of the area devoted to this crop in 1900. The remunerative price at which colza has been sold is said to have led to some amelioration of the financial conditions caused by the failure of last year's harvest.

THE FRENCH HARVEST OF 1900.

The official preliminary estimate of the yields of the principal grain crops in France in 1900 have been recently published in the *Journal Officiel*, and the following table shows the figures in English equivalents together with the corresponding estimates for the previous year.

Crop.	Area.		Production.	
	1899.	1900.	1899.	1900.
	Acres.	Acres.	Bushels.	Bushels.
Wheat	17,142,300	16,642,800	353,152,000	299,821,400
Mixed Corn	553,400	568,100	10,866,600	10,265,200
Rye	3,677,600	3,647,500	64,836,800	61,581,600
Barley	1,991,500	2,070,800	43,905,900	42,264,600
Oats	9,730,100	9,799,600	262,078,600	245,062,600

PARLIAMENTARY PUBLICATIONS.

Report of the Commissioners of National Education in Ireland, 1899-1900 [Cd. 285]. Price 4d.

The Commissioners, in reporting as to the position of agricultural education, state that 80,472 pupils were examined in agriculture in the ordinary national schools in Ireland, and that 53,297 passed. Instruction in the theory of agriculture, for which ordinary results fees are payable, is compulsory in the 4th, 5th, and 6th classes in all rural schools conducted by masters in Ireland; but it is optional in the case of girls' schools where the teacher is qualified to give instruction.

There were 38 school farms in connection with national schools in 1899. The boys in the advanced classes in these schools are examined in the practice as well as the theory of agriculture, and special fees are paid on the proficiency of the pupils, and on the satisfactory state of the farm. The total number of pupils examined in practical agriculture was 690, of whom 590 passed. In 32 of these schools payments were made to the pupils of agricultural classes for working on the small farms or gardens, under the direction of the teachers, assisted by agricultural monitors. There were 116 schools with gardens attached, for the management of which, and for the practical knowledge displayed by the pupils, special fees are also granted.

The number of students of all classes attending the Albert Agricultural Institution at Glasnevin in 1898-9 was 377. All the pupils of the Institution, male and female, received

full instruction in creamery and ordinary dairy management. At the Munster Institution, Cork, the number of students in attendance in 1899 was 144. The progress in itinerant dairy instruction is reported to have been satisfactory.

Agricultural Statistics, Ireland, 1900.—Report on Migratory Agricultural Labourers. [Cd. 341.] Price 6½d.

For some years past the number of Irish migratory agricultural labourers returned as habitually seeking employment at a distance from their homes has exhibited a tendency to increase, although the numbers are not now so great as they were twenty years ago. A minimum of 11,723 appears to have been reached in 1888, since when there has been a gradual rise, and in 1900 the number recorded was 19,022, as compared with 18,910 in 1899.

Of the total in 1900 more than four-fifths, viz., 15,878, came from the province of Connaught, Mayo alone furnishing 10,331, or over half the entire number, and this county appears always to have contributed the largest quota. The numbers from the other counties of Connaught were as follows: Galway, 2,231; Roscommon, 2,060; Sligo, 972; and Leitrim, 284. Outside this province, Donegal, whence 2,204 labourers migrated, was the only county contributing in any material degree to the total. The whole of Ulster furnished 2,586, Munster 469, and Leinster but 89 migratory labourers. Compared with 1899, Munster shows a relatively large increase of 150 (47 per cent.), and Ulster a decline of 348 (12 per cent.)

Expressed as a proportion of the population, it appears that the migratory labourers amounted to 4 per 1,000 of the whole number of persons in Ireland; while in Mayo the ratio was as much as 47, in Roscommon 17.7, in Donegal 12, in Galway and Sligo between 10 and 11 per 1,000. Compared with the adult male population, however, the proportion migrating was 15 per 1,000 for the whole of Ireland; and 198.5 per 1,000, or just one fifth of the adult males, in Mayo.

The majority of these migratory labourers, viz., 15,122, shipped to England; 3,614 went to Scotland, the remainder

seeking work in other counties of Ireland. As a rule, these labourers do not go north of Perth and Forfar in Scotland, or south of Warwick and Northampton in England, although a certain number are also to be found in Hertfordshire and Middlesex. Many men, of course, go to several counties in succession.

Ireland.—Abstracts showing the Acreage under Crops, and the number of Live Stock in 1899-1900. [Cd. 339.] Price. 1½d.

This publication gives the preliminary returns of the acreage devoted to the various crops in Ireland in 1900, together with the number of live stock, and the table reproduced below enables a comparison to be made with the preceding four years.

CROPS.	1896.	1897.	1898.	1899.	1900.
	Acre.	Acre.	Acre.	Acre.	Acre.
Wheat	38,019	47,235	52,798	51,866	53,797
Oats	1,193,587	1,175,118	1,165,359	1,135,536	1,104,848
Barley	173,032	170,504	159,012	169,469	174,006
Bere and Rye	14,008	13,206	12,538	12,322	11,568
Beans and Pease	2,090	1,817	2,247	2,415	2,739
Potatoes	705,665	677,216	664,864	662,914	654,413
Turnips	308,471	308,066	306,929	301,449	297,395
Mangel Wurzel and Beet Root	54,301	54,649	55,955	62,714	68,838
Cabbage	44,198	40,597	44,285	41,671	40,900
Vetches and Rape	10,114	0,045	6,254	7,038	7,553
Carrots, Parsnips, and other Green Crops	24,774	24,974	24,680	23,355	27,272
Flax	72,253	45,537	14,460	54,989	47,327
Meadow and Clover { Clover, Sainfoin, and Grasses under Rotation.	659,071	647,128	652,040	624,163	607,367
Permanent Pasture or Grass not broken up in Rotation.	1,547,353	1,539,014	1,520,430	1,494,744	1,558,054
Total Area under Crops	4,843,220	4,745,006	4,704,860	4,627,545	4,658,607

With regard to live stock, the number of cattle in Ireland has been steadily rising for some years past, and a further increase of 100,986 head took place in 1900, making a total of 4,608,443. Most of this increase took place amongst cattle

under two years old, but the number of milch cows rose by 14,275 head to 1,458,130, which was higher than in any year since 1879. The number of sheep in 1900 was 4,386,697, an increase of 22,190 over the figure of 1899, whilst pigs showed a decrease of 94,836 to 1,268,474, and poultry an increase of 313,568 to 18,547,088 head.

Inland Revenue.—Forty-third Report of the Commissioners of Her Majesty's Inland Revenue for the year ended 31st March, 1900. [Cd. 347.] Price, 1s. 7½d.

The report of the Commissioners of Inland Revenue for the year ended 31st March, 1900, shows that the total net receipts from the Inland Revenue amounted to £85,218,234, of which £9,765,394, arising from excise and death duties, was allocated to the local taxation accounts, and the remainder to the Exchequer. The total net receipts were made up from the following sources: Excise, £37,074,118; stamps, £8,429,471; land tax, £739,493; inhabited house duty, £1,698,523; income-tax, £18,867,336; and death duties, £18,409,293; and they show an increase, compared with 1899, of £6,940,607.

The report deals chiefly with the sources of the revenue but amongst other information a table is given, showing the sums allocated to the local taxation accounts in each year since 1891. From this table it appears that since that year the sum taken annually from the Inland Revenue for the relief of local taxation has risen from £6,868,218 to £9,765,394.

The gross assessment on lands (including Tithe Rent-charges, etc.) under Schedule A. amounted in 1898-99 for the United Kingdom to £53,011,086, a decrease of £926,000 from that of the previous year. For lands in England and Wales, exclusive of the Metropolis, the assessment was £37,296,350, as compared with £38,142,515 in 1897-98. The gross assessment under Schedule B. (profits derived from the occupation of lands) for the United Kingdom in 1898-99, was £17,632,032, a decrease of £658,796 from that of 1897-98.

PRICES OF LIVE STOCK.

RETURNED UNDER THE WEIGHING OF CATTLE ACT.

The returns furnished to the Board of Agriculture under the Markets and Fairs (Weighing of Cattle) Act, 1891, show that during the third quarter of the current year the numbers both of cattle, sheep and swine entering the 21 scheduled markets of Great Britain were fewer than in the corresponding quarter of 1899. The number of animals exposed for sale in the corresponding months of each year, the number weighed, and the number whereof prices have been furnished under the Act, are shewn in the following table:—

Animals.	3rd Quarter, 1900.	3rd Quarter, 1899.
CATTLE:	No.	No.
Entering markets	245,762	267,782
Weighed	29,817	32,552
Prices returned	25,991	28,917
Prices returned with quality distinguished	21,764	24,036
SHEEP:		
Entering markets	1,491,025	1,688,121
Weighed	12,381	13,711
Prices returned with quality distinguished	10,375	11,578
SWINE:		
Entering markets	83,424	95,564
Weighed	635	710
Prices returned with quality distinguished	635	705

The cattle returned as passing over the weighbridge in the six Scottish markets were more than 33 per cent. of the

whole shewn, while the prescribed particulars as regards price were duly rendered, for practically a fourth of the total cattle in the markets. In England the percentage weighed was little over 6 per cent. of the aggregate number entering the markets, prices being given for 4·3 per cent. The use of the weighbridge remains insignificant in the case of sheep and pigs, sheep being returned as weighed at only two of the 15 English centres and at four of the six Scottish markets, and swine being weighed in any material number only at Newcastle, and on a much smaller scale at two other places. The weighbridge seems never to have been used at either Birmingham, Bristol, Lincoln, or York, and only a single animal was weighed at Norwich.

The number and average price per stone and per cwt. of fat cattle of each class weighed and priced at thirteen of the more important markets are shown under:—

PLACES.	INFERIOR OR Third Quality.			GOOD OR Second Quality.			PRIME OR First Quality.		
	Number.	Price		Number.	Price		Number.	Price	
		per Stone.	per Cwt.		per Stone.	per Cwt.		per Stone.	per Cwt.
Carlisle	266	3 5½	27 8	303	3 11	31 4	1,271	4 4½	34 10
Leicester	18	4 1	32 8	41	3 11	31 4	137	4 3	34 0
Leeds	3	3 9	30 0	31	3 10½	30 10	163	4 5½	35 6
Liverpool	—	—	—	452	3 11½	31 8	1,459	4 6½	36 4
London	1	3 7½	29 2	296	4 4½	35 0	916	4 10½	38 10
Newcastle	3	3 7½	29 0	113	4 6½	36 4	102	4 10½	39 0
Shrewsbury	171	3 0½	29 8	185	4 2½	33 8	189	4 7½	37 0
Aberdeen	1,175	3 0½	28 4	1,630	4 5½	35 10	1,557	4 10½	39 6
Dundee	296	3 7½	28 10	1,124	4 0	36 0	310	4 11	39 4
Edinburgh	—	—	—	2,592	4 7½	37 0	90	4 11½	39 10
Falkirk	171	3 10½	30 10	533	4 5½	35 6	299	4 9½	38 6
Glasgow	179	4 1½	31 2	733	4 4½	35 0	1,889	4 9½	38 4
Perth	3	4 3½	34 4	124	4 8	37 4	122	5 0	40 0

The range of values here recorded, in the case of the inferior class of cattle, for which the quotations are, as usual, defective, extended from 27s. 8d. per cwt. at Carlisle to 34s. 4d. per cwt. at Perth—the last figure being, however, of very doubtful value, as representing the value of only three

animals in the three months. In good or second quality fat stock, the Perth quotation is again the highest given, or 37s. 4d. per cwt., while the lowest, 30s. 10d., is returned from Leeds. In prime stock, the mean value of 137 cattle at Leicester comes out as low as 34s. per cwt., while that of 122 cattle sold at Perth is given at 40s. per cwt. The Glasgow returns for this class of stock have a much more satisfactory basis and represent as many as 1,889 transactions, the values averaging 38s. 4d. per cwt.

Comparison with the prices current in the same months of 1899 may be made by the figures shown in the following table:—

PLACES.	INFERIOR OR Third Quality.		GOOD OR Second Quality.		PRIME OR First Quality.	
	1900.		1899.		1900.	
	Per Cwt.	s. d.	Per Cwt.	s. d.	Per Cwt.	s. d.
Carlisle	27 8		27 4		31 4	30 6
Leicester	32 8		27 6		31 4	29 0
Leeds	30 0		—		30 10	28 8
Liverpool	—		—		31 8	30 0
London	29 2		25 2		35 0	33 2
Newcastle	29 0		27 10		36 4	34 10
Shrewsbury	29 8		25 10		43 2	30 4
Aberdeen	28 4		25 4		35 10	33 8
Dundee	28 10		27 2		36 0	33 4
Edinburgh	—		—		37 2	34 10
Falkirk	30 10		29 4		35 6	33 2
Glasgow	33 0		31 8		35 0	33 4
Perth	34 4		38 4		37 4	34 8

These contrasted columns show a more or less material rise in prices in every grade and at every town named, although the advance is by no means uniform.

The course of prices throughout the whole nine months of 1900 may, however, be compared with the figures shown in the immediately preceding year by tracing month by month the aggregate averages which have been furnished throughout these periods by the thirteen markets above quoted.

Months	Good, or Second Quality, per cwt.		Prime, or First Quality, per cwt.	
	1900.	1899.	1900.	1899.
	s. d.	s. d.	s. d.	s. d.
January - - -	34 8	32 6	37 2	34 6
February - - -	34 6	32 6	36 8	34 8
March - - -	34 2	32 10	36 0	34 10
April - - -	33 8	33 2	35 10	35 2
May - - -	35 6	33 4	37 4	35 6
June - - -	37 6	35 2	39 2	37 0
July - - -	36 10	35 4	38 8	37 0
August - - -	36 0	33 4	37 8	35 6
September - - -	35 2	32 4	36 10	34 2

This table shows that neither in 1899, nor in the current year, has the level of price been maintained through the autumn at so high a figure as it had reached in June.

During the three months ended with September, the actual transactions in fat stock recorded, as made at an agreed on price per live cwt., were 2,898, as compared with 4,046 in the like quarter of 1899; the Glasgow market very conspicuously leading in this particular in 1900. In store stock the number weighed and priced was 2,225, against 1,458 in 1899, most of these transactions occurring, as usual, at Shrewsbury.

The usual table, giving details for each of the scheduled places, is appended.

Cattle, Sheep, and Swine, entering the Markets and Marts of the undermentioned Places, with the Number Weighed, as received from the Market Authorities in the Third Quarter of 1900, under the Markets and Fairs (Weighing of Cattle) Act, 1891 (54 & 55-Vict. c. 70).

PLACES.	Cattle.			Sheep.			Swine.		
	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.
ENGLAND.	No.	No.	No.	No.	No.	No.	No.	No.	No.
Ashford - - -	3,218	13	—	45,046	—	—	4,339	—	—
Birmingham - - -	4,393	—	—	30,180	—	—	41,315	—	—
Bristol - - -	7,100	—	—	31,860	—	—	—	—	—
Carlisle - - -	12,628	1,840	1,840	131,830	—	—	2,905	—	—
Leicester - - -	14,071	390	340	26,643	—	—	1,345	—	—
Leeds - - -	6,962	197	197	31,200	—	—	—	—	—
Lincoln - - -	1,563	—	—	13,938	—	—	2,914	—	—
Liverpool - - -	12,510	1,911	1,911	149,390	1,211	1,211	—	—	—
London - - -	17,535	2,913	1,213	130,570	1,968	42	1,030	—	—
Newcastle-upon-Tyne	22,598	218	218	114,073	—	—	6,938	532	532
Norwich - - -	22,828	1	—	68,286	—	—	6,744	—	—
Salford - - -	24,652	480	—	196,856	—	—	928	—	—
Shrewsbury - - -	8,807	2,203	2,180	43,977	—	—	5,208	35	35
Wakefield - - -	18,184	1,625	366	50,335	—	—	—	—	—
York - - -	14,228	—	—	58,727	—	—	—	—	—
SCOTLAND.									
Aberdeen - - -	9,720	4,382	4,382	88,526	8,312	8,312	3,582	—	—
Dundee - - -	4,086	2,969	2,969	7,738	150	459	400	—	—
Edinburgh - - -	13,881	6,259	4,569	63,737	—	—	1,020	—	—
Falkirk - - -	2,125	1,003	1,003	5,627	—	—	21	—	—
Glasgow - - -	14,210	3,127	2,827	135,448	146	68	1,110	—	—
Perth - - -	10,263	1,086	1,049	68,768	292	192	2,620	68	68
TOTAL for ENGLAND	191,477	11,791	8,265	1,122,011	3,179	1,253	73,606	567	567
TOTAL for SCOTLAND	54,285	13,026	*13,499	308,114	9,202	9,122	9,758	68	68
Total - - -	245,762	29,817	*21,764	1,490,125	12,381	10,375	83,364	635	635

* Prices for 3,190 cattle in addition to the above were quoted from Edinburgh and for 1,039 cattle from Perth, but without distinguishing the quality.

PRICES OF MEAT, CORN, AND DAIRY PRODUCE.

AVERAGE PRICES OF DEAD MEAT, per Stone of 8 lbs., at the LONDON CENTRAL MEAT MARKET, during the Third Quarter of 1900, and during the Months of September, October, and November, 1900.

(Compiled from the prices quoted weekly in the "Meat Trades Journal.")

DESCRIPTION.	3rd Quarter 1900.			Sept., 1900.			Oct., 1900.			Nov., 1900.		
	s.	d.	s. d.	s.	d.	s. d.	s.	d.	s. d.	s.	d.	s. d.
SHEEP:—												
Scotch, short sides - - - -	4	7	10 4 10	4	6	10 4 9	4	5	10 4 9	4	4	10 4 7
" long sides - - - -	4	2	11 4 4	4	2	11 4 4	—	—	—	4	1	11 4 4
English - - - -	3	11	11 4 2	3	11	11 4 1	3	8	11 3 11	3	7	11 3 10
Cows and Bulls - - - -	2	0	11 3 2	2	1	11 3 4	2	1	11 3 3	2	0	11 3 1
American, Birkenhead killed - -	3	8	11 3 10	3	9	11 3 12	3	7	11 3 9	3	5	11 3 8
" Deptford killed - - -	3	9	11 4 0	3	9	11 4 0	3	7	11 3 10	3	5	11 3 9
American Refrigerated hind-quarters	3	11	11 4 1	4	0	11 4 2	3	11	11 4 1	3	9	11 3 10
" " fore-quarters - - -	2	8	11 2 10	2	9	11 2 10	2	9	11 2 10	2	7	11 2 9
Australian, Frozen hind-quarters -	2	9	11 2 10	2	9	11 2 10	2	7	11 2 9	2	4	11 2 6
" " fore-quarters - - -	2	1	11 2 3	2	1	11 2 3	2	2	11 2 3	2	1	11 2 2
New Zealand, Frozen hind-quarters.	2	10	11 3 0	2	10	11 3 0	2	3	11 2 11	2	6	11 2 8
" " fore-quarters - - -	2	1	11 2 4	2	2	11 2 5	2	3	11 2 4	2	1	11 2 3
MUTTON:—												
Scotch, Prime - - - -	4	11	11 5 5	4	8	11 5 1	4	5	11 4 10	4	4	11 4 9
English, Prime - - - -	4	8	11 3 2	4	4	11 4 10	4	2	11 4 7	4	0	11 4 6
Ewes - - - -	3	5	11 3 10	3	4	11 3 9	2	10	11 3 5	2	10	11 3 5
Continental - - - -	4	3	11 4 7	4	0	11 4 3	3	3	11 4 3	3	8	11 4 3
New Zealand, Frozen - - -	2	2	11 2 8	4	1	11 2 5	2	3	11 2 10	2	5	11 2 11
Australian, Frozen - - -	2	2	11 2 4	2	0	11 2 7	2	3	11 2 7	2	5	11 2 10
River Plate, Frozen - - -	—	11	2 3	2	0	11 2 5	2	4	11 2 5	2	5	11 2 6
LAMB:—												
English - - - -	5	0	11 3 9	4	10	11 5 5	3	4	11 4 10	4	7	11 4 9
New Zealand, Frozen - - -	2	9	11 3 1	2	8	11 3 1	3	1	11 3 5	3	4	11 3 9
VEAL:—												
English - - - -	4	2	11 4 7	4	3	11 4 7	4	5	11 4 9	4	4	11 4 8
Foreign - - - -	3	7	11 4 1	3	8	11 4 1	3	11	11 4 3	3	14	11 4 2
PORK:—												
English, best - - - -	3	10	11 4 3	4	2	11 4 6	4	—	11 4 7	4	3	11 4 7
" secondary - - - -	3	4	11 3 8	3	7	11 4 0	3	2	11 4 1	3	6	11 4 1
Foreign - - - -	3	4	11 3 8	3	7	11 4 0	3	2	11 4 1	3	6	11 4 1

AVERAGE WHOLESALE PRICES OF CATTLE and SHEEP, per Stone of 8 lbs., sinking the offal, at the METROPOLITAN CATTLE MARKET, during the under-mentioned Quarters of 1899 and 1900.

PERIOD.	CATTLE.			SHEEP.		
	Inferior.	Second.	First.	Inferior.	Second.	First.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
3rd Quarter, 1899	2 4	3 11	4 7	3 3	4 11	5 8
4th Quarter, "	2 7	3 11	4 9	3 4	5 0	5 8
1st Quarter, 1900	2 11	4 1	4 9	3 5	5 1	5 10
2nd Quarter, "	3 1	4 1	4 9	3 5	5 7	6 4
3rd Quarter, "	3 2	4 3	4 11	3 3	5 4	6 0

AVERAGE WHOLESALE PRICES OF BEEF and MUTTON, per Stone of 8 lbs., by the Carcase, at LIVERPOOL and GLASGOW, during the under-mentioned Quarters of 1899 and 1900.

PERIOD.	LIVERPOOL.*				GLASGOW.†			
	BEEF.		MUTTON.		BEEF.		MUTTON.	
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
3rd Quarter, 1899	2 4	11 3 8	3 0	11 5 0	2 4	11 3 8	3 4	11 4 4
4th Quarter, "	2 6	11 4 0	3 0	11 4 8	2 8	11 3 8	3 4	11 4 4
1st Quarter, 1900	2 6	11 4 0	4 0	11 5 6	3 2	11 4 2	4 4	11 5 4
2nd Quarter, "	2 10	11 4 2	4 0	11 5 8	3 6	11 4 0	4 10	11 5 10
3rd Quarter, "	2 8	10 4 0	3 4	10 5 0	3 0	10 3 10	4 0	10 4 10

* Compiled from information furnished by the Medical Officer of Health, Liverpool. The prices quoted are for Carcases of Animals slaughtered at the Liverpool Abattoir, and do not apply to Imported Meat.

† Compiled from information furnished by the Principal of the Veterinary College Glasgow.

BERLIN MARKET.

AVERAGE PRICES of CATTLE and SHEEP (First Quality Dead Weight) in the BERLIN CATTLE MARKET in the under-mentioned Months of 1900.

MONTH.	CATTLE.		SHEEP.	
	Per Cwt.		Per Cwt.	
1900.	s. d.	s. d.	s. d.	s. d.
September	67 7	to 71 8	65 2	to 69 3
October	66 11	" 70 9	64 5	" 68 6
November	64 8	" 68 9	63 8	" 67 9

NOTE.—The above prices have been compiled from the weekly returns published in the *Deutsche Landwirtschaftliche Presse*.

PARIS MARKET.

AVERAGE PRICES of CATTLE, SHEEP, and SWINE (Medium Quality) in the PARIS CATTLE MARKET in the under-mentioned Months of 1900.

MONTH.	OXEN.	CALVES.	SHEEP.	PIGS.
	Per Cwt.	Per Cwt.	Per Cwt.	Per Cwt.
LIVE WEIGHT.				
1900.	s. d.	s. d.	s. d.	s. d.
September	28 1	40 1	33 7	40 11
October	28 1	41 10	33 4	36 5
November	28 6	43 6	32 3	36 6
DEAD WEIGHT.				
1900.	s. d.	s. d.	s. d.	s. d.
September	47 0	67 1	68 3	58 0
October	47 3	69 9	67 2	51 6
November	48 1	72 9	64 6	51 11

NOTE.—The above prices have been compiled from the weekly returns published in the *Journal d'Agriculture Pratique*.

CHICAGO.

PRICES of CATTLE at CHICAGO per Cwt. (Live Weight) in the under-mentioned Months of 1900.

Month.	Good Dressed Beef and Shipping Steers.		Export Cattle.		Extra Prime Cattle.	
1900.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
September	25 4	to 27 6	25 1	to 27 1	27 2	to 28 0
October	24 7	" 26 4	24 1	" 26 3	27 1	" 27 9
November	23 8	" 25 5	22 10	" 25 9	26 9	" 27 7

Compiled from the Live Stock Reports issued by Messrs. Clay, Robinson, and Co., of the Union Stock Yards, Chicago, Illinois.

AVERAGE VALUES, per Cwt., of various Kinds of DEAD MEAT Imported into the United Kingdom from FOREIGN COUNTRIES and BRITISH POSSESSIONS in the under-mentioned Quarters of 1899 and 1900.

(Computed from the Trade and Navigation Accounts.)

PERIOD.	BEEF.		MUTTON.		PORK.		BACON.	HAMS.
	Fresh.	Salted.	Fresh.	Fresh.	Salted.			
3rd Quarter, 1899	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
	38 0	24 2	31 3	42 9	19 6	36 3	43 2	
4th Quarter "	37 11	27 2	31 10	42 10	21 11	37 9	45 2	
1st Quarter, 1900	39 6	27 11	31 4	42 10	24 9	37 1	45 0	
2nd Quarter, "	40 1	26 11	36 3	43 0	24 8	41 6	46 7	
3rd Quarter "	39 1	25 10	34 6	42 1	22 10	43 7	47 10	

AVERAGE PRICES of British Corn per Quarter of 8 imperial bushels,* computed from the Weekly Averages of Corn Returns from the 196 Returning Markets of ENGLAND AND WALES, pursuant to the Corn Returns Act, 1882, together with the QUANTITIES returned as sold at such Markets, in the under-noted periods of the Years 1900, 1899, and 1898.

QUARTER ENDED	PRICES.			QUANTITIES.		
	1900.	1899.	1898.	1900.	1899.	1898.
Wheat.						
	s. d.	s. d.	s. d.	Quarters.	Quarters.	Quarters.
Lady Day	25 11	26 3	35 3	868,378	868,579	609,057
Midsummer	25 9	25 1	41 5	854,497	994,293	557,504
Michaelmas	28 7	25 2	32 8	511,347	754,667	300,279
Christmas	—	26 4	27 2	—	913,421	1,036,075
Barley.						
	s. d.	s. d.	s. d.	Quarters.	Quarters.	Quarters.
Lady Day	25 1	27 1	27 9	888,949	830,398	902,452
Midsummer	24 3	24 6	26 10	931,557	92,648	47,621
Michaelmas	24 5	24 4	25 10	143,532	237,935	99,743
Christmas	—	26 6	28 2	—	2,135,762	2,603,841
Oats.						
	s. d.	s. d.	s. d.	Quarters.	Quarters.	Quarters.
Lady Day	16 7	16 11	17 5	246,940	251,841	26,150
Midsummer	16 2	17 6	19 10	110,103	129,834	93,475
Michaelmas	16 7	17 3	19 7	116,880	149,902	76,727
Christmas	—	16 4	16 11	—	238,783	280,652

* Section 8 of the Corn Returns Act, 1882, provides that where returns of purchases of British Corn are made to the local Inspector of Corn Returns in any other measure than the imperial bushel, or by weight or by a weighed measure, that officer shall convert such returns into the imperial bushel, and in the case of weight or weighed measure the conversion is to be made at the rate of 60 imperial pounds for every bushel of wheat, 50 imperial pounds for every bushel of barley, and 39 imperial pounds for every bushel of oats.

AVERAGE PRICES of British Corn per Quarter of 8 imperial bushels, computed from the Returns received under the Corn Returns Act, 1882, in each of the under-mentioned Weeks in 1900, and in the corresponding Weeks in 1899 and 1898.

Weeks ended (in 1900).	Wheat.			Barley.			Oats.		
	1900.	1899.	1898.	1900.	1899.	1898.	1900.	1899.	1898.
Jan. 6	s. d. 25 9	s. d. 27 0	s. d. 34 11	s. d. 25 7	s. d. 28 3	s. d. 27 9	s. d. 16 2	s. d. 17 0	s. d. 16 10
" 13	25 11	27 2	35 0	25 5	28 2	27 8	16 3	17 1	17 4
" 20	26 0	27 0	34 11	25 8	27 11	27 10	16 2	17 1	17 5
" 27	25 10	26 7	34 6	25 9	27 9	27 8	16 4	17 0	17 2
Feb. 3	25 8	26 6	34 10	25 4	27 2	28 0	16 6	17 0	17 6
" 10	25 10	26 8	35 1	25 3	27 2	27 8	16 5	17 0	17 5
" 17	26 1	26 0	35 0	24 11	26 10	27 11	16 8	16 11	17 8
" 24	26 3	25 7	35 5	25 1	26 7	27 6	16 9	16 11	17 10
Mar. 3	26 4	25 8	35 10	24 6	26 7	28 0	16 10	17 0	17 11
" 10	25 11	25 10	35 8	24 8	26 7	27 10	16 11	16 11	17 9
" 17	25 10	25 10	35 6	24 6	26 3	28 0	16 11	16 10	17 10
" 24	25 11	25 4	35 4	25 0	26 8	28 6	17 1	17 0	17 8
Apl. 7	25 10	24 11	35 3	24 11	26 2	27 11	17 2	16 11	17 10
" 14	25 11	24 6	35 3	24 5	25 7	28 0	17 2	16 11	17 11
" 21	26 0	24 8	36 1	24 9	25 2	28 3	17 3	17 1	18 4
" 28	26 0	25 0	38 4	25 2	25 10	27 10	17 11	17 5	18 11
May 5	25 11	25 3	42 4	25 3	24 5	27 8	18 0	17 6	20 4
" 12	25 11	25 4	45 11	24 10	23 11	27 1	17 11	17 9	21 1
" 19	25 7	25 3	48 1	24 5	23 11	26 0	18 5	17 10	21 3
" 26	25 5	25 2	47 9	23 11	23 8	26 5	18 2	17 8	21 5
June 2	25 5	25 4	46 3	24 4	24 4	26 10	18 6	18 1	21 0
" 9	25 3	25 6	45 4	23 8	21 10	25 8	18 8	18 2	20 11
" 16	25 6	25 7	42 4	23 8	23 1	26 1	18 11	17 10	20 5
" 23	25 9	25 7	40 8	23 5	26 2	24 3	18 11	17 11	20 7
" 30	26 11	25 7	38 3	23 4	24 2	23 4	19 3	18 0	20 8
July 7	27 10	25 7	36 10	22 10	21 9	25 0	19 5	18 1	20 5
" 14	28 7	25 5	37 1	23 2	20 4	24 1	19 1	17 11	20 10
" 21	29 0	25 5	38 1	23 8	21 10	25 0	19 3	18 0	20 10
" 28	29 3	25 2	36 11	24 4	22 5	24 2	19 9	18 2	20 11
Aug. 4	28 10	24 10	35 7	23 10	20 9	26 11	19 4	18 0	20 7
" 11	28 7	24 8	33 8	23 7	22 6	27 5	19 8	17 9	20 9
" 18	28 10	24 7	32 7	23 3	26 11	24 4	19 11	17 4	19 11
" 25	28 10	24 7	30 7	24 10	26 5	27 6	18 8	17 1	19 3
Sept. 1	28 8	25 0	28 1	25 2	25 10	27 8	18 1	16 7	18 11
" 8	28 7	25 5	26 10	25 8	26 5	27 9	17 10	16 6	17 10
" 15	28 4	25 4	25 7	25 4	27 1	26 10	17 1	16 2	16 10
" 22	28 4	25 4	25 5	26 0	27 4	26 9	17 1	16 1	17 1
" 29	28 9	25 6	25 9	26 1	26 11	27 0	17 2	16 5	16 7
Oct. 6	28 9	26 0	26 6	26 2	26 0	27 5	16 10	16 5	16 7
" 13	28 9	27 3	26 6	26 2	27 9	27 11	17 1	16 5	16 6
" 20	28 4	28 2	26 8	26 5	27 6	28 1	16 11	16 3	16 8
" 27	27 11	28 1	27 4	26 3	27 4	28 8	16 11	16 3	16 8
Nov. 3	27 5	27 2	28 4	26 3	27 2	28 6	16 11	16 7	17 2
" 10	27 3	26 7	28 4	25 11	26 9	28 7	16 10	16 5	17 5
" 17	27 1	26 1	28 1	25 8	26 4	28 5	17 1	16 7	17 2
" 24	27 2	25 8	27 9	25 10	26 2	28 4	17 0	16 7	17 1
Dec. 1	27 0	25 7	27 7	25 9	25 10	28 6	17 2	16 6	17 1
" 8	26 10	25 7	27 6	25 11	25 10	28 6	17 4	16 5	17 3
" 15	26 9	25 4	27 2	25 7	25 7	28 5	17 1	16 1	17 0
" 22	25 6	26 9	26 9	25 10	25 10	28 6	16 0	17 0	17 0
" 29	25 9	26 11	26 11	25 5	28 4	28 4	16 2	17 0	17 0

AVERAGE PRICES of WHEAT, BARLEY, and OATS per IMPERIAL QUARTER in BELGIUM in the under-mentioned Months of 1900.

Month.	Wheat.	Barley.	Oats.
1900.	s. d.	s. d.	s. d.
August - - - -	28 10	22 11	19 8
September - - -	28 10	23 7	17 9
October - - - -	29 0	23 6	17 8

The above prices have been compiled from the official monthly averages published in the *Moniteur Belge*.

AVERAGE PRICES of WHEAT, BARLEY, and OATS per IMPERIAL QUARTER in FRANCE, and ENGLAND and WALES, in the under-mentioned Months of 1900.

MONTH.	FRANCE.	ENGLAND.
WHEAT.		
1900.	Per Qr. s. d.	Per Qr. s. d.
September - - -	32 5	28 6
October - - - -	32 7	28 5
November - - -	32 7	27 2
BARLEY.		
1900.	Per Qr. s. d.	Per Qr. s. d.
September - - -	23 2	25 7
October - - - -	23 0	26 3
November - - -	23 0	25 11
OATS.		
1900.	Per Qr. s. d.	Per Qr. s. d.
September - - -	19 5	17 5
October - - - -	19 5	16 11
November - - -	19 6	16 11

Note.—The prices of French grain have been compiled from the official weekly averages published in the *Journal d'Agriculture Pratique*. The prices of British grain are official averages based on the weekly returns furnished under the Corn Returns Act, 1882.

AVERAGE PRICES of WHEAT, BARLEY, and OATS per IMPERIAL QUARTER at the under-mentioned Markets in the under-mentioned Months of 1900.

Month.	London.	Paris.	Breslau.
WHEAT.			
1900.	Per Qr. s. d.	Per Qr. s. d.	Per Qr. s. d. s. d.
September - - -	29 10	34 3	30 6 to 34 2
October - - - -	29 11	34 2	30 5 „ 34 2
November - - -	28 1	34 6	30 4 „ 34 0
BARLEY.			
1900.	Per Qr. s. d.	Per Qr. s. d.	Per Qr. s. d. s. d.
September - - -	27 4	23 9	24 9 to 28 0
October - - - -	30 10	23 5	24 9 „ 28 0
November - - -	27 7	23 3	24 0 „ 27 3
OATS.			
1900.	Per Qr. s. d.	Per Qr. s. d.	Per Qr. s. d. s. d.
September - - -	18 3	20 3	18 10 to 19 10
October - - - -	17 8	20 2	18 7 „ 19 6
November - - -	17 10	20 6	17 11 „ 18 9

Note.—The London quotation represents the price of British corn as returned under the Corn Returns Act, 1882; the price of grain in Paris is the official average price of French grain in that city; the quotations shown for Breslau represent the prices of grain of good merchantable quality.

PRICES OF WOOL.

PRICES OF ENGLISH WOOL, per pack of 240 lbs., in the under-mentioned Months of 1900.

(Compiled from the *Economist*.)

DESCRIPTION.	September, 1900.	October, 1900.	November, 1900.
South Down - -	£ s. £ s. 8 0 to 11 10	£ s. £ s. 8 0 to 11 10	£ s. £ s. 8 0 to 11 5
Half-breds - - -	6 10 „ 8 10	6 10 „ 8 10	6 10 „ 8 10
Leicester - - -	6 0 „ 7 0	6 0 „ 7 0	6 0 „ 7 0
Kent Fleeces - -	6 0 „ 7 0	6 0 „ 7 0	6 0 „ 7 0

MEAN WHOLESALE PRICES of BUTTER, MARGARINE, and
CHEESE in the under-mentioned Months of 1900.

(Compiled from the Grocer.)

DESCRIPTION.	September, 1900.		October, 1900.		November, 1900.	
	Per Cwt.		Per Cwt.		Per Cwt.	
BUTTER:	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Cork, 1sts	94	6	95	6	92	0
" 2nds	91	0	90	0	88	6
" 3rds	87	6	83	0	84	0
" 4ths	82	0	78	0	77	0
Friesland	97	0 to 101	101	0 to 105	105	6 to 110
Dutch Factories	101	0,, 105	106	6,, 112	106	6,, 111
French Baskets	108	6,, 112	117	6,, 122	113	0,, 117
" Crocks and Firkins	100	6,, 104	109	6,, 113	104	6,, 109
" 2nds and 3rds	94	6,, 98	101	6,, 107	96	6,, 100
Danish and Swedish	113	0,, 116	116	0,, 120	117	6,, 122
Finnish	95	0,, 106	91	0,, 101	92	0,, 108
Russian	81	6,, 93	78	0,, 91	81	0,, 94
Canadian and States	81	0,, 106	80	6,, 101	79	6,, 98
Colonial, fine-	101	6,, 108	106	0,, 112	106	6,, 112
" good and inferior	83	0,, 97	84	0,, 103	84	6,, 101
Fresh Rolls (Foreign)	10	9,, 14	11	3,, 14	11	3,, 14
MARGARINE	38	0,, 63	40	0,, 66	40	0,, 66
CHEESE:	Per Cwt.	Per Cwt.	Per Cwt.	Per Cwt.	Per Cwt.	Per Cwt.
Cheddar, new	61	6,, 70	64	0,, 73	58	0,, 74
" Loaf	61	0,, 63	64	0,, 65	63	0,, 66
Cheshire	71	0,, 76	70	0,, 76	70	0,, 76
Wiltshire, Loaf	61	0,, 64	64	0,, 66	64	0,, 66
Double Gloucester	59	0,, 63	60	0,, 64	60	0,, 64
Derby, Factory	56	0,, 60	56	0,, 60	50	0,, 56

WEEKLY PRICES (WHOLESALE) of VEGETABLES and FRUIT
at COVENT GARDEN MARKET.

(Compiled from the Gardeners' Chronicle.)

Description.	Week ending							
	November 3rd.		November 10th.		November 17th.		November 24th.	
VEGETABLES—	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Artichokes, Globe, per doz.	2	0 to 2	4	6 to —	4	0 to 5	3	0
" Jerusalem, per sieve	1	3,, 1	1	3,, 1	1	0,, 1	1	0 to 1
Beans, Channel Islands, Dwarf, new, per lb.	0	5,, 0	0	8,, —	0	8,, 1	1	0,, —
Beet, per dozen	0	6,, —	0	6,, —	0	6,, —	0	6,, —
Beetroot, per bushel	1	0,, 1	1	0,, 1	1	0,, 1	1	0,, 1
Brussels Sprouts, per sieve	1	3,, 2	1	0,, 1	1	0,, 1	1	0,, 1
Cabbage, per tally	1	6,, 2	1	6,, 2	1	0,, 2	1	0,, 2
Carrots, new, per dozen	1	6,, 2	1	6,, —	1	6,, —	1	6,, —
" washed, in cwt. bags	2	0,, 2	2	0,, 2	2	0,, 2	2	0,, 2
Cauliflowers, per tally	4	0,, 8	4	0,, 7	4	0,, 8	4	0,, 8
Celery, per doz. bundles	10	0,, 12	10	0,, 14	10	0,, 12	10	0,, 12
Cress, per doz. punnets	1	0,, —	1	0,, —	1	0,, —	1	0,, —
Cucumbers, per doz.	3	0,, 1	2	0,, 4	2	0,, 3	2	0,, 3
Endive, new French, per doz.	1	0,, 1	1	0,, —	1	0,, —	1	0,, —
" English, per score	1	0,, —	0	3,, —	0	3,, —	0	3,, —
Garlic, new, per lb.	0	2,, —	0	3,, —	0	3,, —	0	3,, —
Horseradish, English, per bundle	1	6,, 2	1	6,, 2	1	6,, 2	1	6,, 2
Leeks, per doz. bunches	1	6,, —	1	6,, —	1	6,, —	1	6,, —
Lettuce, English Ccs, per score	1	0,, 2	1	0,, 2	1	0,, 2	1	0,, 2
Mint, per doz. bunches	1	0,, —	0	8,, 9	0	9,, 1	1	0,, —
Mushrooms, House, per lb.	1	0,, —	3	0,, —	3	0,, —	3	0,, —
Onions, picklers, per sieve	3	0,, 3	3	0,, 3	3	0,, 3	3	0,, 3
" per bag	3	0,, 3	3	0,, 3	3	0,, 3	3	0,, 3
" English, per cwt. bag	4	0,, 4	4	0,, 4	4	0,, 4	4	0,, 4
Parsley, per doz. bunches	2	6,, —	2	6,, —	2	6,, —	2	6,, —
Parsnip, in cwt. bags	75	0,, 100	75	0,, 95	75	0,, 100	75	0,, 100
Potatoes, per ton	0	9,, 1	1	0,, 1	1	0,, 1	1	0,, 1
Radishes, per doz. bunches	0	9,, 1	0	9,, 1	0	9,, 1	0	9,, 1
Salad, small, per doz. punnets	1	3,, —	1	3,, —	1	3,, —	1	3,, —
Shallots, new, per lb.	0	3,, —	0	3,, —	0	3,, —	0	3,, —
Spinach, per bushel	1	0,, —	1	0,, —	1	0,, —	1	0,, —
Tomatoes, English, new, per 12 lbs.	6	6,, —	4	0,, 6	5	0,, —	5	0,, —
" Channel Isl'ds, per lb.	0	4,, 0	0	3,, 0	0	3,, —	0	4,, —
Turnips, per dozen	1	6,, 2	1	6,, 2	1	6,, 2	1	6,, 2
Watercress, per dozen bunches	0	4,, 0	0	4,, 0	0	4,, 0	0	4,, 0
FRUIT—								
Apples, English—								
Cookers, large, per bush.	3	6,, 4	3	6,, 4	2	6,, 3	2	6,, 3
Various, per bushel	2	0,, 4	1	0,, 3	1	0,, 3	1	0,, 3
Cox's, per sieve	3	0,, 4	3	0,, 4	3	0,, 4	3	0,, 4
Kings, per bushel	4	0,, 5	3	0,, 4	3	0,, 4	3	0,, 4
Blonde, per bushel	4	0,, 5	3	0,, 4	3	0,, 4	3	0,, 4
Ribstone, per bushel	4	0,, 7	4	0,, 7	4	0,, 7	4	0,, 7
Chestnuts, per bag	10	6,, 14	10	6,, 14	8	0,, 15	8	0,, 14
Cobnuts, per lb.	0	4,, 0	0	4,, 0	0	4,, 0	0	4,, 0
Cranberries, per case	11	0,, —	12	0,, —	12	0,, —	12	0,, —
Grapes, Alicante, per lb.	0	7,, 1	0	7,, 1	0	8,, 1	0	8,, 1
" Colmar, per lb.	0	9,, 1	0	8,, 1	0	8,, 1	0	8,, 1
" Muscats, Class A, per lb.	2	6,, 3	2	6,, 3	2	6,, 3	2	6,, 3
" " Class B, per lb.	1	0,, 2	1	0,, 2	1	0,, 2	1	0,, 2
" Almeida, per barrel	12	0,, 10	12	0,, 10	12	0,, 10	12	0,, 10
Melons, each	1	6,, 2	1	6,, 2	1	6,, 2	1	6,, 2
Pears, home-grown, per sieve	—	—	3	0,, 4	3	0,, 4	3	0,, 4
Pines, each	1	6,, 3	2	6,, 4	2	6,, 5	2	6,, 5

DISEASES OF ANIMALS IN GREAT BRITAIN.
NUMBER of OUTBREAKS of **Foot-and-Mouth Disease** and of **Swine-Fever**, with the Number of CATTLE and SWINE Slaughtered by order of the Board of Agriculture, in GREAT BRITAIN in each of the under-mentioned periods.

QUARTER ENDED	Foot-and-Mouth Disease.		Swine-Fever.	
	OUTBREAKS Confirmed.	ANIMALS Attacked.	OUTBREAKS Confirmed.	SWINE Slaughtered as Diseased, or as having been exposed to Infection.
	No.	No.	No.	No.
June, 1899 - - -	—	—	917	10,799
September, 1899 - - -	—	—	453	6,645
December, 1899 - - -	—	—	358	5,276
March, 1900 - - -	7	99	438	4,980
June, 1900 - - -	2	24	736	7,600
September, 1900 - - -	7	102	409	2,622

NUMBER of OUTBREAKS reported as having taken place, and Number of ANIMALS returned as having been ATTACKED by **Anthrax** and **Glanders** in GREAT BRITAIN in each of the under-mentioned periods.

QUARTER ENDED	Anthrax.		Glanders (including Farcy).	
	OUTBREAKS Reported.	ANIMALS Attacked.	OUTBREAKS Reported.	ANIMALS Attacked.
	No.	No.	No.	No.
December, 1898 - - -	139	223	168	306
March, 1899 - - -	135	247	176	328
June, 1899 - - -	153	315	175	263
September, 1899 - - -	113	222	261	526
December, 1899 - - -	133	202	241	355
March, 1900 - - -	140	213	259	486
June, 1900 - - -	103	279	286	461
September, 1900 - - -	108	223	316	475

NUMBER OF CASES of **Rabies** in DOGS in GREAT BRITAIN during each of the under-mentioned periods.

THREE MONTHS ENDED	Number of Cases.
30th June, 1899 - - -	—
30th September, 1899 - - -	—
31st December, 1899 - - -	6
31st March, 1900 - - -	2
30th June, 1900 - - -	—
30th September, 1900 - - -	2

DISEASES OF ANIMALS IN IRELAND.
NUMBER of OUTBREAKS of **Pleuro-Pneumonia** and of **Swine-Fever**, with the Number of CATTLE and SWINE Slaughtered by order of the Lord Lieutenant and Privy Council in IRELAND, in each of the under-mentioned periods.

QUARTER ENDED	Pleuro-Pneumonia.			Swine-Fever.	
	OUT- BREAKS Confirmed.	CATTLE found Diseased.	CATTLE Slaughtered as having been exposed to Infection.	OUT- BREAKS Con- firmed.	SWINE Slaughtered as Diseased, or as having been exposed to Infection.
	No.	No.	No.	No.	No.
June, 1899 - - -	—	—	—	95	1,541
September, 1899 - - -	—	—	—	119	2,463
December, 1899 - - -	—	—	—	28	495
March, 1900 - - -	—	—	—	40	702
June, 1900 - - -	—	—	—	78	1,394
September, 1900 - - -	—	—	—	69	1,036

NUMBER of OUTBREAKS reported as having taken place, and Number of ANIMALS returned as having been ATTACKED by **Anthrax**, **Glanders**, and **Rabies** in Ireland in each of the under-mentioned periods.

QUARTER ENDED	Anthrax.		Glanders (including Farcy).		Rabies.	
	OUT- BREAKS REPORTED.	ANIMALS ATTACKED.	OUT- BREAKS REPORTED.	ANIMALS ATTACKED.	CASES REPORTED.	
					DOGS.	OTHER ANIMALS.
	No.	No.	No.	No.	No.	No.
June, 1899 - - -	—	—	4	6	22	3
September, 1899 - - -	1	3	2	4	30	5
December, 1899 - - -	—	—	3	4	7	1
March, 1900 - - -	1	6	4	5	7	—
June, 1900 - - -	—	1	3	7	4	1
September, 1900 - - -	—	—	1	1	1	—

PRODUCE OF HOPS.

PRELIMINARY STATEMENT showing the ESTIMATED TOTAL PRODUCTION of HOPS in the years 1900 and 1899, with the ACREAGE and ESTIMATED AVERAGE YIELD per STATUTE ACRE in each COUNTY of ENGLAND in which Hops were grown.

COUNTY.	Estimated Total Produce.		Acreage.		Estimated Average Yield per Acre.	
	1900.	1899.	1900.	1899.	1900.	1899.
	<i>Cwts.</i>	<i>Cwts.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Cwts.</i>	<i>Cwts.</i>
GLOUCESTER	235	619	47	42	5'00	14'74
HANTS	12,291	30,580	2,231	2,319	5'51	13'19
HEREFORD	32,680	83,950	7,287	7,227	4'48	11'62
KENT	230,028	418,997	31,514	31,988	7'30	13'10
SALOP.	690	966	138	138	5'00	7'00
SUFFOLK	7	34	4	4	1'75	8'50
SURREY	5,311	15,213	1,300	1,388	4'09	10'96
SUSSEX	39,717	73,807	4,823	4,949	8'23	14'91
WORCESTER	26,935	37,207	3,964	3,788	6'79	9'82
Total	347,894	661,373	51,308	51,843	6'78	12'76

THE "LABOUR GAZETTE."

The "Labour Gazette," the Journal of the Labour Department of the Board of Trade, contains an article each month on the state of employment among agricultural labourers in the various parts of the United Kingdom. Special articles also appear therein from time to time on the rates of wages paid to agricultural labourers, the Hiring Fairs in Great Britain, and on migratory Irish agricultural labourers. The "Labour Gazette" is issued on the 15th of each month, and may be obtained direct from the Publishers, Messrs. Horace Marshall & Son, Temple House, Temple Avenue, London, E.C., at the rate of 2s. per annum, post free. Copies may also be ordered through any newsagent, price 1d. each.

ORDNANCE SURVEY MAPS OF GREAT BRITAIN AND IRELAND.

The Ordnance Survey are issuing a new series of folding pocket maps for England and Wales on the scale of one inch to the mile. The maps are printed in colours on sheets 18 by 12 inches, mounted on canvas, in a cover or flat, price 1s. each. The one-inch map can also be procured at the same price in black and white, showing outline and contours; or in outline, with hills printed either in black or brown; the outline map has recently been revised. These maps are not only useful for general topographical purposes, but should also prove serviceable to cyclists and pedestrians, since they show all roads, indicating their character and whether metalled or not, footpaths, hills, rivers, towns, villages, railway stations, and local boundaries.

Combined one-inch outline maps have also been published of Bath, Birmingham, Bournemouth, Bradford, Brighton and Worthing, Bristol, Chatham, Derby, Gloucester and Cheltenham, Huddersfield, Leeds, Liverpool, London, Manchester, Nottingham, Plymouth, Rugby, Sheffield and the Peak, Warrington, Warwick and Leamington, Weymouth, Dorchester and Portland, Winchester, Aberdeen, Dundee, Glasgow, Clovelly, the Isle of Wight, the Lake District of England, the New Forest, and South-East Kent. Additional maps are in course of preparation.

These combined maps are based on the revised one-inch map. In most cases they are being published folded in covers, and with the principal roads coloured, at prices varying from 1s. to 1s. 6d.

Cheap maps of counties, groups of counties, or districts are also being published on the $\frac{1}{4}$ -inch scale, with main roads coloured, at 6d. plain, or 9d. if folded in a cover. Kent, Northumberland and Durham are already published, and maps of counties in the South of England will before long be prepared.

There are agents for the sale of Ordnance Survey Maps in

most of the chief towns, and maps can be ordered and indexes, etc., seen at many Head Post Offices, in places where there are no agents. They can also be ordered, through any bookseller, from the Director-General, Ordnance Survey Office, Southampton; or in the case of Ireland, from the Officer in Charge, Ordnance Survey, Dublin.

POST OFFICE SAVINGS BANKS, WITH GOVERNMENT SECURITY.

ADVANTAGES OFFERED FOR LIFE INSURANCE.

LIFE INSURANCES from £5 to £100 can be granted to persons between fourteen and sixty-five years of age. Children between eight and fourteen years of age can be insured for £5.

GOVERNMENT SECURITY.—Persons insured have direct Government security.

PROPOSAL FORMS can be obtained at any Post Office Savings Bank, where the charges can also be ascertained.

EVIDENCE OF AGE.—A statement of age is sufficient if the Controller of the Savings Bank Department can verify it from the records of the Registrar-General, London, and thus the cost of a certificate of birth is saved. A simple form for the purpose can be obtained at any Post Office Savings Bank.

MEDICAL CERTIFICATES can be dispensed with for Insurances up to £25 inclusive.

PREMIUMS are payable by transfers from Savings Bank deposit accounts, and deposits can be made for the purpose at any Post Office Savings Bank. When the balance in the account is insufficient, the depositor will be informed accordingly in time to make a deposit. By means of the Penny Stamp Slips the provision can be made in sums of one penny at a time.

FRIENDLY SOCIETIES.—Members can pay their premiums through their Society, if the Society is willing to undertake the collection.

RESIDENCE ABROAD.—Permission is granted to persons over thirty years of age, who have been insured five years, to reside in any part of the world without the payment of any extra premium.

LAPSED INSURANCES.—MONEY NOT LOST.—If after paying two annual premiums the Insurance is discontinued, a surrender value is payable, or a "paid up" policy is issued for such an amount of Insurance as the premiums already paid may justify.

NOMINATIONS.—Any insured person over sixteen years of age can, without any expense, nominate a person to receive the amount of Insurance money at death.

PAYMENT AT DEATH.—The amount insured is paid immediately evidence of death is furnished. A form for obtaining a cheap certificate of death, at the reduced charge of one shilling, can be obtained from the Controller of the Savings Bank Department.

FACILITIES FOR INVESTING IN THE FUNDS.

INVESTMENTS IN GOVERNMENT STOCK can be made through any Post Office Savings Bank of sums from one shilling to £200 Stock in any year ending 31st December until the maximum of £500 Stock has been reached; and money can be deposited for this purpose irrespective of ordinary Savings Bank deposits. The dividends are collected by the Post Office and added to the depositors' accounts without charge.

SALES.—A depositor who buys Stock in this way can sell the whole or part of it at any time through the Post Office Savings Bank.

COMMISSION.—The commission on a purchase or a sale of Stock is 9d. for Stock not exceeding £25, and 6d. on each further £25 up to £100. Beyond this it is 6d. more for each additional £100 Stock or part of £100 Stock.

FURTHER PROVISIONS IN REGARD TO STOCK.—A depositor may, at a small cost, transfer Stock into his name at the Bank of England, or obtain a Stock Certificate with dividend coupons annexed.

LIST OF LEAFLETS ISSUED BY THE BOARD OF AGRICULTURE.

Number.	Title.
Leaflet No. 1	Mites on Currant and Nut Trees.
" " 2	Vine and Raspberry Weevils.
" " 3	The Turnip Fly or Flea.
" " 4	Caterpillars on Fruit Trees.
" " 5	The Mangel Wurzel Fly.
" " 6	The Field Vole.
" " 7	<i>Out of Print.</i>
" " 8	Farmers and Assessments to Local Rates.
" " 9	Ensilage.
" " 10	Wireworms.
" " 11	The Daddy Longlegs or Crane Fly.
" " 12	The Gooseberry Saw-Fly.
" " 13	Acorn Poisoning.
" " 14	The Raspberry Moth.
" " 15	The Apple Blossom Weevil.
" " 16	The Apple Sucker.
" " 17	<i>Out of Print.</i>
" " 18	Fertilisers and Feeding Stuffs Act.
" " 19	Pea and Bean Weevil.
" " 20	The Magpie Moth.
" " 21	The Warble Fly.
" " 22	The Diamond Back Moth.
" " 23	Potato Disease.
" " 24	The Ribbon Footed Corn-Fly.
" " 25	The Cockchafer.
" " 26	Farmers and the Income Tax.
" " 27	Remission of Tithe Rentcharge.
" " 28	Anthrax.
" " 29	Swine Fever.
" " 30	The Codlin Moth.
" " 31	The Onion Fly.
" " 32	Foul Brood or Bee Pest.
" " 33	Surface Caterpillars.
" " 34	The Woolly Aphis or American Blight.
" " 35	The Celery Fly.
" " 36	Cultivation of Osiers.
" " 37	Rabies.
" " 38	The Carrot Fly.
" " 39	Assessments to Land Tax.
" " 40	The Kestrel or Windhover.
" " 41	The Red Spider or Spinning Mite.
" " 42	The Short-eared Owl.
" " 43	Titmice.
" " 44	The Common Lapwing or Plover.
" " 45	The Starling.
" " 46	The Stem Eelworm.
" " 47	The Asparagus Beetle.
" " 48	The Pea Thrips.
" " 49	The Fruit Tree Beetle.
" " 50	Water Wagtails or " Dishwashers."
" " 51	The White or Barn Owl.
" " 52	Gooseberry Blight.
" " 53	The Pear Midge.
" " 54	The Spotted Flycatcher.
" " 55	The Swallow.
" " 56	The Canker Fungus.
" " 57	External Parasites of Poultry.
" " 58	Internal Parasites of Poultry.
" " 59	Improvement of Land Act.
" " 60	The Wood Leopard Moth.
" " 61	Sheep Scab.
" " 62	The Pear and Cherry Sawfly.
" " 63	Destruction of Charlock.
" " 64	White Root Rot.
" " 65	The White Ermine Moths.
" " 66	Workmen's Compensation Act, 1900.

Copies of the above leaflets may be obtained free of charge and post free on application to the Secretary, Board of Agriculture, 4, Whitehall Place, London, S.W. Letters of application so addressed need not be stamped.

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THE JOURNAL OF THE BOARD OF AGRICULTURE

Vol. VII. No. 4. MARCH, 1901.

THE BRITISH CROPS OF 1900.

In the December number of the *Journal*, attention was called to the particulars made public respecting the estimated yield per acre of each of the three principal corn crops, and also that of hops, in Great Britain in the harvest of 1900. The yield of all these crops was more or less materially below the average of the preceding decade. The official estimates of the produce of the remaining crops are now published in the usual form, and will be found to give a somewhat less unsatisfactory picture of the results of last year. The crop of potatoes proves to have been considerably, and that of peas slightly, below the decennial average, but, on the other hand, the hay and root crops of Great Britain were substantially above that average. The variation in all the crops for which returns of yield are collected, is shown in the accompanying table:

Crop.	Yield per Acre.	Above or Below Average.	Crop.	Yield per Acre.	Above or Below Average.
Wheat	<i>Bushels.</i> 28'53	- 1'62	Potatoes	<i>Tons.</i> 4'87	- 1'03
Barley	31'31	- 2'19	Turnips	14'19	+ 1'30
Oats	37'95	- 0'86	Mangold	20'42	+ 3'16
Beans	28'11	+ 0'96	Hay fr. Clover, etc.	28'96	+ 1'24
Peas	25'89	- 0'25	Hay fr. Prmt. Grass	24'42	+ 1'99
			Hops	6'78	- 1'63

Examining in detail the figures not previously issued it will be observed that, in the case of beans, the crop in 1900,

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although estimated to be about a bushel above the ten years' average, fell nevertheless two bushels per acre short of the yield returned in the preceding year.

BEANS.	Estimated Total Produce.		Estimated Yield per Acre.		Average Yield per Acre 1890-99.
	1900.	1899.	1900.	1899.	
	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>
England - - -	6,928,000	7,005,000	27'88	29'90	26'87
Wales - - -	33,000	36,000	25'34	27'29	25'12
Scotland - - -	427,000	440,000	32'89	33'66	32'35
Great Britain -	7,388,000	7,481,000	28'11	30'09	27'15

The yield of peas was slightly under average in Great Britain as a whole, and still more markedly below the yield of 1899. The decline was, however, not everywhere obvious, there being, in fact, many more English counties with an over-average than with an under-average crop, while the small areas grown in Wales and Scotland gave a better crop in the past season than in 1899.

PEAS.	Estimated Total Produce.		Estimated Yield per Acre.		Average yield per Acre. 1890-99.
	1900.	1899.	1900.	1899.	
	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>
England - - -	3,995,000	4,359,000	25'94	27'31	26'20
Wales - - -	34,000	35,000	21'65	21'22	19'60
Scotland - - -	32,000	27,000	25'21	24'04	24'77
Great Britain -	4,061,000	4,421,000	25'89	27'23	26'14

The potato crop in 1900 appears to have been the smallest recorded since these returns were first collected in 1884. The yield per acre was estimated at a ton below the average, and at three-quarters of a ton less than the indifferent crop

f 1899. The deficiency would seem to have been almost universal throughout Great Britain, only three English, one Welsh, and six Scotch counties showing any indication of escaping the general scarcity.

POTATOES.	Estimated Total Produce.		Estimated Yield per Acre.		Average Yield per Acre. 1890-99.
	1900.	1899.	1900.	1899.	
	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>
England - - -	1,986,000	2,254,000	5'00	5'81	6'03
Wales - - -	153,000	173,000	4'61	5'24	5'68
Scotland - - -	596,000	650,000	4'54	5'11	5'60
Great Britain -	2,735,000	3,077,000	4'87	5'62	5'90

The estimated yield of turnips and swedes in 1900, on the contrary, presented a very marked contrast to the unprecedentedly low return of the preceding year. The magnitude of the change is evidenced by the estimated total produce reaching very nearly 24,000,000 tons as against 16,000,000 tons in 1899. The yield exceeds that of the previous season by nearly 5 tons per acre, and the contrast was even greater in England than in Scotland, where the failure of the crop in 1899 was not so pronounced.

TURNIPS AND SWEDES.	Estimated Total Produce.		Estimated Yield per Acre.		Average Yield per Acre 1890-99.
	1900.	1899.	1900.	1899.	
	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>	<i>Tons.</i>
England - - -	15,855,000	9,574,000	13'66	7'95	12'08
Wales - - -	966,000	735,000	15'34	10'99	14'73
Scotland - - -	7,139,000	5,752,000	15'34	12'23	14'85
Great Britain -	23,960,000	16,061,000	14'1	9'23	12'89

The mangold crop of 1900 was estimated at nearly 20½ tons per acre, a figure which, with one exception (1886),

is the heaviest on record. In the Eastern division of England the yield was estimated at exactly 19 tons per acre, while in the Western counties, representing, however, only half the acreage devoted to this crop in the Eastern division, it was nearly 23 tons.

MANGOLDS.	Estimated Total Produce.		Estimated Yield per Acre.		Average Yield per Acre 1890-99.
	1900.	1899.	1900.	1899.	
	Tons.	Tons.	Tons.	Tons.	Tons.
England	8,243,000	6,378,000	20'51	17'56	17'29
Wales	171,000	130,000	17'37	14'64	16'06
Scotland	49,000	30,000	18'34	16'87	16'95
Great Britain	8,463,000	6,538,000	20'42	17'48	17'26

The hay crop, both from clover and rotation grasses, and also from permanent grass, showed a satisfactory excess over the average, although it must be borne in mind that the decennial standard of comparison has been appreciably lowered by the elimination of 1889—a year of maximum yield—and the inclusion of 1899—a year of deficient yield.

Hay Cut from Clover and Rotation Grasses.	Estimated Total Produce.		Estimated Yield per Acre.		Average Yield per Acre 1890-99.
	1900.	1899.	1900.	1899.	
	Tons.	Tons.	Cwts.	Cwts.	Cwts.
England	2,261,000	2,208,000	28'29	27'22	27'43
Wales	244,000	241,000	24'75	24'28	22'86
Scotland	683,000	595,000	33'64	30'20	31'05
Great Britain	3,188,000	3,044,000	28'96	27'48	27'72

There was a good deal of local variation between the estimated yields of particular counties. In Scotland, as the

accompanying tables show, the results were relatively higher in the case of both hay crops than in England.

The yield of hay cut from permanent grass was, however, more uniform throughout England than in Scotland, where the results in different counties varied widely, although the crop as a whole was 3 cwts. above average, while in England the excess was barely 2 cwts.

Hay Cut from Permanent Grass.	Estimated Total Produce.		Estimated Yield per Acre.		Average Yield per Acre 1890-99.
	1900.	1899.	1900.	1899.	
	Tons.	Tons.	Cwts.	Cwts.	Cwts.
England	4,670,000	4,380,000	24'73	23'34	22'74
Wales	463,000	414,000	19'91	18'09	17'99
Scotland	207,000	185,000	31'44	29'03	28'34
Great Britain	5,340,000	4,979,000	24'42	22'95	22'43

RECENT EXPERIMENTS IN THE MANURING OF POTATOES.

During the past few years a considerable number of experiments in the manuring of potatoes have been conducted in connection with several of the collegiate centres of agricultural instruction in England and Scotland. Some of these experiments have been directed towards an investigation of the characteristics of some of the multitudinous varieties of potatoes at present more or less extensively cultivated, with a view to determine their relative crop-producing powers, the eating quality of their tubers, and other properties that affect the sum of their total value. The greater number of the experiments have, however, been designed with a view to the discovery of the most efficacious and most economical methods of manuring the potato crop, and it is with these only that it is proposed to deal in this article. The experiments which fall to be considered were conducted in Cheshire, Yorkshire, Northumberland, and Durham, and in a number of counties in the centre and south-west of Scotland. The experiments in Cheshire were carried out in the years 1898 and 1899 on the College Farm at Holmes Chapel, and the reports on them were written by Principal Gordon. Those in Northumberland were conducted in the same years by the Durham College of Science on the experimental farm at Cockle Park; while experiments were also carried out under the direction of the College on six farms in the county of Durham in the year 1899. The details of these experiments are given in the report prepared by Professor Somerville and members of his staff. The Yorkshire experiments were conducted in the same years on the College Farm at Garforth and on other farms in the county, and those of the year 1899 were designed and reported on by Professor J. R. Campbell. The Scotch

experiments were conducted during the years 1897 and 1898 by the Agricultural Department of the Glasgow Technical College, and in 1899 by the West of Scotland Agricultural College, into which the former Department had been merged. These experiments were carried out on twelve farms in 1897, on nineteen farms in 1898, and on seventeen farms in 1899, and the published reports on them were prepared by the present writer. In all cases where the experiments were conducted on more farms than one, the reports have been based mainly on the average results, and it is the generally accepted opinion that the average results of a sufficient number of properly conducted field experiments are of much greater value than those of any single experiment. In dealing with these various experiments and the reports on them, the series reported on by Professor Somerville, Mr. Solomon, and Mr. Lawrence will for the sake of convenience be referred to as the "Durham" experiments; those reported on in the Yorkshire College publications by Professor Somerville and Professor Campbell, as the "Yorkshire" experiments; those reported on by Principal Gordon as the "Cheshire" experiments; while the Scotch series will be designated the "Glasgow" experiments.

It is in some respects unfortunate that the various series of experiments were designed independently of each other. Had the same schemes been adopted at all the centres, strong confirmation would have been afforded of results obtained on all alike, while consistent variations would have thrown light on the influence exercised on the results by differences in climate and in soil. On the other hand, the separate schemes that have been adopted have admitted of inquiry into a much greater number of questions than could have been overtaken in any single experiment jointly carried out by all the Colleges, while the variations in the plans followed have not been so wide as to preclude useful comparisons of many of the results.

Influence of Variety.

The chief object aimed at in most of these experiments has been to discover the cheapest and most effective method of

manuring the potato crop, but incidentally some valuable information has been obtained on some other points of great practical importance. One is the extent to which the effect of any manures applied to the crop is controlled by the inherent productive capacity of the particular variety of potato grown. This was very well illustrated in the Cheshire experiments of 1899, where manures were applied to the two varieties British Queen and Hough Giant. The application of farmyard manure at the rate of 15 tons per acre produced an increase in the yield of the British Queen of 9 tons 18½ cwt. potatoes, while in the Hough Giant the same manure gave an increase of only 7 tons 10 cwt. On two other plots a small dressing only was applied of a complete artificial manure, which produced an increase of yield in the British Queen of 7 tons 1 cwt. per acre, but only 3 tons 1¼ cwt. in the Hough Giant potato. Both results indicated a capacity in the British Queen potato to respond to the application of manures in a degree quite impossible to the Hough Giant.

In the Durham experiments of 1898 on plots without manure, the Up-to-Date potato gave a yield of 1 ton 17 cwt. tubers more than the Bruce potato. But when a dressing of 9½ cwt. artificial manure was applied, the produce of the Up-to-Date potato was increased by 4 tons 14 cwt., while that of the Bruce was only increased by 3 tons 6 cwt..

In the Glasgow experiments of 1899 a similar contrast was found between the Up-to-Date and the Maincrop potatoes, both being varieties extensively cultivated in Scotland at the present time. On the average of seventeen farms the Maincrop potato gave a yield without manure of 4 tons 2½ cwt. per acre, while the Up-to-Date gave 4 tons 13 cwt. The latter potato proved, therefore, the more productive by the moderate amount of 10½ cwt. But when manures were applied the results shown below were obtained.

On each of the three plots treated with different kinds and quantities of manures it was found that the manures capable of producing an increase of over 5 tons per acre in the yield of the Up-to-Date potato were unable to produce more than about 3 tons increase in the Maincrop. The uniformity of the differences on the several plots, each of

which was quite independent of the others, was so striking, and the number of farms on which the experiments were conducted was so great, as to exclude any probability of error. The differences revealed in these several experiments in the capacity of varieties of potatoes to respond to the application of manures constitute a discovery of exceptional practical

Effect of Manures on the Up-to-Date v. Maincrop Potato.

Plot.	Manures applied per acre.	Increase per acre produced by Manures on the Maincrop Potato.		Increase per acre produced by Manures on the Up-to-Date Potato.	
		Tons. Cwt.		Tons. Cwt.	
A.	20 tons farmyard manure	3	4	4	18
B.	10 tons farmyard manure, with about 6½ cwt. artificials	3	7½	5	8½
C.	11 cwt. artificial manure only	3	1	5	2½

importance. This becomes very evident when it is considered that the difference in value of the increased produce of the Up-to-Date over that of the Maincrop potato in the Glasgow experiments was equal to, or greater than, the whole cost of the manures applied. The obvious inference is that the whole question of the economy of applying particular manures to the potato crop must depend very largely on the selection for cultivation of the varieties that possess the greatest capacity for responding to the treatment accorded to them, and that manures which will give a very profitable return when applied to one kind of potato may not do so when applied to another.

A curious and suggestive feature in these results was the small difference in cropping capacity shown by the Up-to-Date and Maincrop potatoes on unmanured land as compared with that shown when manures were applied. On the unmanured land the yield of the Up-to-Date exceeded that of the Maincrop by only 10½ cwt., while on the fully manured land the difference in yield amounted to nearly 2 tons per

acre. This variation in the relative production with and without manure suggests the possibility that on poor land and with scanty manuring the yield of the different kinds of potatoes may approach more nearly to a uniform standard, but that with liberal manuring a much wider variation in production may be manifested, according to the inherent capacity for growth of the varieties of potatoes grown.

General Objects of the Experiments.

In ordinary farm practice potatoes are rarely grown except with applications of farmyard manure, to which artificial manures may or may not have been added. This fact appears to have been kept in view in the preparation of all the schemes of experiments carried out by the various colleges, for all of them have been designed with evident relation to this practice. Hence the schemes of the colleges in relation to this point show a general uniformity of plan, which favours their easy comparison. In most of them there were plots to which farmyard manure was applied alone in the quantity usually given by farmers, along with plots to which, in addition to farmyard manure, there were applied dressings of artificial manures of various kinds and quantities, the main object being to discover which of these supplementary dressings would give the greatest increase of crop, and which would prove most profitable. In most of the schemes plots were also included to determine whether full crops of potatoes could be grown with artificial manures without farmyard manure. In the Glasgow experiments throughout, and also in the Yorkshire experiments of 1899, one of the chief objects aimed at was to determine whether small dressings of farmyard manure with supplementary applications of artificials would not prove more effective and profitable than the ordinary full dressings of farmyard manure applied alone. Along with these leading objects of investigation there were included in all the schemes a number of subordinate inquiries which related chiefly to the various forms and quantities in which the different kinds of artificial manures could be employed. In the Yorkshire and the Glasgow series an important section of the work dealt with the effects produced

by manures on the quality and the feeding value, as well as on the quantity of the potatoes grown. But the limitations of space make it impossible to devote attention here to any but the leading objects of the experiments.

The efficacy of Farmyard Manure when applied to the Potato Crop.

The results of the various experiments supply fresh and valuable data on the amount of effect produced by farmyard manure on the potato crop. These data are as follows:—

Series of Experiments in which the result was obtained.	Year in which the Experiment was conducted.	Number of Experiments from which the Result was calculated.	Variety of Potato Grown.	Quantity of Farmyard Manure applied.	Total Increase of Crop produced by the Farmyard Manure over the Unmanured Plots.			Increase of Crop obtained for each ton of Farmyard Manure applied.		
				Tons.	Tons.	Cwt.	Qrs.	Tons.	Cwt.	Qrs.
Durham -	1875	1	Up-to-Date	12	5	2	0	0	5	2
do. -	1899	6	Several Varieties	12	2	13	0	0	4	3
Cheshire -	1869	1	British Queen	15	7	13	1	0	13	1
Yorkshire -	1862	1	Bruce	9	6	4	0	0	11	1
do. -	do.	4	—	10	4	10	0	0	9	0
do. -	1869	5	Several Varieties	20	4	3	0	0	4	0
do. -	do.	do.	do.	10	1	11	1	0	5	1
Glasgow -	1897	6	Maincrop	15	2	6	1	0	3	0
do. -	do.	5	Several Varieties	15	2	16	2	0	3	3
do. -	1898	19	Maincrop	20	4	19	2	0	5	0
do. -	do.	do.	do.	10	2	6	2	0	7	0
do. -	1899	9	do.	10	5	1	0	0	2	1
do. -	do.	do.	do.	10	2	1	3	0	4	1
do. -	do.	5	Up-to-Date	20	4	13	0	0	3	0
do. -	do.	do.	do.	10	2	0	2	0	0	3

These figures prove quite conclusively the value and reliability of farmyard manure as a manure for the potato crop. In no single instance in all the trials recorded was there a case found in which farmyard manure failed to produce a considerable increase of crop. Naturally the amount of increase varied greatly, and the conditions under which the experiments were conducted were so diverse that it is hardly possible to deduce from all the results a useful average. The

varieties of potato grown were seldom the same, and in the different series of experiments the dressings of farmyard manure applied varied not only in quality, but also in the quantity applied even on the same station. The soils were of different character and the climatic conditions varied, not only at the several centres, but also in the successive seasons. In looking at these figures it is difficult to avoid a regret that the schemes of the several colleges should not have been made identical in regard to the variety of potato grown, and in the inclusion of at least one plot to which the same quantity of farmyard manure had been applied. In spite of the other conditions of variation an average result of much value could then have been obtained. As the figures stand, the most useful information is to be found in the extremes of variation that occurred. The smallest increase obtained for each ton of farmyard manure applied was $3\frac{1}{4}$ cwt., while the largest was $13\frac{3}{4}$ cwt. The effects generally produced would indicate the latter result to be somewhat abnormal, and more commonly the return for each ton of manure varied between 4 cwts. and 8 cwts. potatoes. The average value of a potato crop, including not only large sized eating potatoes, and seconds or potatoes of seed size, but also the small and damaged tubers suitable only for feeding farm stock, may be fairly put at £2 10s. per ton. On the lowest increase obtained in these experiments the money return for the farmyard manure was therefore 8s. $1\frac{1}{2}$ d. per ton, and on the highest, £1 14s. 5d. While an exact average can hardly be fixed, it may nevertheless be fairly concluded that neither the maximum nor the minimum shown in these results represents the return that a farmer would be fairly entitled to expect for his farmyard manure on the average of a consecutive series of years. If it be assumed that his average return would be more nearly represented by 6 cwt. per acre he would then receive 15s. for every ton of farmyard manure applied to the potato crop. From that there falls deducted the expenses incurred in the handling and spreading of the 6 cwt. extra yield, but on the other hand there would remain a large residue of farmyard manure in the

soil to enrich it and to add to its future fertility, and this residue, at the lowest computation, would certainly far more than repay the greater labour costs involved in the treatment of the larger crop. Altogether, therefore, having regard alike to the certainty of the action of farmyard manure and to the amount of increase of crop it produces, the results of all these experiments give ample support to the general practice followed by farmers of applying their farmyard manure to the potato crop. It follows also that where the manure from town stables and byres is purchased for application to the potato crop, at the prices at which it has been obtainable for many years, an exceedingly profitable return for the money expended on the purchase can be got in the first year alone, if the manure be utilized in the growth of potatoes.

Influence of Quantity of Manure on the Return Obtained.

It has been already pointed out that the amount of increase of crop produced by manures is greatly dependent on the variety of potato grown, but in the Glasgow reports attention has also been repeatedly called to the fact that the effect produced by farmyard manure also depends in a very marked degree on the quantity applied. This is shown in the results both of the 1898 and 1899 experiments recorded above, but the figures of 1898 may be selected for illustration. In that year the average increase of crop produced when farmyard manure was applied at the rate of 20 tons per acre was 4 tons 19 cwt. 2 qrs., while, when only the half of that quantity of farmyard manure was given, the increase obtained amounted to 3 tons 9 cwt. 2 qrs. While the first 10 tons of manure applied were capable of increasing the crop by 3 tons 9 cwt. 2 qrs., the addition of a second 10 tons of manure was able to produce a further increase of only 1 ton 10 cwt. While every ton of the first 10 tons of farmyard manure gave an increase, therefore, of 7 cwts. potatoes, every ton of the second 10 tons gave an increase of only 3 cwts. potatoes. At the price of £2 10s. per ton for the potatoes, each of the first 10 tons of farmyard manure gave a return in crop of the value of 17s. 6d., while each ton of the second 10 tons gave a return of the value of 7s. 6d. only, or less than half as much.

The important principle that manures, when given in quantities in excess of a certain limit, produce a constantly diminishing effect, was also exemplified in the use of artificial manures in the Durham experiments of 1899.

Experiments in Co. Durham in 1899—Average of Six Farms.

Plot.	Manures Applied per Acre.	Increase over Unmanured Crop.		
		Tons cwt. qrs.		
10	12 tons farmyard manure	2	16	3
6	" " " with 12½ cwt. mixed artificials	3	19	3
8	" " " with 6½ cwt. " "	3	14	1

In this instance 6½ cwt. of mixed artificials added to 12 tons of farmyard manure gave a return of 17½ cwt. potatoes, but when another 6½ cwt. of the same artificials were added the further increase of the crop amounted to only 5½ cwt., or less than one third of that produced by the first application.

A somewhat similar result is recorded in the Glasgow reports of 1899. In the experiments of that year the addition of 6 cwt. mixed artificials to 20 tons farmyard manure gave an average increase of crop of 7½ cwt. potatoes; but when the same artificials were added to 10 tons of farmyard manure they gave an increase of 18 cwt., or nearly three times as much.

All these results, found on a crop which responds readily to the action of manures, and which gives a more profitable return for them than most crops grown on the farm, indicate very clearly the importance of determining for each crop not only the most suitable kind of manure, but also the quantity in which it ought to be employed. It is obvious that in all cases there is a point beyond which the application of manure ceases to be profitable, though the limit is one that may vary with every season as well as with every crop. But even an approximate determination of the maximum profit limit up to which manures should be applied, but beyond which the application should cease, seems to be one of the objects that ought to be kept steadily in view in the arrangement of further field experiments.

What Combination of Artificial Manures added to a Dressing of Farmyard Manure will give the most Profitable Results?

This was the most important practical question dealt with in the experiments, and in all the series an attempt was made to find an answer to it. The combinations found most effective in the various experiments are shown in the following table:—

Series of Experiments in which the Result was obtained.	Year in which the Experiment was conducted.	Number of Experiments from which the Result was calculated.	Manures Applied per Acre.	Total Produce of Crops per Acre.		Increased Yield Produced by Artificials added to the Farmyard Manure.	Value of the Increase at 6s. rose. per Ton.	Cost of the Artificial Manures.
				Tons.	Cwt. Qrs.	Tons. Cwt. Qrs.	£ s. d.	£ s. d.
Cheshire.	1893	1	15 tons Farmyard Manure.	16	3 1			
do.	do.	do.	15 tons Farmyard Manure along with 3 cwt. Superphosphate, 1 cwt. Sulphate of Ammonia, 1 cwt. Muriate of Potash.	19	14 1	3 9 0	8 11 6	1 10 0
do.	1899	1	15 tons Farmyard Manure.	10	0 0			
do.	do.	do.	15 tons Farmyard Manure with the same Artificials as in 1898.	17	14 2	7 11 3	3 9 3	1 19 3
Yorkshire.	1898	1	9 tons Farmyard Manure.	6	1 0			
do.	do.	do.	9 tons Farmyard Manure along with ½ cwt. Sulphate of Ammonia, ½ cwt. Superphosphate, 1 cwt. Sulphate of Potash.	7	0 0	1 5 0	1 2 0	0 13 3
Yorkshire.	1898	1	10 tons Farmyard Manure.	11	7 2			
do.	do.	do.	10 tons Farmyard Manure along with 1 cwt. Sulphate of Ammonia, 1 cwt. Superphosphate, 1 cwt. Sulphate of Potash.	16	11 1	5 11 0	1 7 0	1 11 1
Durham.	1898	2	15 tons Farmyard Manure.	10	1 0			
do.	do.	do.	15 tons Farmyard Manure along with 1½ cwt. Sulphate of Ammonia, 6½ cwt. Superphosphate, 1 cwt. Sulphate of Potash.	19	15 3	9 13 3	1 6 11	1 17 0
do.	1899	1	10 tons Farmyard Manure.	9	18 2			
do.	do.	do.	12 tons Farmyard Manure along with 1 cwt. Sulphate of Ammonia, 5 cwt. Superphosphate, 4 cwt. Kainit.	12	9 1	2 11 1	6 3 2	1 14 1

Series of Experiments in which the Result was Obtained.	Year in which the Experiment was conducted.	Number of Experiments from which the Result was Calculated.	Manures Applied per Acre.	Total Produce of Crops Per Acre.	Increased Yield Produced by Artificial added to the Farmyard Manure.	Value of the Increase at £ s. d. Per Ton.	Cost of the Artificial Manures.
Durham.	1899	6	12 tons Farmyard Manure.	Tons. Cwt. Qrs. 8 16 1	Tons. Cwt. Qrs.	£ s. d.	£ s. d.
do.	do.	do.	12 tons Farmyard Manure along with 2½ cwt. Sulphate of Ammonia, 5½ cwt. Superphosphate, 5 cwt. Kainit.	10 9 1	1 13 0	4 2 6	2 13 6
Glasgow.	1897	6	15 tons Farmyard Manure.	6 9 1			
do.	do.	do.	15 tons Farmyard Manure along with 4 cwt. Superphosphate, 1 cwt. Sulphate of Ammonia, 1 cwt. Sulphate of Potash.	7 4 3	0 15 2	1 18 9	1 5 2
do.	do.	5	15 tons Farmyard Manure.	6 2 0			
do.	do.	do.	15 tons Farmyard Manure along with 4 cwt. Superphosphate, 1 cwt. Sulphate of Ammonia, 1 cwt. Sulphate of Potash.	7 1 0	0 19 0	2 7 6	1 8 2
do.	1898	19	15 tons Farmyard Manure.	8 4 0			
do.	do.	do.	15 tons Farmyard Manure along with 4 cwt. Superphosphate, 1 cwt. Sulphate of Potash, 113 lbs. Nitrate of Soda.	9 12 0	1 8 0	3 10 0	1 13 0
do.	1899	9	20 tons Farmyard Manure.	7 6 2			
do.	do.	do.	20 tons Farmyard Manure along with 4 cwt. Superphosphate, 1 cwt. Sulphate of Ammonia, 1 cwt. Sulphate of Potash.	7 14 1	0 7 3	0 19 5	1 13 3
do.	do.	do.	15 tons Farmyard Manure.	6 4 2			
do.	do.	do.	15 tons Farmyard Manure along with 4 cwt. Superphosphate, 1 cwt. Sulphate of Ammonia, 185 lb. Muriate of Potash.	7 12 1	1 6 0	3 5 0	1 10 0
Glasgow.	1899	5	20 tons Farmyard Manure.	9 11 1			
do.	do.	do.	20 tons Farmyard Manure along with 4 cwt. Superphosphate, 1 cwt. Sulphate of Ammonia, 1 cwt. Sulphate of Potash.	9 17 3	0 6 2	0 16 3	1 13 3
do.	do.	do.	15 tons Farmyard Manure.	7 19 2			
do.	do.	do.	15 tons Farmyard Manure along with 4 cwt. Superphosphate, 1 cwt. Sulphate of Ammonia, 185 lb. Muriate of Potash.	10 1 2	2 2 0	5 5 0	1 16 9

In examining these figures it may be proper first of all to dismiss from consideration all the experiments conducted on one farm only, also such very abnormal crops as those grown both in the years 1898 and 1899 on the Cheshire farm, where, presumably, the high yield was due to a rich soil and to a vigorous and productive new variety of potato. Apart from these exceptional results an examination of the returns shows that the efficacy or otherwise of an addition of properly selected artificials to a dressing of farmyard manure is mainly dependent on the amount of the latter applied. The evidence on this point is derived solely from the Glasgow experiments, for in none of the others did the dressing of farmyard manure given to the crop exceed 15 tons per acre, and on most of them the quantity was either 9, 10, or 12 tons only.

In the Glasgow experiments of 1897 the quantity was 15 tons per acre, but in the succeeding years two dressings were applied to different plots, one of ten tons and one of 20 tons per acre. In the Durham duplicate experiments of 1897 15 tons were applied, as in the Glasgow experiments of 1897, and it may be seen that artificials added to this quantity of farmyard manure produced in both series of experiments a fair increase of crop, which repaid the cost of the manures and left a moderate profit, amounting in one case to 9s. 11d., in another to 10s. 7d., and in a third to 19s. 4d. per acre. It has to be remembered, however, that these represent the most profitable returns obtained in the experiments, and that on other plots to which different combinations of artificial manures had been applied the amount of profit was less, or an actual loss was incurred. There is a very distinct indication in all the results that when farmyard manure is applied to the crop in a quantity as large as 15 tons per acre, artificial manures must be carefully selected and used with skill if their employment is to prove profitable, and that even when so employed the amount of profit per acre to be got from their use is not likely to be great. At any rate the addition to 15 tons of farmyard manure of the quantities of artificial manures employed in these experiments seems to have brought the total manurial

application as closely as possible to the maximum profit point. This view receives strong support from the results obtained in the Glasgow experiments of 1899. These experiments were carried out on two varieties of potatoes, one of which, the Up-to-Date, is known to be one of the most productive potatoes in cultivation, and one, therefore, on which large dressings of manure would be most likely to give a sufficient and a profitable increase of crop. But on both varieties of potatoes, on the average of nine farms in the one case and of five in the other the addition of 6 cwt. of artificial manure per acre to a dressing of 20 tons farmyard manure produced only a small increase of crop, which, in both sets of experiments, had a value equal to about half the cost only of the artificials applied. The indication of all the experiments appears to be that under ordinary conditions an application of properly selected artificial manures may be profitably applied to the potato crop along with 15 tons farmyard manure; but that when the quantity of the latter exceeds 15 tons per acre the addition of artificials is quite as likely to result in a loss as in a profit.

On the other hand, when the quantity of farmyard manure given to the potato crop does not exceed 10 or 12 tons per acre, the evidence of the experiments is that the addition of artificials then becomes highly efficacious and profitable. Thus, in the Durham series of 1897, when 12 tons of farmyard manure were employed, a large addition of artificials gave a profit of £1 9s. per acre; while in the Yorkshire experiments of 1898 and in the Glasgow experiments of 1898 and 1899, in all of which farmyard manure was applied at the rate of 10 tons per acre, the profits arising from the addition of artificials which cost from about £1 8s. to £1 17s. ranged between £1 8s. 3d. and £3 8s. 3d. per acre. It is obvious, therefore, that when the dressing of farmyard manure falls to 10 tons per acre it is insufficient of itself to produce a full potato crop, and artificial manures added to farmyard manure can then be relied on to give a very profitable increase.

Can Artificial Manures be substituted successfully for a Part of the Farmyard Manure?

It has just been seen that artificial manures added to a moderate dressing of farmyard manure are capable of giving such an increase of crop as will repay their cost and leave a sufficient margin of profit, but it has still to be shown whether, by such additions of artificials to a small dressing of farmyard manure, crops can be grown as large as those obtained in ordinary practice from large applications of farmyard manure alone. This question has been dealt with only in the Yorkshire experiments of 1899 and in the Glasgow experiments of 1898 and 1899. The results were as follows:—

YORKSHIRE, 1899—AVERAGE OF 5 FARMS.				
Manures Applied per Acre.		Total Produce of Crop per Acre.		
		Tons.	Cwt.	Qrs.
(a)	20 tons Farmyard Manure	10	10	3
(b)	10 tons Farmyard Manure 1½ cwt. Sulphate of Ammonia 6 cwt. Superphosphate 2 cwt. Sulphate of Potash	10	6	3

GLASGOW, 1898—AVERAGE OF 19 FARMS.				
		Tons.	Cwt.	Qrs.
(a)	20 tons Farmyard Manure	9	15	0
(b)	10 tons Farmyard Manure 4 cwt. Superphosphate 1 cwt. Sulphate of Potash 143 lbs. Nitrate of Soda	9	12	0

GLASGOW, 1899—AVERAGE OF 9 FARMS.				
		Tons.	Cwt.	Qrs.
(a)	20 tons Farmyard Manure	7	6½	0
(b)	10 tons Farmyard Manure 4 cwt. Superphosphate 1 cwt. Sulphate of Ammonia 185 lbs. Muriate of Potash	7	10½	0

Alike in the Yorkshire experiments of 1899 and in the Glasgow experiments of 1898 the dressing of farmyard manure alone produced slightly larger crops, but in the Glasgow experiments of 1899 it was somewhat surpassed by the combined application of farmyard manure and artificials. In all the comparisons, however, the differences were slight. Practically the crops were equal in the two methods of manuring, and the experiments have therefore shown that it is quite possible to grow as large crops of potatoes with a half dressing of farmyard manure as with a full dressing, provided the half dressing be supplemented with suitable artificials.

What is the most suitable Artificial Manure to apply along with Farmyard Manure to the Potato Crop?

The majority of the plots in all the experiments were designed to supply an answer to this inquiry, and there is a general agreement in the main result. The evidence is ample, except in those experiments in which the artificials produced a very limited effect, that the artificial manure for this purpose must be a complete manure containing the three substances nitrogen, phosphoric acid, and potash, and that the omission of any one of these ingredients lessens the efficacy of the manure and reduces both crop and profits.

The effects of using incomplete mixtures of artificial manures from which one of the three essential elements was omitted produced, however, somewhat variable results in the different series of experiments. This might depend partly on the total amount of effect produced by the artificial manures, partly on the nature of the soil, and probably not a little on the quality and quantity of the farmyard manure employed, as well as on other conditions.

The most successful combinations of artificials employed in the various series of experiments to supplement farmyard manure have been already given, but special attention may be again directed to those which produced the largest yields of crop in the Glasgow experiments of 1898 and 1899.

In 1898 the most effective combination was found to be :—

4 cwt. Superphosphate (30 per cent.)	} per acre.
1½ „ Nitrate of Soda.	
1 cwt. Sulphate of Potash (96 per cent.)	

while in 1899 better results were got from

4 cwt. Superphosphate (30 per cent.)	} per acre.
1 cwt. Sulphate of Ammonia.	
1½ cwt. Muriate of Potash (70 per cent.)	

Can Potatoes be successfully grown with Artificial Manures alone without Farmyard Manure?

This inquiry is of less practical value than those already considered, for it is not recommended by anyone that a manure which has shown itself so suitable for the potato crop as farmyard manure should be entirely withheld from it. Moreover, it is recognized that, however efficacious artificial manures may be found under normal weather conditions, they are liable to prove much less effective than farmyard manure in seasons of drought. Hence those who recommend, as a result of their experiments, that farmyard manure should be applied to the potato crop in moderate rather than in large quantity, and that suitable artificials should be given with it, do not advise that reliance should be placed on artificials alone to the entire exclusion of farmyard manure. Nevertheless there may occur circumstances in which farmyard manure cannot be given in any quantity, and when reliance has to be placed solely on artificial manures. If so, all the experiments in which suitable artificial manures have been supplied in sufficient quantity show that in ordinary seasons they will be quite adequate to the production of good crops of potatoes. But it has also been demonstrated clearly enough in the various experiments, that, unless the artificials be composed of a suitable combination of ingredients and be given in sufficient quantity, they will not produce a yield of crop equal to that grown with full dressings of farmyard manure. In the Yorkshire experiments of 1898, for example, not one out of four combinations of artificials employed in the county series produced a crop equal to that grown on 10 tons farmyard manure, and the experiments of 1899 gave similar results. In the Durham experiments of 1898, also, the best of four combinations of artificials fell far short of producing a crop equal to that grown on 15 tons farmyard manure.

On the other hand, in the Durham experiments of 1899 four new combinations of artificials were employed, each of

which produced a crop larger by about 15 cwt. per acre than that grown on 12 tons farmyard manure. In the Glasgow experiments of 1899, also, three combinations of artificials were tried, each of which produced a crop nearly 1 ton per acre heavier than that grown with 10 tons farmyard manure alone, and which only fell slightly short of that grown with 20 tons farmyard manure.

These successful combinations of artificial manures, and the amount of effect they were capable of producing on the potato crop, as compared with farmyard manure, are fully shown in the following instructive table:—

Experiments on the Maincrop Potato in 1899—average of 9 farms (Glasgow series).

Plot.	Manures Applied per Acre.	Total Produce per Acre.		
		Tons.	Cwts.	Qrs.
A	No Manure	4	2	2
B	10 tons Farmyard Manure	6	4	1
C	20 " " " "	7	6	2
D	6 cwt. Superphosphate 2 " Sulphate of Ammonia 1 " Nitrate of Soda 2 " Sulphate of Potash (91 per cent.)	7	3	2
E	6 cwt. Superphosphate 2 " Sulphate of Ammonia 1 " Nitrate of Soda 247 lbs. Muriate of Potash	7	2	2

R. PATRICK WRIGHT.

SEEDS FOR HAY AND PASTURE.

In the spring of 1899 the Agricultural Department of Reading College commenced three sets of experiments dealing with different seeds mixtures for hay and pasture. These have been made at the Home Farm, Strathfieldsaye (Berkshire); on land at East Thorpe, Reading (Berkshire); and on the Plantation Farm, Wolverton (Hampshire). At Plantation Farm and at Strathfieldsaye the plots are each $\frac{1}{4}$ acre in area, and at East Thorpe the plots are each $\frac{1}{8}$ acre in area. Seven plots were sown down with different grass seeds mixtures, with the object of testing their suitability for a three or four years ley. The statement on the next page gives the amounts of the different seeds sown per acre on the plots, as well as the cost at the time of sowing.

In the case of the experiments made in the Ell Field of Strathfieldsaye Home Farm the soil is a stiff clay with a few flints lying on a subsoil of the London clay. The seeds were sown in the spring of 1899, the land having previously been sown with wheat. After the wheat was harvested the young seeds did not promise well, but they made a considerable improvement in the following spring.

The plots were inspected on June 4th, 1900. At that time Plot 1 looked the best, with Plot 3 second, and Plots 5 and 6 third. Plots 2 and 4 did not look better than Plots 1 and 3. On Plots 2 and 4 only a few kidney vetch plants were present, and the few chicory and burnet plants looked unsightly and rather coarse. Plot 7 looked the most unsatisfactory, probably because of the small amount of cow-grass clover on this plot, and because the stronger grasses had not had time to establish themselves. Timothy promised

Quantities and Cost of Seeds sown per Acre.

Plot 1, costing 17s. an acre :— 5 lb. Italian Ryegrass. 12 lb. Perennial Ryegrass. 1 lb. Foxtail. 2 lb. Meadow Fescue. 2 lb. Timothy. 2 lb. Cocksfoot. 2 lb. Alsike. 2 lb. White Clover. 1 lb. Red Clover. 2 lb. Cowgrass. 1 lb. Trefoil. 32 lb. Plot 2, costing 22s. an acre. Same as Plot 1 with :— 2 lb. Burnet. 1 lb. Chicory. 1 lb. Yarrow. 2 lb. Kidney Vetch. 37½ lb. Plot 3, costing 10s. 6d. an acre :— 4 lb. Italian Ryegrass. 10 lb. Perennial Ryegrass. 1 lb. Cocksfoot. 1 lb. Meadow Fescue. 2 lb. Timothy. 2 lb. Alsike. 1 lb. White Clover. 1 lb. Red Clover. 1 lb. Cowgrass. 1 lb. Trefoil. 24 lb. Plot 4, costing 15s. 6d. an acre. Same as Plot 3 with :— 2 lb. Burnet. 1 lb. Chicory. 1 lb. Yarrow. 2 lb. Kidney Vetch. 29½ lb.	Plot 5, costing 21s. an acre :— 10 lb. Lucerne. 10 lb. Sainfoin (in the husk). 2 lb. Cocksfoot. 2 lb. Timothy. 2 lb. Tall Fescue. 1 lb. Trefoil. 2 lb. Alsike. 1 lb. Cowgrass. 10 lb. Perennial Ryegrass. 40 lb. Plot 6, costing 22s. 6d. an acre :— 35 lb. Sainfoin (in the husk). 3 lb. Lucerne. 2 lb. Cocksfoot. 2 lb. Timothy. 2 lb. Tall Fescue. 1 lb. Trefoil. 2 lb. Alsike. 1 lb. Cowgrass. 10 lb. Perennial Ryegrass. 58 lb. Plot 7, costing 22s. an acre :— 7 lb. Cocksfoot. 3 lb. Tall Fescue. 2 lb. Dogstail. 4 lb. Timothy. 4 lb. Italian Ryegrass. 2 lb. Perennial Ryegrass. 1 lb. White Clover. 2 lb. Alsike. 1 lb. Cowgrass. 1 lb. Trefoil. 1 lb. Foxtail. 2 lb. Meadow Fescue. 30 lb.
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well where it had been sown, but neither sainfoin nor lucerne was a success on this land. The herbage on the plots was cut and weighed at the end of June, 1900, when it was found that each plot produced the following amount of dry hay, calculated per acre :—

	Tons.	Cwt.	Lb.		Tons.	Cwt.	Lb.
Plot 1	1	17	0	Plot 5	1	8	0
Plot 2	1	15	0	Plot 6	1	7	0
Plot 3	1	10	0	Plot 7	1	3	0
Plot 4	1	10	0				

These results confirm the estimates made in the beginning of June. It will thus be seen that in the first year the seeds mixture sown on Plot 1 has given the most satisfactory result, and the quality of the herbage was distinctly better than on Plot 2, where, to the same mixture, burnet, chicory, yarrow, and kidney vetch had been added. The results so far go to show that, on this land, it is not advisable to include these plants in a seeds mixture. It was also evident that timothy grass was especially suitable for this heavy soil. It should be noted also that the more expensive seeds mixture on Plot 7, which practically excludes perennial ryegrass, has given a very unsatisfactory result in the first year, the results on Plot 1, which is less expensive, and includes a good deal of perennial ryegrass being much more satisfactory.

The experiments at East Thorpe, Reading, are being conducted on a piece of land on the left hand side of the Redlands Road, lying on the valley gravel. The soil is a free, rather gravelly loam, and, as it had been a market garden before commencing the experiments, it is in fairly good condition. Oats were sown on the plots in the spring of 1899, immediately after which the grass seeds were sown. The young seeds looked very well on all the plots after the oats had been harvested in the autumn of 1899.

Each plot was divided into two halves, which were placed at different parts of the experimental ground, so that any inequality of the soil might be equalised as far as possible.

The plots were inspected on May 31, 1900. At that time on Plot 1 the crop was light, of a light colour, and with few clover plants. Plot 2 was similar, but the chicory plants were strong and coarse, yarrow was fair, there was no kidney vetch, but a few strong plants of burnet. Plot 3 at that time looked the poorest, while Plot 4 was very much like Plot 2. Plot 5 at this time looked best both as to quantity and quality of herbage; the herbage was of a darker colour and was more even than that on the others. On Plot 6 the herbage was not so even, while the sainfoin plants were few and weak. On Plot 7 the strong grasses, especially cocksfoot, were well represented, but clovers were scarce.

The plots were cut and weighed on June 18th, 1900, with the following results in weight of green herbage per acre:—

	Tons.	Cwt.	Lb.		Tons.	Cwt.	Lb.
Plot 1	6	10	0	Plot 5	6	0	56
Plot 2	8	14	0	Plot 6	5	17	0
Plot 3	6	11	56	Plot 7	5	12	56
Plot 4	10	0	56				

It will take at least 3 tons of green herbage to produce one ton of hay. The hay on Plots 2 and 4 was coarse and would be almost unsaleable, because of the presence of the coarse chicory plants.

The finest quality hay was produced on Plot 5, the next best being on Plot 6, followed by that on Plots 1, 3 and 7. It should also be mentioned that had the plots been mown a week earlier Plot 5 would have given better quality hay and a heavier crop, as it was too mature at the time of cutting. On the other hand, the herbage on Plot 7 greatly improved, both in quality and quantity, in the last week before cutting, the strong grasses, especially cocksfoot, having come forward in the last week and thickened the bottom of the herbage. Clovers did not do well on any of the plots. Although the plants added to Plots 2 and 4 have greatly increased the bulk of the herbage the result cannot be said to be satisfactory.

The aftermath on the plots was examined on October 15th, 1900. On Plot 1 this was very scanty; cocksfoot, however, was more evident. On Plot 2 the chicory was very strong, the plants being from 3 to 4 feet high, and the size of the stems on the ground being from $\frac{1}{4}$ to $\frac{1}{2}$ inch in diameter; up to a foot above the ground there were leaves, and above this the flower spike; at this stage it looked coarse and anything but an article of fodder; where the chicory had not run to seed it produced a large number of root leaves. It was interesting to notice that the grasses as well as clover seem to have grown stronger under the shelter of the chicory. On Plot 3 the herbage was of much the same appearance as on Plot 1, but it was not so abundant. Plot 4 was similar to Plot 2. It is possible that if the chicory had been eaten down in time by the live stock so as to prevent stem formation, that more leaves would have been produced and that these plots would not have looked so ragged and unsightly. On Plot 5

the lucerne plants looked fresh and green and along with this the grasses looked very well, cocksfoot and the ryegrasses looking especially well. Neither sainfoin nor clovers were present. The aftermath on this plot was the best both as to quality and quantity. On Plot 6 only a few sainfoin plants were apparent, and the herbage on the plot was next in value to that on Plot 5. The aftermath on Plot 7 was even and of good quality and consisted principally of grasses. The feeding value of the aftermath was estimated as follows:—Plot 5, 5s. an acre; Plot 6, 3s. 6d. an acre; Plot 7, 2s. 6d. an acre; Plots 1 and 3, 1s. 6d. an acre. The aftermath on Plots 2 and 4 was not valued, because of the coarse character of the chicory plants present.

On this soil the following plants which were sown were sparsely represented in the autumn of 1900: sainfoin, burnet, kidney vetch, and the clovers. So far the results on this gravelly soil seem to show that the grass seeds mixture sown on Plot 5 is the most satisfactory.

The experiments at Plantation Farm, Wolverton, are being made in the Piece Field adjoining the Down, which is about 100 acres in area. The soil directly overlies the chalk, is a light sandy loam with some flinty gravel, only a few inches deep, and is a typical one for carrying sheep. It is really down land, at an altitude of about 600 feet, and is in an exposed position. Clover has not been grown on this land for many years. The seeds were sown with a barley crop in the spring of 1899, and in the autumn of that year the young seeds promised well. The plots were inspected on June 18th, 1900. The herbage on all the plots looked well, and compared favourably with the rest of the field. On Plot 1 the ryegrasses were well developed but the clovers not so much. On Plot 2 kidney vetch had done well, and was at that time in flower; chicory was neither strong nor abundant; there were only a few plants of burnet, and no yarrow. Plot 3 was quite as good as Plot 1, and here the clovers had done better; while Plot 4 had a somewhat similar appearance to Plot 2. On Plot 5 there was the heaviest yield of excellent quality herbage, there being much clover but little lucerne present. Sainfoin, however, was well developed and in

flower; perennial ryegrass was well forward; but neither timothy, cocksfoot, nor tall fescue were much in evidence. The herbage on Plot 6 was much thinner than that on Plot 5. The herbage on Plot 7 was lighter, cocksfoot, tall fescue, and foxtail not being in evidence, but timothy, meadow fescue, and perennial ryegrass had established themselves, and clovers—especially cowgrass—were well developed.

So far it looks as if the No 5 mixture is the most suitable as a seeds mixture on this land

The plots were mown on June 28th, 1900, when the herbage was made into hay and afterwards weighed. The following are the results per acre :—

	Tons.	Cwt.	Lb.		Tons.	Cwt.	Lb.
Plot 1	1	3	0	Plot 5	2	0	0
Plot 2	1	5	0	Plot 6	1	10	0
Plot 3	1	8	0	Plot 7	1	8	0
Plot 4	1	15	0				

At this centre kidney vetch proved a useful plant. On Plots 2 and 4 chicory did not prove nearly so strong a plant as at the other centres, while yarrow and burnet have not shown themselves to be valuable. The clovers and sainfoin have done much better here than at the other two centres.

A review of the results of the experiments at the three centres shows that on the heavier London Clay soil at Strathfieldsaye the seeds sown on Plot 1 have given the most satisfactory result, and the ryegrasses and timothy have so far done better on this soil than the other grasses.

On the light gravelly soil at Reading the grasses have done much better than the clovers in the first year, as the latter died out, and at this centre the quality of the herbage on Plot 5 is distinctly superior to that on any other plot. An important point also is that this plot has been greener throughout the season and has had a better bottom covering of herbage than that on any other. This was entirely due to the development of lucerne on this plot. For pasture purposes this plot has been distinctly the best.

On the chalk soil at Wolverton the clovers have done well, especially cowgrass clover. At this centre, as at Reading, plot 5 has given the most satisfactory result. It is probable that the seeds mixture sown on No. 3, with the addition of

2 lb. of kidney vetch and more cowgrass clover, would give a very good result on this land.

So far as the plants added to plots 2 and 4 are concerned, burnet has not proved useful at any of the centres; it is more in evidence at Wolverton than at the other two centres, and where it occurs it apparently greatly lessens the value of the herbage. Further it is evidently not desirable to cultivate this plant in the south of England, where it is looked upon as a troublesome weed, especially on sainfoin soils.

Chicory has grown much stronger on the gravelly soil at Reading than at the other two centres. In hay, when it develops, it produces strong, coarse stems, which are unsightly and must lessen greatly the value of the hay. It is evidently not a desirable plant to include in a seeds mixture on ordinary soils, whatever its value may be as a grazing plant on poor soils, where other pasture plants will not establish themselves.

Kidney vetch has done best on the chalk soil at Wolverton. Its success there suggests the advisability of including this plant in a seeds mixture for chalk soils; so far it has not been successful on the heavy soil at Strathfieldsaye or the light soil at Reading.

Sainfoin has established itself well on the chalk soil at Wolverton, but so far has done little at the other two centres. Lucerne has done well on the chalk at Wolverton and on the gravelly soil at Reading, but not on the clay soil at Strathfieldsaye. Among the grasses timothy and the ryegrasses have done well on the clay, the ryegrasses and meadow fescue on the chalk, and on the light gravelly soil at Reading cocksfoot and the ryegrasses were developed to the greatest extent.

DOUGLAS A. GILCHRIST.

IMPORTS OF AGRICULTURAL PRODUCE IN 1900.

The following Tables, which have been compiled from the Trade and Navigation Returns, show the quantities and values of the principal articles of agricultural produce imported into the United Kingdom during the past year compared with the similar imports for 1899.

In connection with the imports of live animals and dead meat which are shown in the first Table, it will be seen that there was a considerable reduction in the number of sheep received and some falling off in the entries of cattle, the decline in both cases being almost entirely attributable to the suspension of the shipments from Argentina, whence the consignment of cattle numbered 38,562 head, and of sheep 178,969 head, as compared with 85,365 and 382,080 respectively in the previous year. Cargoes of cattle from other Transatlantic ports were, however, on a slightly larger scale, the United States having contributed 350,209, and Canada 104,328 head, these numbers representing increases of nearly 29,000 and 10,000 over the supplies credited to the same sources in 1899. From the former country the supplies of live sheep, which amounted to 142,905 head, were also about 22,000 in excess of those of the preceding twelve months; but the shipments from the Dominion fell from 64,000 to 36,000 head.

There was an important rise in the declared value of imported cattle, the average per head being £18 4s. as compared with £17 in 1899 and £16 10s. in 1898; sheep, however, did not exhibit much change in value.

In the case of fresh meat, attention may be directed to the increase of 325,000 cwts. in the entries of beef, of which the importation has been advancing at a rapid rate in recent

years. The receipts in 1900 were over 1,000,000 cwts. greater than in 1898 and 2,000,000 cwts. more than in 1894. The United States furnished as usual approximately three-fourths of the total quantity imported. Among the other countries engaged in this trade in the past year Argentina figured prominently with a contribution of 412,000 cwts.; in 1899 the consignment from this republic amounted to only 150,000 cwts. The average value per cwt. of the fresh beef imported from all sources was 39s. 7d., or about 11d. higher than in the previous year.

There was a slight diminution in the imports of fresh mutton. Argentina and Australasia contributed 1,114,795 cwts. and 1,933,246 cwts. respectively to the supply of the past year. A noteworthy feature of the trade in imported mutton was the marked increase in the declared value, the average per cwt. having been 31s. 5d. against 31s. 7d. in 1899 and 29s. 7d. in 1898.

Table I.—Imports of Live Animals for Food, and Dead Meat.

Description.	Quantities.		Values.	
	1899.	1900.	1899.	1900.
	No.	No.	£	£
Cattle	503,504	495,134	8,572,114	9,004,529
Sheep	607,755	382,822	942,891	610,108
Total Live Animals	—	—	9,515,005	9,614,637
	Cwts.	Cwts.		
Beef, Fresh	3,802,803	4,128,130	7,345,264	8,163,348
“ Salted	178,183	194,668	230,943	259,299
Mutton, Fresh	3,446,022	3,392,850	5,439,317	5,841,566
Pork, Fresh	668,972	695,395	1,403,041	1,495,393
“ Salted	284,720	248,710	305,829	301,346
Bacon	5,804,583	5,641,248	10,399,602	11,773,969
Hams	1,978,626	1,802,670	4,094,500	4,221,817
Meat, unenumerated, Salted or Fresh	464,759	530,614	883,349	982,025
Meat, Preserved	652,421	804,471	1,895,716	2,383,510
Rabbits (dead)	377,311	473,167	638,655	730,437
Total Dead Meat	17,658,490	17,911,923	32,636,216	36,152,710

A rise in value was also the principal characteristic of the past year's import trade in bacon and hams, the average value of the former article having been 41s. 9d. per cwt., or about 5s. 11d. more than in the preceding year; while in the case of hams the value rose by 5s. 5d. to 46s. 9½d. per cwt., these figures being in both instances the highest declared value since 1894. The quantity of bacon imported in the past year was 163,000 cwts. less than in 1899; the United States sent 3,957,000 cwts., Denmark 1,095,000 cwts., and Canada 530,000 cwts., these contributions representing decreases of 132,000 cwts. and 116,000 cwts. and an increase of 75,000 cwts. respectively, as compared with the previous year's figures. In hams also there was a decline of 176,000 cwts., the importation from the United States (1,602,000 cwts.) being 222,000 cwts. less, and from Canada (196,000 cwts.) 45,000 cwts. more than in 1899. The only other item of interest in this table is the increase in the importation of rabbits, owing to much heavier shipments from Australasia.

If the amount of dead meat represented by the imported live animals be added to the quantity of imported dead meat in the above Table, it would appear that our imports of all kinds of meat in the past year amounted to about 21,521,000 cwts. of the declared value of £45,767,000.

Table II.—Imports of Dairy Produce.

Description.	Quantities.		Value.	
	1899.	1900.	1899.	1900.
	Cwts.	Cwts.	£	£
Butter	3,389,851	3,378,516	17,213,516	17,450,432
Margarine	953,175	910,416	2,549,476	2,464,839
Cheese	2,384,069	2,711,805	5,503,004	6,853,317
Milk, Condensed	824,599	986,741	1,455,033	1,743,475
Milk and Cream, Fresh	7,859	15,638	16,068	26,837
	Gt. Hundreds	Gt. Hundreds		
Eggs	16,174,756	16,881,838	5,044,402	5,406,141

With respect to the imports of dairy produce it will be seen from the foregoing Table that there was an increase in

the total value of the milk, butter, margarine, cheese, and eggs imported of about £2,164,000, our total expenditure on these commodities having amounted to £33,745,000, as compared with £31,781,000 in 1899 and £29,221,000 in 1898.

Butter did not show much variation in quantity, but there was an increase in the declared value which brought up the average from 101s. 6d. to 103s. 4d. per cwt. The quantity received from Denmark was 1,486,000 cwts., or 56,000 cwts. more than in the previous year. Our next largest contributor was Australasia, whence we imported a larger quantity than in any previous year, viz., 517,000 cwts., towards which Victoria contributed 265,000 cwts., New Zealand 164,000 cwts., and New South Wales 81,000 cwts. A decided decline was observable in the supplies from the United States and Canada, which were 56,000 cwts. and 138,000 cwts. respectively, against 159,000 cwts. and 250,000 cwts. in 1899. The receipts of butter from France, which have been slowly declining for some years past, only amounted to 322,000 cwts. The quantity of margarine imported in the past year was 33,000 cwts. less than in 1899, but it was about the average of the past five years.

A more noteworthy change is the increase of 327,000 cwts. shown in the imports of cheese. This is chiefly accounted for by larger imports from the two countries which are the principal competitors for this trade, viz., Canada, which sent 175,000 cwts. more, or 1,512,000 cwts. in all, and the United States, which sent 90,000 cwts. more, or 681,000 cwts. in all. The average declared value rose from 46s. 2d. to 50s. 7d. per cwt.

The import trade in foreign eggs, which has been steadily growing for many years past, showed a further rise in the year under review, and it may be noted that this increase was largely due to three countries, which have only recently begun to send eggs to the United Kingdom in any quantities, viz., Egypt, Morocco, and the United States. The quantity received from Egypt was 464,000 great hundreds, as compared with 255,000 in 1899, while Morocco sent 270,000 great hundreds and the United States sent 426,000, against 108,000 and 145,000 great hundreds respectively.

Russia maintained her position as the largest exporter of eggs to these shores, with consignments amounting to 4,025,000 great hundreds; Germany, with 3,514,000, showed an increase of 59,000 great hundreds; and Denmark, Belgium, and France were credited with from $2\frac{1}{4}$ to $2\frac{1}{2}$ million great hundreds each. The average declared value was 6s. 5d per great hundred of 120 eggs, a rise of 2d. over the previous year's figure.

The receipts of condensed milk increased by nearly 20 per cent., and the average value was 35s. 4d. per cwt., or about $1\frac{1}{2}$ d. more than last year. Of fresh milk and cream, the imports amounted to 15,638 cwts., the quantity credited to France being 10,750 cwts., or about 69 per cent., of the total quantity imported.

The following table shows the imports of horses, poultry, and miscellaneous animal products:—

Table III.—Imports of Horses, Poultry, and Miscellaneous Animal Products.

Description.	Quantities.		Values.	
	1899.	1900.	1899.	1900.
Horses No.	43,899	51,787	£. 1,143,090	£. 1,350,493
Poultry and Game .	—	—	785,294	1,010,327
Lard Cwts.	2,188,049	1,926,554	3,068,975	3,266,582
Tallow and stearine .	2,061,137	2,177,991	2,380,033	2,835,208
Hides "	1,210,273	1,385,879	2,788,087	3,434,493
Wool, Sheep's and Lambs' } lbs.	663,351,817	553,154,712	23,714,771	21,836,184
Sheepskins, Undressed } No.	15,478,816	15,045,195	1,506,997	1,600,723

Wool, the imports of which have been falling for some years past, further declined by over 16½ per cent. This was due mainly to smaller supplies from Australasia and the Cape. As, however, the re-exports, were less by nearly

100 million lbs., the quantity retained for home consumption, 358 million lbs., did not show much variation from that of the previous year. The average value, 9½d. per lb., was higher in 1900 by nearly 1d. per lb. The trade in dry hides from British India exhibited a considerable development, 583,000 cwts. being imported from that country in the past year compared with 217,000 cwts. in 1899 and 183,000 cwts. in 1898. The imports of wet hides declined by 130,000 cwts.

Our imports of grain and flour during the past year exhibited perhaps less change, both in quantity and value than the other articles to which reference has already been made.

Of wheat and wheat flour expressed as grain we received 98,535,000 cwts., as against 98,506,000 cwts. in 1899, a decline in the flour imports being compensated for by an increase in those of grain. The average value of the wheat grain was 6s. 10d. per cwt., or 2d. more than in 1899; while the flour was valued at 9s. 5d., or an increase of one penny per cwt.

Table IV.—Imports of Grain and Flour.

Description.	Quantities.		Values.	
	1899.	1900.	1899.	1900.
	Cwts.	Cwts.	£	£
Wheat	66,636,078	68,615,990	22,281,219	23,326,676
Wheat Meal and Flour .	22,945,708	21,544,935	10,700,980	10,102,498
Barley	17,189,358	17,054,990	4,950,132	5,152,947
Oats	15,626,730	20,109,660	4,199,724	5,236,499
Oatmeal	789,810	837,440	505,464	523,765
Maize	62,741,350	54,150,410	12,978,025	12,327,530
Maize Meal	1,814,766	1,633,505	457,534	456,449
Peas	2,752,950	2,257,079	898,951	782,599
Beans	1,877,220	1,705,760	573,891	533,118
Other Corn and Meal .	1,964,697	1,665,460	541,772	479,519
Total	—	—	58,087,692	58,921,510

Favourable harvests in Argentina enabled that country both in 1900 and in 1899 to rank next to the United States

as the principal exporter of wheat to the British market, in the past year it supplied 27 per cent. (18,524,000 cwts.), and the United States sent 47 per cent. (32,588,000 cwts.) of the total supply of wheat grain. India, which supplied 8,192,000 cwts. in 1899, provided only 9,000 cwts. in the past year. Russia, in former seasons a considerable contributor, has not been an important factor in this trade since 1897; in 1900 the Russian consignments only amounted to 4,421,000 cwts. About 83 per cent. of the wheat flour came from the United States (17,871,000 cwts.), the supplies from Canada (1,195,000 cwts.) and from Austria-Hungary (1,168,000 cwts.) being comparatively unimportant.

The barley imports of the past season are the lowest since 1892. The total for 1900 shows a decline of more than 30 per cent. from the imports of 1898 and of 28 per cent. from the average of the five preceding years. The principal feature in the trade was a decline of over 3,000,000 cwts. in the shipments from Russia, which amounted to 4,653,000 cwts., but this deficiency was nearly made up by increased importations from Turkey and the United States, whence we obtained 4,203,000 cwts. and 4,277,000 cwts. respectively.

The imports of oats, were 28·7 per cent. above those of last year, and reached a figure higher than any previously recorded. Over 53 per cent. came from Russia (10,674,000 cwts.), 28 per cent. from the United States (5,715,000 cwts.) and 7½ per cent. from Canada (1,518,000 cwts.).

Of maize, the imports dropped by nearly 14 per cent., or 8,600,000 cwts. The total was not, however, materially below the average for the past five years. From Roumania the receipts were only 2,275,000 cwts. as compared with 7,403,000 cwts. in 1899, while the shipments from the United States (38,422,000 cwts.), Argentina (6,526,000 cwts.), and Canada (4,795,000 cwts.) were all on a lower scale than in the preceding year.

The average declared value of barley is given as 6s. 1d. per cwt., or 4d. more than in 1899, while oats work out at 5s. 2½d. (a fall of 2½d.), and maize at 4s. 7d. per cwt. (a rise of 5d.).

The imports of maize meal, although somewhat less than

in 1899 were still much in excess of even the high level attained in 1897 and 1898. The imports of peas, beans, and other corn and meal were all below those of the preceding year.

Miscellaneous imports of vegetable produce are shown in the following table:—

Table V.—Miscellaneous Imports of Vegetable Produce.

Description.	Quantities.		Values.	
	1899.	1900.	1899.	1900.
			£	£
Onions - - - bush.	7,018,299	7,082,334	845,752	853,903
Potatoes - - - cwts.	5,159,011	8,903,534	1,577,726	2,232,342
Vegetables, unenumerated (including Tomatoes) - - -	—	—	1,744,558	1,557,733
	Bush.	Cwts.		
Apples - - - -	3,861,172	2,128,477	1,186,143	1,224,655
Pears - - - -	571,832	476,908	266,351	366,871
Plums - - - -	558,273	423,019	294,052	392,696
Cherries - - - -	281,236	242,505	153,642	308,395
Hay - - - - tons	131,546	109,708	429,799	—
Straw - - - - "	64,827	55,460	145,112	—
Hops - - - - cwts.	180,233	198,494	809,842	795,470
Flax - - - - tons	99,052	71,588	2,927,864	2,509,810
Hemp - - - - "	91,973	106,097	2,664,647	3,384,160
Wood and Timber (except Mahogany), loads	9,430,641	9,899,686	22,188,238	25,873,564
Clover and Grass Seeds cwts.	299,268	261,957	549,743	508,913

The imports of potatoes were greater than in any year since 1880, and exceeded those of 1899 by nearly 73 per cent.; the average value, on the other hand, fell to 5s. per cwt., from nearly 6s. 1½d. in 1899, and 5s. 8d. in 1898, the latter being the lowest average price at which potatoes had been entered since 1881. The receipts from Germany and France amounted to 1,329,000 cwts. and 2,193,000 cwts. respectively as against 758,000 cwts. and 1,750,000 in 1899, but the major part of the increase is due to much larger shipments from unspecified countries. Tomatoes from abroad were valued in the past year at £791,000 for 833,000 cwts. The imports of hops were

about 10 per cent. more than in 1899, but their declared value fell from 89s. 10d. to 80s. 2d. per cwt. With regard to wood and timber, the total value of the imports rose by 16½ per cent. from £22,188,000 to £25,874,000, an increase of no less than £3,686,000 in this item, which does not include the amounts credited to furniture woods, hardwoods, and veneers, the addition of which would add to the total value a sum of over £2,000,000.

RETURN OF MATERIAL TO THE ROOT OF THE HOP.

In the old-fashioned way of growing hops, the bine or vine, which renews itself from the permanent root every year, is trained up one or more wooden poles from 10 to 15 feet high, and when the hops are ready for picking the bine is cut near the ground level, the pole is pulled up and laid so that the pickers can conveniently pick off the hops into their bins or baskets. Of late years the poles have largely been replaced by strings of coir yarn, which are attached to permanent wires running across the hop garden and supported by stout posts. When the hops are ready for picking the string is cut at the top and falls down with the bine twined round it, so that the hops can be readily picked without any cutting of the bine. But though these systems of growing hops upon string and wire are gaining ground every year, a considerable proportion of the total acreage of hops is still grown upon poles, in which case the bine must be cut before the pole can be pulled up. At the time the hops are picked the plant as a whole is far from ripe, the bine and the leaves are green and active, sometimes the sap is still flowing so freely that the cut surfaces "bleed" considerably. On general theoretical grounds it might be expected that this cutting of the bines before the plant is ripe must result in a considerable loss to the permanent root; not only would the leaves assimilate and manufacture carbohydrates from the air, but probably some of the valuable material in the bine and the leaf would be withdrawn as the plant ripened, and be stored in the root to assist the development of the plant in the following year. Although this has never

been demonstrated, practical men had noticed that hops generally "break" more strongly in the spring where they are grown on string and not cut down at picking time than where they are grown upon poles, and it is considered one of the advantages of stringing over poling that cutting of the bines is avoided. In the garden of the South Eastern Agricultural College at Wye one of the experimental plots was formerly set with poles, and it had been noticed that on this plot the hops started more weakly than in the rest of the garden where the bines had been cut in the previous autumn.

In order to ascertain if the withdrawal of material from bine and leaf of the hop to any material extent does take place as the plant ripens and dies down, certain hills were marked, and hops, leaf, and bine were separated and weighed at the usual picking time, September 21st. Some adjoining hills were left untouched till they were dead, and on November 21st the bine and leaf was also collected and weighed.

The material thus obtained was dried, sampled, and analysed, with the results set out below* :—

	Hops.	Green Leaves.	Dead Leaves.	Green Bine.	Dead Bine.
Dry Matter % of Material as Picked.	22.5	30.33	58.1	26.1	81.3
Nitrogen % of Dry Matter - -	3.46	2.54	2.13	.984	.347
Ash " " - -	7.96	12.4	20.2	6.04	4.83
Lime " " - -	1.085	6.84	9.65	1.85	2.28
Potash " " - -	2.61	1.71	.429	1.04	.13
Phosphoric Acid " - -	1.05	.482	.605	.37	.081

To estimate from these figures the quantities per acre of each of the constituents that are removed from the land or returned to the roots it is necessary to know the weights of the hops, leaf, and bine respectively, for which purpose there

*Since the above was written a paper has appeared, by Prof. Fruwirth and Dr. Zielstorff (Land. Versuch. Stat. LV., 1901, p. 9), giving corresponding analyses of hops grown in the garden of the Agricultural College at Hohenheim, Wurtemberg, from which they arrive at a similar conclusion as to the return of nutrient material to the root.

are also available two sets of observations made by Professor Percival in 1895. The green weight per hill of six bines in each case was as follows :—

Locality.	Hops.	Leaves.	Bine.	
	Ozs.	Ozs.	Ozs.	
Goudhurst, 1895 - -	164	54	98.4	Extra heavy crop.
Paddock Wood, 1895 -	126	55.5	64.5	Very leafy.
Wye, 1900 - - -	65	49	79	Short crop.
Mean weight.	118	53	81	

Both the actual and the relative weights in these three cases vary considerably. If the mean weights be combined with the analyses before set out, on the basis of 1,000 hills to the acre, a very common rate of planting, the results give the following quantities of material as contained in an average crop at picking time :—

	Weight of Material per Acre.			
	Hops.	Leaf.	Bine.	Whole Plant.
	lbs.	lbs.	lbs.	lbs.
Green Weight - - -	7370	3310	4940	15620
Dry Matter - - -	1492	1004	1289	3785
Nitrogen - - -	50.5	25.4	12.7	88.6
Lime - - -	16.2	68.4	23.9	108.5
Potash - - -	39.0	17.1	13.4	69.5
Phosphoric Acid - - -	15.7	4.82	4.77	25.3

These figures, being based on only a few determinations of quantities that are variable, are at best only rough approximations to a mean; as regards the hops themselves, the most variable element, they correspond to a crop of about 16 cwt. of dried hops per acre, the leaf and bine represent much more nearly the average amounts.

The amounts removed by the whole plant are not unlike the quantities taken from the soil of an average crop of swedes; they are roughly equivalent to 5 cwt. of Nitrate of Soda, 6 cwt. of Kainit, and 2 cwt. of Superphosphate, per acre. It must not be supposed, however, that the above mixture represents the amount or proportions of manure to use for the crop, for it often happens that the particular constituent least abundant is that which the plant finds a special difficulty in obtaining from the soil, and of which it most wants an extra supply as manure.

The amount of dry matter produced per acre affords a slight indication as to the amount of water required by the hop plant, for the researches of Lawes and Gilbert, Hellriegel, King, and Dr. H. Brown, have furnished figures showing the relation between the amount of water that is transpired by a plant, and the amount of dry matter formed, and though no figures are yet available for the hop plant, a fair approximation can be obtained by taking the average figure of 300 lbs. of water transpired for each pound of dry matter produced. The dry matter produced being 3,785 lbs. per acre, or 1·7 tons, the amount of water required will be 510 tons per acre, or a little more than 5 inches of rain must pass through the hop plant during its growth. The water required by the crop is thus not very large, being about the same as that needed by a good crop of clover or seeds, but much less than that which is requisite for a crop of roots, especially of mangolds, and this enables one to understand how such great crops of hops can be grown in East Kent, a district of small rainfall and extreme evaporation.

By comparing the analyses of the bine and leaves at picking time with the corresponding material when the plant has ripened and died, it will be seen that there has been a considerable migration of the valuable constituents to the root. In the dead bine the proportion of nitrogen is only about one-third of what is present when the plant is growing, while the potash and the phosphoric acid have been still more thoroughly removed. In the case of the leaves the comparison is more difficult to make, since the dead leaves have lost by decay and weather much of their softer combustible material. This is

evident from the increased proportion of ash in the dry matter, for no access of fresh mineral material is likely to have taken place, the amount has only increased relatively owing to the loss of the other non-mineral dry matter. But even the dry matter of the dead leaves is poorer in nitrogen and potash, though slightly richer in phosphoric acid than the dry matter of the green leaves.

In calculating from these analyses the quantities of material returned to the root stock during the ripening of the plant after the hops have been picked, it is necessary to make estimates of the weights of dead bine and leaves, for the actual amounts cannot be ascertained with accuracy.

As regards the bine, the weight of dry matter per acre will be less when dead than when green, because both combustible material and mineral matter will have been withdrawn; but to get any trustworthy idea of the extent of this loss of weight it would be necessary to compare the weights of green and dead bine over a considerable area. A trial of five hills only of each gave 17 ozs. of dry matter per hill when dead, against 21 ozs. of dry matter when green, and another comparison made by carefully matching equal lengths of bine of various thicknesses gave a dry weight of 117 for the dead bine against 127 for the green bine.

	Percentage.		Lbs. per acre.	
	In Green Bine.	In Ripe Bine.	In Green Bine.	In Ripe Bine.
Dry Matter	100	100	1289	1289
Ash	6·04	4·83	77·4	62·2
Nitrogen	·984	·347	12·7	4·5
Lime	1·85	2·28	23·9	29·4
Potash	1·04	·13	13·4	1·7
Phosphoric Acid . .	·37	·081	4·77	1·04

It will, however, be sufficient for the present to regard the dry weight of green and dead bine as the same, the more so as the unknown error thus introduced will only diminish

the figures it is desired to estimate—the gross amount of nutrient material returned to the root. The composition of hopbine, green and ripe, may therefore be shown as the table above.

In the case of the leaves it is still more difficult to obtain the actual weight of dry matter per hill when dead; the degradation of the softer material is great, the leaves get rubbed and frayed and blown away wholesale, so that probably the best approximation will be obtained by assuming that the mineral matter remains constant, and calculating the proportions of Nitrogen, Phosphoric Acid, and Potash on this basis. The following table shows the composition of green and dead hop leaves worked out in this way:—

	Percentage. Ash = 100.		Lbs. per acre.	
	Green.	Dead.	Green.	Dead.
Dry Matter	80.6	49.5	100.4	61.4
Ash	100	100	124.5	124.5
Nitrogen	20.5	10.5	25.4	13.0
Lime	55.2	47.8	68.4	59.7
Potash	13.8	2.12	67.1	2.65
Phosphoric Acid	3.9	3.0	4.82	3.75

By combining the figures for bine and leaves the following results are obtained, showing the amount of material per

Material in Bine and Leaves, lbs. per Acre.

	Green.	Dead.	Returned to Root.
	lbs.	lbs.	lbs.
Nitrogen	38.1	17.5	20.6 = 54 per cent.
Lime	92.3	88.1	4.2 = 4.6 "
Potash	30.5	4.35	26.15 = 85.7 "
Phosphoric Acid	9.59	4.79	4.8 = 50 "

acre in the bine and leaves in the green and in the dead state, the difference representing the amount of material returned to the root of the plant.

From the foregoing results the distribution of the useful constituents of the hop crop may be deduced as follows:—

Material in Hop Crop, lbs. per Acre.

	Sold in Hops.	Dead Bine and Leaves.	Returned to Root.	Total.
	lbs.	lbs.	lbs.	lbs.
Nitrogen	50.5	17.5	20.6	88.6
Lime	16.2	88.1	4.2	108.5
Potash	39.0	4.35	26.15	69.5
Phosphoric Acid	15.7	4.79	4.8	25.3

It is thus seen that by allowing the bine and leaves to ripen instead of removing them at picking time, more than half of the nitrogen, five-sixths of the potash, and half the phosphoric acid they contain goes back to the root; amounts which are roughly one quarter, one third, and one quarter respectively of the whole material taken by the plant from the soil during the year's growth of the plant.

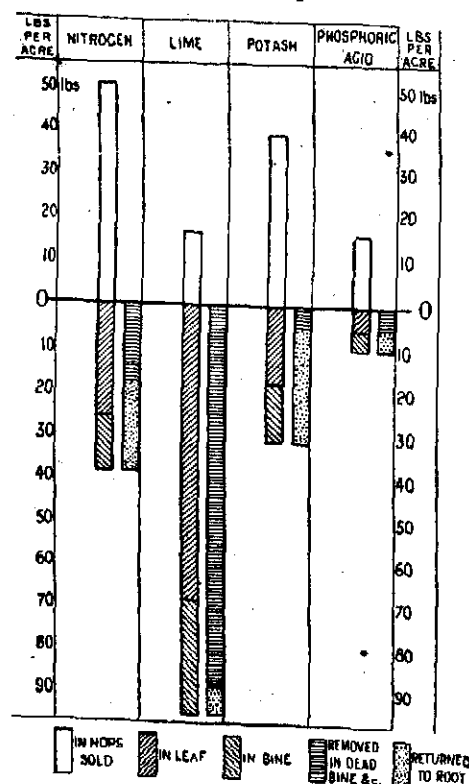
It is noticeable that the lime, which may be regarded as material of little value and easily obtained from the soil, is not returned to the root, but is wholly shed with the dead bine and leaves.

The source and ultimate destination of the various nutrient materials are shown graphically in the diagram, on which the single column above the central line represents the quantities of Nitrogen, Lime, Potash, and Phosphoric Acid that are contained in the hops and sold; and the pairs of columns below represent the same materials in the leaf and bine, the left hand column in each case showing the distribution between leaf and bine at picking time and the right hand column the final division between the rootstock and the dead matter.

Though the gross amounts of nutrient material thus retained are not great, being represented approximately by

1 cwt. of sulphate of ammonia, 2 cwt. of kainit, and $\frac{1}{2}$ cwt. of superphosphate, this quantity of manure would by no means be so efficacious as the material which is in the plant and wholly ready for use when wanted. At the same time these materials are doubtless accompanied by a considerable amount of carbohydrate reserve, withdrawn from the leaves and bine in a similar way. It is difficult to estimate this migration, as the carbohydrate reserve in the green bine does not appear to be in a form that admits of ready estimation.

Diagram showing Source and Ultimate Destination of Nutrient Materials of the Hop Plant.



The losses that arise in a practical way from the practice of cutting the bine grown upon poles is clear from the results obtained in the garden at Wye, where one section was in poles in 1897 and 1898, and was changed to pole and string work in 1899 and 1900. Thus the bine was cut at harvest

in 1897 and 1898, and would affect, if at all, the crops of 1898 and 1899. The following table shows the actual crops obtained on the plot in question, together with the average of the crops upon the neighbouring plots where some other system of training was followed; the last column shows the crop on the plot in question calculated as a percentage of this average crop of the garden.

Year.	System.	Special Plot.		Average Crop of Garden.	Crop Per cent. of Average.
		Previous Harvest.	Crop.		
1897	Poles.	Not Cut	cwts. per acre 11	cwts. per acre 11.7	94
1898	Poles.	Cut	9.36	11.6	80.7
1899	String.	Cut	16.8	20.1	83.6
1900	String.	Not Cut	9.7	10.4	93.3

In 1898 and 1899 the plot where the bine had been cut at the previous harvest yielded only a little over 80 per cent. of the average yield of the neighbouring plots, whereas in 1897 and 1900 the same plot, but with the bine not cut at the previous harvest, yielded more than 93 per cent. of the average crop.

The effect of cutting the bine is very marked, for on each occasion it has depressed the crop in the following season by about 10 per cent. of the general yield of the garden.

From a consideration both of analyses of the green and dead hop plant and of field experiments it is evident that a valuable amount of nutrient matter will be retained by the permanent root if the bine and leaves are allowed to ripen before they are separated from the stock. A considerable increase of crop will be obtained by growing hops upon some system of training that dispenses with the necessity of cutting the bine when the hops are picked.

A. D. HALL.

TESTING OF BABCOCK APPARATUS.

The Board of Agriculture have made arrangements with the Committee of the National Physical Laboratory for the examination of Babcock Milk Testing Apparatus, and they desire to give publicity to the following instructions and regulations which have been drawn up by the Committee for the information of persons desiring to have such apparatus tested.

Regulations.

The Committee of the National Physical Laboratory are prepared to receive for the purpose of verification the pipettes, measuring glasses, and test bottles used in the Babcock method of testing milk.

The apparatus to be tested should be sent, securely packed, to the Director, The National Physical Laboratory, Old Deer Park, Richmond. The carriage to and fro must be paid by the sender. A letter of advice must accompany all instruments sent for verification, which should contain the maker's name, a description of the instruments sent, and full directions for their return.

Great care is taken at the Laboratory to guard against loss or injury, but it is to be understood that all risks attendant on transit and safe custody are assumed by the persons who send the instruments.

In the Babcock test bottles the space between two consecutive graduations on the stem is supposed to contain .04 c.cm. The graduations will be tested at five points, and the bottle will be stamped as correct provided (1) the error at no point amounts to more than .01 c.cm. and (2) the difference between the errors at no two points amounts to .02 c.cm.

In the milk pipettes to hold 17.6 c.cm. an error of .05 c.cm. will be allowed. For other pipettes the same proportionate degree of accuracy will be required.

The measuring glasses will be tested at 4 points, and the greatest permissible error will be .25 per cent. of the nominal contents.

FEES.

For a single pipette	3d.
For a single test bottle	6d.
For a single measuring glass	6d.

In the case of instruments which fail to pass the test, half fees will be charged.

All accounts are rendered quarterly.

If more than 100 instruments of the same pattern, tested during any quarter for a single firm or individual, are stamped as correct, then a discount of 10 per cent. will be allowed from the fees, provided the account is settled within two months of the quarter day on which it is due.

Every piece of apparatus which has passed the test will be marked with an official stamp.

The Committee hope to be in a position shortly to verify the apparatus used in other methods of testing milk.

AGRICULTURAL AND MISCELLANEOUS NOTES.

EXPERIMENTS IN BREEDING FAT LAMBS.

In the last number of this Journal an account was given of some experiments carried out by the Agricultural Department of the University College, Bangor, at Lledwigan Farm during 1899-1900 to test the effect of various crosses in breeding fat lambs. Those experiments were made with Merionethshire ewes crossed with Wiltshire, Shropshire, and Leicester rams. A second set of experiments was undertaken with sixty ewes of the class known in Carnarvonshire as "Lleyn Sheep." They are big sheep, containing a large admixture of Leicester blood. They were divided into four lots, and each ewe was numbered. Lot I., consisting of 15 ewes, ran with a Shropshire ram; lot II., consisting of 15 ewes, with an Oxford ram; lot III., consisting of 14 ewes, with a Suffolk ram; and lot IV., consisting of 16 ewes, with a Border-Leicester ram. The rams were turned in on September 1st, and removed at the end of November. All the ewes were then placed in the same fields and remained together until the lambs were sold.

There were two barren ewes in lot III. and one in each of the remaining lots. The lambs dropped numbered 24 in lot I., 25 in lot II., 21 in lot III., and 30 in lot IV.

The difference in the average age of the various lots was not more than a week, and there was really no advantage in favour of the older lambs, as they suffered severely during a somewhat prolonged period of frost and snow, which the younger lambs escaped. There were no losses among the Shropshire crosses, all the 24 lambs being sold, but there was a large percentage of deaths among the Oxford crosses, only 16 being sold. This loss was in great measure due to the fact that one of the ewes dropped 5 lambs, all of which

died. Of the Suffolk cross lambs 19 out of 21 lived, and there were four losses among the Border-Leicesters.

The lambs were sold to a dealer as soon as they were ready for the butcher, and were all disposed of in the Manchester market except a few of the early lambs, which were slaughtered in the neighbourhood. The lambs sold before the end of May realised 3s. per head more than any of the lots which were sold afterwards. The lambs of each cross which were marketed by that period included 7 Shropshire crosses, of an average live weight of 74.5 lbs. each; 5 Oxford crosses, averaging 70.2 lbs.; 16 Suffolk crosses, of which two were sold by April 20th, weighing 53.5 and 57 lbs. respectively, while 14 sold in May averaged 69.7 lbs.; and 20 Border-Leicesters, one of which, sold in April, weighed 55 lbs., while the remaining 19, sold in May, averaged 68.1 lbs. per head.

On July 9th 2 Shropshire crosses were sold averaging 70 lbs. each, and 2 Oxford crosses of 69 lbs. each. The remainder of the lambs were disposed of in two lots on August 6th and September 6th respectively, when their live weights were as under:—

	August 6th.		September 6th.	
Shropshire cross	7	averaged 80.7 lbs.	8	averaged 68.3 lbs.
Oxford cross	5	" 89.2 "	4	" 97.5 "
Suffolk cross	2	" 95.5 "	1	" 90.0 "
Border-Leicester cross	4	" 91.1 "	2	" 99.0 "

From the standpoint of early maturity, the best results were obtained with the Suffolk and Border-Leicester crosses. Of the former 16 out of the 19 sold were sent to market before the end of May, their average live weight being 67.9 lbs.; while 20 out of the 26 Border-Leicesters were sold in the same period at an average live weight of 67.5 lbs. It will be noticed, too, that the lambs of these two crosses which were sold late in the season attained a considerable weight. Neither the Oxfords nor the Shropshires fattened early, but the former were almost without exception good growers, and weighed well towards the end of the summer. To realise a good price towards the end of the summer, lambs must have size as well as condition, and the Shropshire crosses did not come up to expectations in this respect. The experiment is to be repeated.

TREE PLANTING IN ROUGH NURSERIES.

The Report of the Commissioners of Woods and Forests for 1899-1900 contains an account of the operations which have been successfully adopted by the Deputy Surveyor of the Forest of Dean in the replanting of the New Beechenhurst and Serridge enclosures. In the vacant spaces which were to be planted, rows were dug one spit wide and about four feet apart, and in these rows the two-year-old larch or seedling oaks were planted about one foot apart. The rows were left untouched for two years, with the exception of having the fern and grass cut from between them in the summer. At the end of two years the rows were gone through and about four out of every five of the trees were taken up and planted in pits in other vacant spaces, thus leaving a full stock for crop in the rows.

The advantages of this system are stated to be that the permanent crop is on the ground earlier than it would otherwise be; the check in lifting trees from one part of an enclosure and immediately planting them again (generally the same day) in another part is very slight. The trees thrive much better than if they had at that size to be conveyed by rail or carted long distances, which necessitates, on the ground of expense, their being removed in large quantities and so having to remain several days "heeled in" before they are planted in their final places. The expense of clearing the grass and fern in the rough nurseries is no greater than the expense of clearing a smaller number of trees on the same area. The whole of the planting of the Serridge enclosure (133 acres) was done with trees from these rough nurseries at New Beechenhurst, and no loss has occurred up to the present.

As a further development of the rough nursery system, acorns and sweet chestnuts have been sown in rows, which can be thinned out and the superfluous trees utilised elsewhere later on.

ERADICATION OF CHARLOCK BY SPRAYING WITH NITRATE OF SODA.

During the past two or three years much interest has been aroused by the many trials that have been made on the eradication of charlock by the application of certain substances in the form of a fine spray. While instances of partial or complete failure are from time to time recorded, there can be no question that the bulk of the evidence is entirely favourable to the process. So far, the substances that have been used in this country are, almost exclusively, the sulphates of copper and iron; but in France, where the idea originated, experiments have during the past two seasons been made with various other substances, and notably with nitrate of soda. The results attending the use of this substance are said to be very satisfactory, so far as the destruction of charlock is concerned; while the advantage of employing an agent that can both kill weeds and fertilise the crop is at once apparent. The dressing that is said to be most successful in France consists of a 20 per cent. solution, applied at the rate of 100 gallons per acre. This means the use of 200 lbs. of nitrate of soda per acre, which is a large amount when compared with 16 lbs. of copper sulphate dissolved in forty gallons of water—the standard dressing at present in use. If, however, spraying is undertaken sufficiently early, one may expect to be repaid in the manurial return yielded by the nitrate, and if to this is added the gain derivable from the destruction of charlock, the results of the process may be quite satisfactory. For the present, however, it would be well to rest satisfied with giving this new method an experimental trial, using various strengths of solution and various quantities per acre.

EXPERIMENTS WITH LUCERNE.

The Agricultural College and Experimental Farm of the Ontario Department of Agriculture have lately carried out a study of the composition and digestibility of lucerne as

affected by maturity, with a view to determining the most advantageous time of harvesting the crop, and the results are contained in Bulletin 111 of the Department.

For the purpose of the experiment the crops of lucerne on plots, one-thirtieth of an acre in extent in 1898, were cut at three different periods. The first plot was cut when the buds were well formed; the second, nearly two weeks later, when the blossoms were one-third out; and the last nearly another two weeks later, when the plant had passed the full bloom stage. After cutting, the crop was weighed, cured in the usual way, weighed again, and a sample taken for analysis, the rest being used in the experimental digestion work. The following table shows the weight of the various cuttings:—

Crop.	Green State.	As Hay.	Dry Matter.
	lbs. per acre.	lbs. per acre.	lbs. per acre.
Second crop, 1897.			
First cutting; buds formed - - -	17,100	3,761	3,197
Second cutting; blossom one-third out - -	15,400	4,493	3,819
Third cutting; a little past full bloom - -	11,500	3,902	3,317
First crop, 1898.			
First cutting; buds formed - - -	18,000	3,582	3,045
Second cutting; blossom one-third out - -	19,050	5,001	4,251
Third cutting; a little past full bloom - -	17,550	4,581	3,894
Second crop, 1898.			
First cutting; buds formed - - -	7,125	2,234	1,899
Second cutting; blossom one-third out - -	9,090	2,947	2,505
Third cutting; a little past full bloom - -	8,040	2,604	2,214

The growth of the second crop of 1898 was adversely affected by the absence of rain, hence the reduction in quantity as compared with the previous year. With one exception, the largest yield, whether in the green state, as hay, or as dry matter, was obtained from the second cutting, made when the plants were about one-third in blossom. It is possible that the weight of the crop would have increased for a few days longer, but it is clear that by the time of the third cutting there had been a marked decrease, which can be at least partially accounted for by the large number of leaves which had fallen off previous to the third cutting.

Chemical analysis showed that the percentages of the most valuable food constituents also decreased by the third cutting. As the plants matured the percentage of crude protein decreased, and the crude fibre increased, pointing to the advantage of earlier cutting; at the same time, however, the absolute weight was increasing up to the time of the second cutting, and owing to this the greatest absolute quantity of protein was found to be yielded by the second cutting. The relative decrease in protein, and increase in fibre, as the plants mature, is confirmed by some American experiments. As regards the percentage of carbo-hydrates, the experiments under notice showed that this, on the average, increased up to the time of the second cutting; but similar experiments quoted as having been made in the United States did not bear this out.

Inasmuch, however, as the absolute amount, as well as the percentage, of crude fibre increased with each successive cutting, the digestibility required further investigation. An experiment was accordingly made with three sheep, fed successively on the three different cuttings of each crop. The dung of the animals, representing the undigested portion of the food, was weighed and analysed, and the results compared with the weight of fodder supplied. It appeared that a gradual decrease in the digestibility, as measured by the percentage of food digested, was recorded as the growth of the lucerne advanced; the deterioration being considerably more rapid between the second and third periods than between the first and second. But here again, owing to the greater weight of hay obtained from the second cutting, the results showed that the largest amount of digestible matter was obtained from the second cutting.

The conclusions drawn by the Ontario Department of Agriculture from these experiments are that lucerne should be cut when about one-third in blossom; and that there is a marked decrease in total quantity, as well as in digestible matter, during the ensuing two weeks.

In this connection it may be noticed that the Department occasionally experienced trouble with sheep and cattle, when feeding with lucerne cut after the plants had reached full blossom,

the symptoms pointing to indigestion; and the facts indicated, although in an inconclusive manner, that there was some risk in feeding, in large quantities, lucerne hay made from the plant in advanced stages of maturity.

AGRICULTURAL EXPERIMENTAL WORK IN CANADA.

The following notes have been summarised from a paper read by Dr. William Saunders, Director of the Canadian Experiment Stations, before the British Association at Bradford in September last, in which he gave a detailed account of the steps taken in the Dominion to further the experimental investigations of the conditions under which agriculture may be most profitably adapted to the soil and climate of that colony. In 1884 the Canadian House of Commons appointed a Select Committee to inquire into the best means of developing and encouraging the agricultural interest of the country. Among the recommendations made was the establishment of Government experimental farms where trials might be conducted in connection with all branches of agriculture and horticulture; the results to be published from time to time and disseminated freely among the farmers of the Dominion. No action was taken until 1886, when an Act of Parliament was passed authorising the establishment of a Central Experimental Farm at Ottawa (to serve the provinces of Ontario and Quebec), and four branch farms, viz., one each for the Maritime Provinces, Manitoba, the North-West Territories, and British Columbia.

The work, as set forth in the Act, included: (a) experiments to test the value of different breeds of stock and their adaptability to the varying climatic conditions; (b) scientific research relating to dairy produce; (c) the testing of varieties of cereals and other plants used in farming or gardening, and the dissemination among persons engaged in these occupations, upon conditions prescribed by the Ministry of Agriculture, of such surplus products as might be considered worthy of introduction; (d) analysis of fertilisers, and

their comparative value for different crops; (e) examination of the composition and digestibility of foods for domestic animals; (f) experiments in the planting of trees for timber and shelter; (g) investigation of the diseases of plants and of domestic animals, of the ravages of insects, and of the means of prevention and remedies; (h) the testing of the purity of seeds; and (i) any other researches which might be approved by the Minister of Agriculture.

The four branch farms are located at Nappan (Nova Scotia), Brandon (Manitoba), Indian Head (Assiniboia), and Agassiz (in the coast climate of British Columbia). The sites were chosen so as to be fairly representative of the larger settled areas, while in the arrangement of the work such experiments as would be most likely to be beneficial to the larger number of settlers in each case were among the first to engage the attention of the officers in charge.

It was intended that the experimental farms should become bureaus of information to which farmers could apply for aid in the solution of difficulties which might occur in farm work. Their utility in this direction is indicated by the rapid increase in the correspondence with farmers in all parts of the Dominion. In 1889, the year after the farms had become fairly organised, the number of letters received was 8,000; in 1899 it was almost 70,000. Of these last 36,000 received written replies, the remainder being of such a nature as to permit of their being answered by printed circulars. In addition 215,000 reports and bulletins were sent out.

Among other work carried out by these State Farms may be mentioned the experiments conducted in the ploughing-in of green clover to enrich the land. It appears that clover can be sown to advantage with all cereal crops in the Eastern Provinces, and the coast climate of British Columbia, without lessening the grain crop for the current year, and that after the grain is cut the clover grows luxuriantly, acting as a catch crop during the latter part of the season. The land has been much improved by ploughing in such clover, as has been shown by increased crops on many plots when compared with adjoining plots on which no clover had been sown. Thus a crop of oats yielded an average increase

for the first year of 28 per cent. by weight of grain and 78 per cent. of straw; while the following barley crop, without any additional fertiliser, showed an increase of 29 per cent. of grain and 35 per cent. of straw on the plots which had been treated with clover. In a similar course of experiments with potatoes an average increase of 28 per cent. in the weight of tubers was secured.

Trials carried out at the farms have shown the value of early sowing. Wheat, oats, barley and peas were sown at the very earliest time practicable on plots of land, very uniform in character, which had received the same preparation; and six successive sowings were made at intervals of a week during the ensuing six weeks. The plots were all harvested and threshed separately. The best crops were obtained from the second sowings, *i.e.*, those which were made just one week after it was possible to sow the seed; delay in sowing beyond this resulted in loss, which became more serious according as the delay was greater.

During a five years' test of forty-one varieties of oats, all of them sown each year on the same day and on similar soil, the results have demonstrated the relative productivity of certain sorts. Each year a list has been published of the best twelve in the series and in the whole five years only fifteen varieties have found their way into this select list, and nine of these have appeared among the best twelve every year. Similar results were obtained with wheat and barley. It may be noticed that in these experiments the yield of spring wheat under uniform conditions has ranged from 16 to 31 bushels per acre, oats from 42 to 89 bushels, barley from 33 to 58 bushels, and peas from 20 to 46 bushels.

After careful experiments have shown that any variety is specially promising such variety is cultivated on a larger scale, so as to admit of its free distribution among farmers of the Dominion upon personal application. The samples thus distributed weigh from 3 to 10 lbs., and only one variety can be obtained by an applicant each year. With this restriction the quantity sent out annually from the Central Farm averaged over sixty tons, while the applications have each season averaged more than 30,000. The farmers

receiving these samples have usually after the second season a quantity sufficient to sow a considerable acreage; and by this method the better varieties of grain are soon spread over the country, and the average yield of the more important crops is thereby increased.

The object lessons which have been given in raising fodder crops, and converting these into ensilage, thus providing succulent food for cattle, have greatly stimulated the dairy industry, especially the manufacture of butter in winter, and the fattening of steers. Attention has also been given to experiments conducted with reference to the economical production of butter of the highest quality, and the best management of milk so as to secure the most complete separation of the butter fat.

Experiments in tree planting were begun at all the experimental farms as soon as practicable after their organisation. At the Central Farm, twenty acres are devoted to determining the relative growth of the more important timber trees under different conditions. Another sixty acres are used as an arboretum where trees and shrubs from many countries are being tested with a view to ascertain how far they are suitable to Eastern Canada. As the need for forest shelter is very great on the open plains in the North-West, special encouragement is given to tree planting for shelter there. About 60 to 70,000 trees have been planted in shelter belts, blocks, avenues, and hedges, furnishing examples as to the best methods of planting and giving information as to the cost. Over a million and a quarter young forest trees have been distributed free on application during the past twelve years, and more than seven tons of tree seeds have also been sent to settlers.

EXPERIMENTS WITH SWINE IN ONTARIO.

The Annual Report of the Ontario Bureau of Animal Industry for 1899 contains a report of some experiments with pure-bred swine, which have been carried out under similar

conditions for four successive years at the Ontario Agricultural College, Guelph. The object of these experiments was to compare different breeds with regard to economy of production and suitability for the export bacon trade, and also to compare the feeding qualities of maize with barley. Six animals of each of the following breeds were used:—Yorkshire, Tamworth, Berkshire, Chester White, Duroc Jersey, and Poland-China, each breed being divided into two lots of three hogs each, or 18 in each set. The experiment lasted for about four months, and the ration consisted of maize in the case of one half of the pigs, and of barley in the case of the remainder, together with an equal portion of wheat middlings. After about two months the proportion of grain was increased and ultimately the middlings were omitted from the ration altogether. Skim milk was given to the pigs for the first ten weeks, in the proportion of about 2 lbs. of milk to one of meal. The animals were given a somewhat restricted amount of food, the aim being to keep them in a good growing condition without developing an excessive amount of fat. With regard to the amount of dry food required to produce 100 lbs. of gain live weight, it was found in the four years that the Berkshire and Tamworths were the most economical, but the general conclusion deduced from the experiments was that economy of production is more influenced by the individuality of the animals than by the breed. With respect to suitability for bacon purposes, the Yorkshires were found to be the most uniform lot when killed, whilst the Tamworths stood second. As regards the comparative values of maize and barley for feeding purposes, it was found that the hogs receiving maize made the most economical gains during the time milk and middlings were fed, but that after the milk and middlings were discontinued the hogs receiving barley surpassed those on maize in rapidity and economy of growth.

PASTEURISATION OF MILK.

The Annual Report of the Ontario Department of Agriculture contains an account of some results which have been

observed in the pasteurisation of whole milk at the Kingston Dairy School in that Province. It was found that when the milk was heated to a temperature of 160° for pasteurising purposes, the capacity of the milk separator was greater than when the milk was dealt with at a temperature of 80° and in addition there was a decrease in the amount of fat remaining in the separated milk. Experiments showed that a separator which dealt with 300 gallons per hour at 80 degrees left 12 per cent. of fat in the separated milk, while at a temperature of 160° the quantity of milk passing through the machine could be increased to 330 gallons per hour and no trace of fat left in the milk. The fact that the capacity of a separator can be increased or the efficiency of an inferior separator improved so that there is no appreciable loss of fat is, it is pointed out, a matter of importance, and the value of the butter-fat thus saved would in some creameries pay for the installation of a pasteurising plant.

With regard to the keeping qualities of butter made of pasteurised cream, the experience at this school is that it will keep far better than the butter churned from raw cream and that there is no loss of yield in pasteurising if the cream is properly dealt with; the butter appears fresher and the use of preservatives is unnecessary.

AGRICULTURAL CLASSIFICATION IN THE CENSUS OF 1901.

The Board of Agriculture think it desirable to bring under the notice of agriculturists the following Memorandum, which has been prepared by the Registrar-General with reference to the returns to be made of the occupations of persons engaged in agriculture in the approaching Census of the population of England and Wales on the 31st day of March, 1901.

Memorandum by the Registrar-General.

The persons engaged on farms are intended to be shown in the Census of 1901 in the following groups:—

- (1) Farmer, grazier.
- (2) Farmer's son, or other relative, assisting in the work of the farm.

- (3) Farm bailiff.
- (4) Shepherd.
- (5) (a) Agricultural labourer, farm servant, distinguished as in charge of horses.
- (b) Agricultural labourer, farm servant, distinguished as in charge of cattle.
- (c) Agricultural labourer, farm servant, not otherwise distinguished.

It is of the utmost importance that the Census to be taken on the 31st day of March, 1901, should furnish an accurate return of the *occupations* of persons engaged on farms in England and Wales. This can only be secured if the columns provided for the purpose in the schedule be correctly and carefully filled up by the occupier of every separate house or tenement, in such terms that each person may be subsequently grouped under one or other of the foregoing headings.

1. Every occupier of land whose principal occupation is that of a *farmer or grazier* should state this fact, employing one or other of these terms. (Where the occupation of farming is secondary to any other, that fact should be stated on the schedule in addition to the primary occupation, as required by Instruction No. 2 on the schedule.)

2. *Sons or other relatives* of farmers (male and female) engaged in "assisting in the work of the farm" should so return their occupation.

3. A person in charge of a farm on behalf of the owner or occupier should describe himself as "farm bailiff," or, if the term *foreman or steward* is used in these circumstances, it should be explained that it is employed in this sense.

4. *Shepherds* are to include every person on the farm whose time is wholly or chiefly taken up with the care of sheep.

5. The three sub-divisions under which *agricultural labourers* are now to be shown must include *farm labourers, farm servants* (not being domestic servants), and all other

persons engaged in farm work, other than shepherds; and such persons are accordingly requested to indicate by some distinctive term, such as "carter on farm," "cattleman on farm," whether their main employment is the working or tending of *horses*; or the tending or management of *cattle*; or whether their work on the farm is of a *general* character and does not permit of the distinction just suggested being drawn, in which case either the term "farm servant" or "agricultural labourer" should be used.

Where a term of local use is employed in filling up the schedule, explanatory words of a simple and general character must be added to make it clear to which of the above groups the person using it belongs.

It is particularly important that the directions of Instruction No. 10 on the schedule should be followed, and where specific names, such as "waggoner," "carter," "horse-keeper," "teamster," or "cattleman," are employed, they should be invariably followed by the words "*on farm*." Especially must care be taken not to use the term "labourer" alone without the qualification *farm labourer* or *agricultural labourer*, or *labourer on farm*, wherever the labour is in connection with any kind of farmwork.

Other persons belonging to the agricultural classes, such as gardeners, woodmen, and others following specific occupations, will be separately grouped under headings not referred to in this Memorandum. Gardeners, however, engaged with nurserymen and seedsmen should always state the fact, so that they may be readily distinguished from gardeners in private employment.

In cases where a person no longer pursues his calling, but has retired from active work, the previous occupation should always be given, coupled with the word "retired."

In view of the importance at the present time of all questions relating to the number and distribution of the agricultural population, the Board trust that all persons concerned will on this occasion render their best assistance to ensure that the particulars entered on the Census schedules by farmers and farm labourers are precise and specific and

capable of accurate arrangement in the groups to which they respectively belong.

AGRICULTURAL WAGES IN DECEMBER, 1899 AND 1900.

The Board of Trade have summarised in the *Labour Gazette** the information received from a number of correspondents in England as to rates of weekly cash wages paid to ordinary agricultural labourers, exclusive of piecework earnings and all extra allowances in cash or kind, in December, 1900, as compared with December, 1899.

The general effect of the returns is to show that there was an upward movement in agricultural wages.

The following table shows the number of agricultural labourers (according to the census of 1891) in the Poor Law Unions reported on, grouped by districts, and also by the extent to which the rates of weekly cash wages are stated to have changed in December, 1900, as compared with 1899 (it is assumed that the change recorded for a district applies to all the labourers in that district):—

Districts.	No. of Poor Law Unions reported on.	Number of Agricultural Labourers in Poor Law Unions in which there has been—				
		No change.	Increase per week of			Total.
			6d.	1s.	1s. 6d.	
Midland Counties -	46	47,256	—	17,863	1,601	66,720
Eastern Counties -	53	91,802	—	36,825	2,553	131,180
Southern and South-Western Counties -	69	59,532	2,779	31,328	3,767	97,406
Total -	168	198,590	2,779	86,016	7,921	295,306
Percentage -	—	67·3	0·9	29·1	2·7	100·0

* *Labour Gazette* for February.

It will be seen from this table that out of the total number of agricultural labourers—namely, 295,306—in the unions reported on, 198,590 (or 67·3 per cent.) were in unions where there was no change in the predominant rates of wages, and 96,716 (or 32·7 per cent.) were in unions where wages rose, the changes varying from 6d. to 1s. 6d. a week. Much the greatest proportion of the labourers whose wages were increased received a rise of 1s. a week. The total increase in the weekly wages, if spread over all the labourers in the unions reported on, amounts to an average rise of 4d. a week.

The greatest number of changes took place in the Eastern Counties. Of the 96,716 labourers in unions in which wages rose, 39,378 (or 40·7 per cent.) were in these counties.

It is to be observed that in many cases the rise in December, 1900, compared with 1899, is to be accounted for by wages having remained at their summer level, instead of the customary seasonal reduction having taken place in the autumn. In the Eastern Counties changes from the summer to the winter rates, which are usually made in October or November, frequently did not take place until December. In some cases wages were not reduced until January, 1901, while there are cases where no reduction has yet been made.

The Northern Counties have been excluded from these calculations, as the greater number of labourers there are hired by the year or half-year. Wages in these counties in 1900 showed an upward tendency.

THE EARNINGS OF SHEPHERDS IN GREAT BRITAIN.

The Report on the Wages and Earnings of Agricultural Labourers,* which was referred to in the September number of this Journal, contains much information about the earnings and method of payment of shepherds in various parts of Great Britain, in respect to which there is apparently greater variation than in the case of ordinary labourers.

* Report by Mr. Wilson Fox on the Wages and Earnings of Agricultural Labourers in the United Kingdom. *Cd.* 346.

In England, men of this class are usually given a free cottage, together with "lamb money," an item almost invariably paid where large flocks are kept, in Norfolk, Suffolk, Hampshire, Wiltshire, and Dorset, and very generally elsewhere, except in the northern counties. There are frequently other allowances in kind, though the practice of making such payments varies considerably, even in the same county. From information furnished by employers of labour and by chairmen of Rural District Councils, the value of these allowances, together with the cash wages paid in each county, has been calculated to show as far as possible what may be considered to be the estimated earnings of shepherds in various counties in England. These are highest in Lincoln and Nottingham, where they amount to 20s. or over; whilst in the North and East Ridings of York, Stafford, Leicester, Rutland, Warwick, Monmouth, Kent, Surrey, and Essex, the total earnings worked out to 19s. or more; in Northampton, Shropshire, Hertford, Suffolk, and Sussex they were 18s. and upwards; and in the remaining counties from 16s. to 18s. per week. In Cumberland and Westmorland there are, generally speaking, but few regular shepherds except on estates or large farms. When regular shepherds are employed they get from 15s. to 22s. per week and a free house, and sometimes fuel free or carted; and occasionally a little extra for lamb money. In Durham and parts of Northumberland shepherds get from 15s. to 20s. a week in cash with similar allowances. Sometimes they get less cash and the keep of one or two cows or perhaps a few sheep. In the north of Northumberland the conditions are very similar to those described as prevailing in Scotland, where the keep of a small flock of sheep forms an important item in the total earnings.

In Wales, on a very large number of farms no regular shepherds are employed, but where kept they are, generally speaking, paid rather higher wages than the ordinary labourers, the shepherd, if he is in charge of a large flock, being frequently the highest paid man. Lamb money, however, in Wales is not nearly so common as in England.

In Scotland shepherds are an important class, and in the

chief sheep districts the calling is often hereditary; the sons being employed on the same farm as their fathers, and the flock not infrequently passing to their charge. On some of the large sheep farms in the Highlands, a number of shepherds are kept, and each shepherd has his own "hirsle," as the flock is termed in some districts, to look after. In all parts of Scotland a considerable portion of the wages are generally paid in kind. In some cases the shepherds receive the whole of their wages in this form. Although the custom is not so prevalent as formerly, many shepherds have a "pack flock," *i.e.*, they are allowed to keep a certain number of their own sheep with those of their employers. The shepherd's "pack" is fed, clipped, washed, etc., and sold with his employer's flock. The size of the shepherds' packs varies in different counties and in different districts according to prevailing customs and to the class of sheep kept.

Nine examples are furnished in the report of the total estimated income of shepherds having "packs," distinguishing the profit from the flock, cash wages and allowances. In seven out of the nine cases, the shepherds received no payments in cash whatever, their remuneration being paid entirely in kind, and it was estimated that in 1898 the total income of five of these seven shepherds was between £60 and £70, and of the other two a trifle over £70. The packs in these seven cases varied from 14 to 50 sheep and the profit from £26 to £39, whilst the allowance of cottage and garden, potato ground, keep of cow, oatmeal, etc., brought the estimated earnings up to the above mentioned sums. The two men who received cash wages, amounting to £31 and £20 respectively, had flocks numbering about a dozen sheep each, from which profits of £18 and £26 were obtained, while similar allowances brought up their total earnings to £74 or £75 per annum.

In the above cases it must be recollected that no deduction has been made for interest on capital invested in the pack or for contingencies.

The above instances of individual cases of shepherds with pack flocks show higher earnings than the average of those whose wages are mostly paid in cash. The total earnings

500 EGYPTIAN EXPORTS OF ONIONS, EGGS, AND QUAILS.

of the latter have been calculated, from returns relating to 830 shepherds in different parts of Scotland, to range in the majority of counties from 18s. to 20s. per week. In the counties of Perth, Ross and Cromarty, the earnings were between 17s. and 18s., whilst in Inverness, Nairn, and Elgin they were over 16s. weekly. Of these sums 5s. to 7s. and over represents the value of the allowances, in regard to which Mr. Wilson Fox observes that shepherds often have the keep of one and sometimes two or three cows, and also the keep of one and sometimes two "followers" (calves) for a year. In parts of the Highlands they often have two or three acres of land, called a croft, part of which is generally planted with potatoes. A perquisite, which is frequently allowed to shepherds, more particularly in the Highlands, is the right to the carcasses of "fallen" sheep, which have died from no disease rendering the flesh harmful for consumption. The flesh of these sheep is dried, and is frequently eaten by the shepherds and labourers in the Highlands. Another small perquisite is waste wool at clipping time, *i.e.*, matted or dirty wool, sometimes called "clarty wool," and wool found on bushes, etc., known in the Highlands as "brock wool." In some districts shepherds get some food given to them at particular times when the work is especially hard, such as clipping, marking, washing, etc. Where a cow is not kept, milk is a very common allowance, also potatoes; allowances of meal are often given, coals may be carted free, and not infrequently coal or peat is given free.

EXPORT OF ONIONS, EGGS, AND QUAILS FROM EGYPT.

The crop of onions in 1899 proved a large one in Egypt, and the total quantity exported during that year considerably exceeded the shipments of 1898. The crop is nearly all disposed of between the beginning of March and the end of June, the amount during the first half of 1900 being 1,488,000 cwts., valued at £155,907; this quantity being practically identical with that exported in 1899, which was, however,

valued at £233,058. More detailed information for 1899 shows that, in that year, 827,000 bags were returned as shipped to English ports (chiefly Liverpool and Hull), 353,000 bags to Trieste, and 109,000 bags to Genoa, Venice, Marseilles, Hamburg, and Antwerp. It is stated that in their eagerness to put Egyptian onions on the European market at as early a date as possible, the bulbs are frequently shipped in a green state, and they are worthless on arrival; while defective packing and sorting entail further loss.

The trade in eggs is a new one, dating only from 1896, since when it has grown with great rapidity. In 1897 the number of eggs exported was nearly 14,000,000; in 1898, 35,000,000; and in 1899, 40,000,000: while the value in these three years was £12,683, £35,031, and £44,325 respectively. The export during the first six months of 1900 (practically the whole trade is confined to the first half of the year) was still more marked, the quantity reaching 60,000,000, and the value £83,034. Of this latter quantity, 49,000,000, in round numbers, were despatched to the United Kingdom, 8,000,000 to France, and nearly 2,000,000 to Austria. It is stated that the Egyptian egg, like the fowl which produces it, is extremely small, and almost disappears from view in an ordinary English egg-cup. It will be noticed, nevertheless, that the value of the eggs quoted above has increased in much greater proportion than the quantity.

The trade in live quails continues on a large scale, although the number exported has not again reached the total of 1897, when it amounted to 2,071,500 birds. In 1898 1,182,008 quails, valued at £14,138, were exported, and in 1899, when there was a slight increase, the number shipped was 1,260,150, valued at £15,429. During 1900 there was a slight falling off. Up to October 31st the value of the quails exported from Egypt amounted to £13,082, as compared with £13,358 during the same period of 1899. This trade is one which does not commend itself to any sportsman or lover of birds. It is slowly but surely reducing the number of quails that annually visit Egypt, and is the cause of many acts of cruelty to these birds.

[Foreign Office Report, Annual Series, No. 25, 1900. Price 2½d.]

WEST INDIAN VEGETABLES AND FRUIT.

At the third West Indian Agricultural Conference, held at Barbados in January last, Dr. Morris, Imperial Commissioner of Agriculture, stated that an attempt was being made to establish an industry in raising early potatoes for the English market. Experiments were being carried on by the Imperial Department of Agriculture in several islands with imported English seed, under advice obtained from one of the largest potato merchants in the United Kingdom.

A small, but very successful, onion industry was being carried on at Antigua. Dr. Morris pointed out, however, that it was not sufficient to raise produce, but also to find a suitable and remunerative market for it. Planters should look well in advance and harvest their produce at the most favourable time, and present it in exactly the right condition to suit local as well as foreign markets.

Fruit cultivation was not being extended in any of the smaller islands. At Jamaica, the establishment of a direct fruit service between that island and the United Kingdom could not fail to arouse interest in the capabilities of the West Indies to supply oranges, bananas, and pineapples in large quantities to European markets; but the present steamer facilities outside Jamaica were entirely unsuited for a regular fruit trade.

[*West Indian Bulletin*, Vol. II., No. 1, 1901.]

GRAIN TRADE ROUTES IN THE UNITED STATES.

At the commencement of this century the export of cereals and their products from the United States was comparatively insignificant, and a peculiarity of the foreign commerce was the preponderance of the flour exports over the grain. From 1820 to 1829 the value of the wheat meal exported was £10,000,000, the wheat being only £31,250, while £979,000 worth of maize was exported in the form of meal, and £896,000 as grain during this period.

At this time the great natural outlet was the river Missis-

issippi and its tributaries; wheat, flour, and maize being collected at Cincinnati and St. Louis, and shipped down to New Orleans. As late as 1840 more barrels of flour arrived at New Orleans than at Buffalo, but the immense impetus given to the development of the north central States by the Erie Canal, which was opened in 1825, soon deprived the Mississippi route of its pre-eminence; in addition to which there were many drawbacks to the southern route, due to climate, difficulties of navigation, and want of facilities at the Gulf ports. As a result of these drawbacks and of the development of the Erie Canal, the fourth and fifth decades witnessed a diversion of the grain traffic from the southern to the eastern route. The receipts of grain and flour at such cities on the Mississippi River system as Cincinnati, St. Louis, and New Orleans did not decrease, but they did not increase to a degree at all comparable with the increase of receipts and shipments at Lake cities.

The development of the eastern route was continuous and rapid. During the years immediately following 1823 a very large increase took place in the population bordering on Lake Erie and Lake Michigan. The first shipment of grain from Lake Michigan took place in 1836 from the port of Grand Haven, and in 1838 a consignment of 39 bags of wheat was made from Chicago. By 1841 grain began to be shipped from Milwaukee, and the completion of the Illinois and Michigan Canal and of the Galena and Chicago Union Railroad to Fox River opened up the northern part of Illinois to the grain trade.

The immediate effect of the opening up of the eastern route was the rapid extension of the grain area and the shifting of its centre of production towards the West. In 1840 the total production of cereals in the United States had amounted to 616,000,000 bushels; by 1850 it had reached 867,000,000, and during the decade ending 1860 it had reached a total of 1,239,000,000 bushels. The production of wheat alone increased from 100,485,944 bushels, or 4.33 bushels per head, in 1850 to 173,104,924 bushels, or 5.50 per capita, in 1860. The increase in the production of wheat had not been uniform, however, the production having increased to a far greater extent in the west than in the east.

The shifting of the wheat centre during the sixth decade from the middle to the north central States was due to, and in turn necessitated the use of, the eastern water route.

During the seventh decade of the present century the chief change in the movement of grain from the west to the seaboard was caused by the competition of the railroads with the inland waterways. This competition, which ultimately became serious and finally culminated in the diversion of the major part of the traffic to the railroads, first manifested itself on the eastern route. The north-central States had been rapidly covered with a network of railroads, and in 1856 shipments of grain by rail began to be made from western cities to the Atlantic seaboard, though for a few years this competition was comparatively ineffective.

Of the total grain traffic, the railroads competed most vigorously for the carriage of flour, maize, and oats. The flour traffic was more quickly absorbed by the railroads than was the wheat traffic, and in 1872 practically all (99·3 per cent.) of the flour was shipped east by rail. The railroads succeeded much better in moving maize than wheat, the proportion carried by rail aggregating 41·0 per cent. for wheat and 58·2 per cent. for maize. The cause for this difference lay chiefly in the geographical positions of the wheat and maize belts.

The most important changes effected by the participation of the railroad in the eastern grain traffic were the extension of the grain area and the severance of its dependence on the lake region, and the creation of a direct route from the west to seaboard cities other than via New York or New Orleans.

The centre of the wheat area, which had moved from the middle to the north central States, then progressed from the north central to the north-western States, and a broad belt of fertile wheat land was cultivated in Minnesota, Wisconsin, and Iowa; while the maize belt was rapidly extending in Illinois and Missouri and States farther west. The production of cereals increased from 1,239,000,000 bushels in 1859 (census of 1860) to 1,629,000,000 bushels in 1869 (census of 1870), and whereas of the crop of 1859 only 1·8 per cent. was

exported, of the larger crop of 1869 3·5 per cent. was exported to foreign countries.

The competition of the railroads also effected a change in the distribution of the grain at the eastern terminals. Formerly much of the grain which had been sent to such eastern cities as Portland, Boston, Philadelphia, and Baltimore had reached them by traffic coastwise from New York, just as in still earlier days they had received considerable portions of their grain by coastwise movement from New Orleans. The participation of the railroad rendered Baltimore, Philadelphia, and other Atlantic cities as accessible as New York, and much of the direct trade now went to those cities instead of to New York.

The grain traffic on the lakes has until recently favoured the terminal cities of Chicago and New York. As long as the main portion of the traffic went via the lake route and terminated on the Hudson River, New York enjoyed an immense pre-eminence, and her chief rivals were found in ports like Montreal and Boston lying to her north, instead of such southern ports as Philadelphia, Baltimore, Norfolk, Newport News, etc. The advantages obtained by New York from the Erie Canal, taken in connection with her naturally fine harbour, gave that city its dominating position in the export and import trade, which was further increased by reason of the size of the territory and density of the population tributary to New York. The railroads, however, brought the more southern Atlantic ports nearer to Chicago and the West than was New York, and a gradual diversion of the trade took place, which reduced New York's share of export grain very materially, although the total amount exported from that city did not decrease.

To a considerable extent the diversion of the grain traffic has been due to maize, a great part of which is not tributary to the lakes, and which consequently would be less affected by an improvement in the Erie Canal, which joins New York and the Great Lakes. To a large extent also the Gulf ports are participating in this maize traffic, and this has been especially noticeable during the last two or three years.

The most notable feature of the last twelve years has been

the diversion of the flour traffic from Chicago to points further north and west. Until 1887 the shipments of flour from Chicago had been rapidly increasing, but from this time on it has been rapidly diverted. As early as 1882 the millers and shippers of St. Paul and Minneapolis had been discussing the feasibility of a railroad connecting these twin cities with Sault Ste. Marie at the south-eastern point of Lake Superior, and by 1888 the Minneapolis, St. Paul, and Sault Ste. Marie Railway was completed.

The trade via this route grew very rapidly, and preyed to a large extent on the Chicago traffic. But the route which has most completely displaced Chicago has been that via Duluth and Superior. These cities are situated at the head of Lake Superior, and are as near to Buffalo by water as is Chicago, while the haulage by rail is far less than in the case of Chicago, and the result has been the diversion of the flour trade from Chicago to the two western ports.

The westward movement of the centre of the maize belt has been of the greatest importance in altering the general trend of the maize traffic in the country.

The movement in the maize belt was originally north and west, but the northern limit, set by climatic conditions, has been reached, and the movement is now due west. In 1839 (census of 1840) the States in which most maize was produced were Tennessee, Kentucky, and Virginia, these three States furnishing 32 per cent. of the crop, or, including North Carolina, Alabama, and Georgia, 50 per cent., while the north central States (Ohio, Indiana, and Illinois in that order) contributed but 22 per cent., and Missouri but five per cent. of the total crop. Now the six southern States named produce but a very small fraction of the crop, and even the five north central States (Illinois, Indiana, Ohio, Wisconsin, and Michigan), which about 1869 were the most important, only had 27 per cent. in 1889, while the production in the four trans-Mississippi States (Iowa, Missouri, Kansas, and Nebraska) amounted to 46 per cent. Even beyond the Mississippi this western movement of the maize crop centre has been progressing.

The centre of the wheat production of the United States

has moved north and west even more rapidly, owing to its having a higher value per given bulk, and consequently a greater portability than maize. The rapid improvements in transportation, and the improved facilities in handling as well as in hauling, have enabled the farmer to raise his wheat many hundreds of miles from the eastern seaboard and to compete advantageously with the farms lying nearer to the markets. In the earlier decades of this century the centre of wheat production was in the Atlantic seaboard States, and the west was uncultivated and even unpopulated. In 1839 (census of 1840) the great wheat States were Ohio, Pennsylvania, New York, and Virginia (including West Virginia), and these four States, with a centre considerably east of Pittsburg, produced 52,000,000 bushels, or about five-eighths of the total for the United States, as compared with less than 15 per cent. in 1898.

By 1859 the States standing foremost in the order of wheat production were Illinois, Indiana, Wisconsin, and Ohio, Virginia, and Pennsylvania; the north central States maintaining their pre-eminence until 1879, and even later. By 1879 the trans-Mississippi States entered the competitive field of wheat production, and the chief feature of the last twenty years has been the rapid growth of the wheat produced in these States. In the order of their wheat production the trans-Mississippi States rank at present as follows:—Minnesota, 78,400,000 bushels; Kansas, 64,900,000; North Dakota, 55,700,000; South Dakota, 42,000,000; Nebraska, 34,700,000; the five States producing 275,700,000, or over 40 per cent. of the total crop, as compared with 15 per cent. in 1879, and $1\frac{1}{2}$ per cent. in 1859. Of the north central States, Ohio with 42,100,000, Indiana with 38,400,000, and Michigan with 34,100,000 bushels, furnish over one-sixth of the total production, and maintain a high absolute, if a decreasing relative, proportion; but Illinois has gone over almost completely to the culture of maize and oats. The middle Atlantic States, with the exception of Pennsylvania, have greatly reduced their wheat production, while that of New England has practically ceased. The Southern States also furnish now a much smaller proportion of the country's

wheat than before the war. The Pacific States have more than increased their share in the country's production of wheat, although even here the centre of production has been shifted northward from California towards Oregon and Washington. The chief development, however, has been the concentration of the surplus wheat production in the vast territory west of the Mississippi River.

[*The Grain Trade of the United States.*—Treasury Department Bureau of Statistics.]

DOMESTIC ANIMALS IN BARNS OR INCLOSURES IN THE UNITED STATES.

Particulars of the domestic animals on farms in the United States were recorded, at the census of 1900, in the regular farm schedule, but in addition to these there were many animals in barns and inclosures, for which special schedules were prepared. Animals coming within this definition included all domestic animals in cities, towns, and villages; in stock yards; all employed in manufacturing, lumbering and mining industries, and kindred enterprises; and all used for pleasure or profit by individuals other than farm proprietors. The present is the first occasion on which these animals have been enumerated, although estimates of such stock were made in 1860 and 1870. A census bulletin (No. 17) has recently been issued, giving the results of this enumeration, but it is stated that the figures are to be regarded as to a certain extent preliminary.

The number of barns or inclosures in the United States reporting domestic animals not on farms or ranges on the 1st of June, 1900, was 1,878,207. This was substantially one-third of the total number of farms at the same date. The numbers of various kinds of domestic animals in these barns and inclosures were—cattle, 1,466,970; horses, 2,833,877; mules, 162,115; asses, 12,870; sheep, 156,470; swine,

1,592,861; and goats, 47,652. It may further be noted that two-thirds of the cattle, viz., 959,570, were dairy cows of two years and over.

AGRICULTURAL SOCIETIES IN WURTEMBERG.

The number of agricultural and co-operative societies of various kinds in Wurtemberg appears, according to an article in the official *Jahrbuch* of that country, to be considerable, and it is through these agricultural societies that the Government grants for the improvement of live stock and the assistance of agriculture generally are to a large extent administered.

The number of district societies in 1897 amounted to 64, with 48,739 members. More than one-half of these societies undertake the co-operative purchase of fertilisers, feeding-stuffs, and other farming requisites for the benefit of their members. All of them assist and endeavour to promote the establishment of co-operative dairies and other forms of co-operation, and also undertake the improvement of live stock.

The development of agricultural credit in Wurtemberg appears to be very extended, and in 1897 the Union of Societies for this purpose included no less than 766 loan banks, with 68,058 members. Of this number the transactions of 716, whose accounts were complete at the time of the Report above referred to, amounted to £3,501,265, their profits to £8,376, and the reserve funds to £40,020.

Co-operative organisation for the purpose of the sale in common of agricultural produce has lately made great progress, partly by the assistance afforded by the Government to this branch of co-operation, but chiefly owing to the fact that the farmers are learning to value more and more the advantages of combined action. The earliest example of a society of this kind is an association of vine-growers.

established in 1854, and there are nine such associations now in existence. A more recent development has been in the direction of the co-operative sale of grain, for which purpose twenty societies, with 1,181 members, were formed in 1896, 1897, and 1898. Of this number seventeen had received grants from the State amounting in all to £1,000, in sums varying from £400 to as little as £5; in the other three cases the grant was under consideration. Only two, however, of these societies were on any considerable scale. One at Weilderstädt had built a grain warehouse with a hop-drying apparatus attached; and one at Kupferzell had also erected a warehouse connected with the railway by a branch line. The remaining societies have limited themselves to procuring corn-cleaning machines, and supplying sacks, etc., and have made use of any available accommodation in the neighbourhood which they have used as a centre for the collection and cleaning of the grain.

With regard to the co-operative purchase of farming requisites for distribution to members at a cheap price, this is, as stated above, carried on by a number of the district agricultural societies; 389 of the credit banks also extended their sphere of usefulness in this direction, and their transactions in 1897 amounted to £49,486. Separate co-operative associations for this purpose have also been established to the number of 45, with 4,853 members.

The number of co-operative dairies in 1898 was 306, with a total membership of 18,700. There were also 583 non-co-operative dairies, which purchased milk at a fixed price from the producers and manufactured it for their own profit. These 889 dairies received a daily average of 85,389 gallons of milk, and the annual production amounted to 76,140 cwts. of butter and 81,580 cwts. of cheese.

AGRICULTURAL SYNDICATES IN FRANCE.

In France the formation of professional syndicates for the development of industry, agriculture, and trade in general

was authorised by a law passed in 1884. The Government, moreover, took measures to foster the system of co-operation, which has increased with remarkable rapidity.

The latest "Annuaire des Syndicats Professionnels," published by the French Labour Department, shows that the total number of these syndicates in 1884 was 175, of which five only were agricultural; whereas, the figures of the year 1898 enumerate 1,824 agricultural syndicates out of a grand total of 6,326. The others comprised 1,965 employers' and 2,361 employees' industrial and trade syndicates; while there were 176 joint associations of employers and employed.

The total number of members of the syndicates in 1898 was 1,097,000. Over two-thirds belonged to the agricultural section, of which the membership rose from 234,000, in 1890, to 792,000 in 1898.

It was found advantageous, from the first, to consolidate individual syndicates into "Unions," which numbered 56 in 1890 and 170 in 1898. The number of agricultural syndicates thus united was 1,192 in 1898, forming 34 central bodies, and representing nearly half-a-million agriculturists.

AGRICULTURAL MACHINERY IN SOUTH RUSSIA.

A report on the trade in agricultural machinery in South Russia, by the German Agricultural Attaché at St. Petersburg, has recently been published in the "Mitteilungen" of the German Agricultural Society. This report gives some information as to the position occupied by foreign countries in the supply of agricultural implements in the South of Russia.

The supply of ploughs is said to be almost entirely in the hands of German firms, though reference is made to a manufactory at Odessa which sells 24,000 ploughs annually; while with regard to drills, broadcast distributors, and various grain-cleaning machines, German wares may generally be

said to command the market, though they are exposed to the competition, amongst others, of an English firm with works in Russia, who are said to dispose annually of machines largely of this character to the value of £165,000.

America occupies the first place in the supply of reaping and binding machines, though the market is limited by the popularity of a mowing-machine of native manufacture, of which about 25,000 are turned out annually at prices varying from £12 10s. to £17 10s. The trade in steam-threshing machines is reported to be entirely in the hands of England, while implements required in vine growing are chiefly of French manufacture. There is no demand for dairy machinery, as the dairying industry is but little developed in South Russia.

It appears that the greatest difficulty met with in the agricultural machinery trade is the granting of long credit, but quite 90 per cent. of all sales are conducted on this basis, and the majority of the present population could not buy otherwise.

THE ANGORA GOAT IN THE UNITED STATES.

The United States has recently published a bulletin on the Angora goat, with a view of supplying information regarding the breeding and keeping of that animal for the production of mohair, an industry which has, it appears, recently been attracting some attention in the United States. The Angora goat has been bred in that country to a small extent for many years past, the first importation of pure-bred goats from the district of Angora having taken place in 1849. No exact figures of the number at present existing are available, but the Department of Agriculture estimates that there were about 400,000 Angora goats of all grades in the United States in 1900. Texas, California and New Mexico, with Oregon and Nevada, appear to be the districts in which they are principally distributed. In order to ascertain the

quantity of mohair obtained from these flocks, enquiries were addressed to mills using this product, and it was ascertained that the quantity of home produce consumed in 1899 was 1,077,000 lbs., while the imported produce amounted to 1,119,000 lbs. Assuming that practically the entire native yield goes to the mills for manufacture, it is believed that this figure may be taken to represent the total product of the United States for 1899. The duty on imported mohair is 6d. per lb.

All dogs intended to be introduced into the Colony of New South Wales must be examined at the owner's or shipper's expense, prior to shipment, by a veterinary inspector appointed by the New South Wales Government. The ports in connection with which such inspectors have been appointed, in the United Kingdom, are, London, Liverpool, and Glasgow. Further particulars can be obtained from the Agent-General for New South Wales, 9, Victoria Street, London, S.W.

The Board of Agriculture have received a copy of regulations, issued by the United States Department of Agriculture, providing that all cattle over six months old imported into the United States must be tested with tuberculin, either by an inspector of the United States Department stationed in Great Britain, or after the arrival of the animals at the quarantine station in the United States. The application of the tuberculin test does not, however, relieve the animals from the necessity of undergoing quarantine on arrival at their port of destination.

For cattle imported by way of Canada, certificates of tuberculin tests made by the Canadian Superintendent of Quarantine during the period of detention will be accepted. Intending exporters who desire to have their cattle tested in Great Britain should address Dr. T. A. Geddes, United States Consul-General's Office, 12, St. Helen's Place, Bishopsgate Street, E.C.

The following information, contained in the last annual report made to the Foreign Office by His Majesty's Consul at Naples, may be found useful by exporters of plants from this country as well as by many British residents in Italy. Plants intended for export

to Italy must be accompanied by a certificate from the local mayor or civil authority, stating that the soil from whence they came was not used for the cultivation or storing of vines, and "that there is no disease in the district." This declaration must be *visé* by the Italian Consul. The next step is to inform the Minister of Agriculture at Rome, when, how, and where it is proposed to send the plants, so that orders may be given to the Customs authorities to admit them at the desired station or port of entry. The arrival of the plants should as nearly as possible coincide with that of the official permit. Plants cannot be exported to Italy by parcel post

[Foreign Office Report, Annual Series, No. 2,550. Price 1½d.]

An interesting feature in the development of Christmas Island is the vast extent of the phosphate deposits already discovered, and the extension which the existence of these deposits may make to the trade of Singapore. The business of working the deposits and exporting

Phosphate Industry in Christmas Island.

the phosphates really commenced in January, 1900, and since then over 30,000 tons have been exported to England, Germany, Japan, and Australia. With projected improvements it is believed that the output will soon be increased to at least 100,000 tons per annum. The phosphates produced are now all exported in the natural state as they come from the ground; but it is stated that the syndicate recently formed to develop the island intends to erect its own plant for milling the raw stuff, and treating it so as to transform the phosphates into superphosphates, which are the staple form in which phosphates are used as a fertilising agent. The works for this purpose will very possibly, for convenience of trade, be erected in Singapore.

[Board of Trade Journal, No. 218, 1901.]

The *Curierul Financiar* gives the text of a bill for the promotion of the dried fruit industry which has been prepared by the Roumanian Minister of Agriculture and passed by the Chamber. According to this proposal the Minister of Agriculture is authorised to advance money to communes and to private persons for the installation of ovens for fruit drying up to 60 per cent. of the value of the ovens. Materials brought from abroad for the construction of such ovens will be free of duty. These advances are to be repaid without interest, in seven equal annual payments from the end of the first year after the date when they were granted. Interest at 5 per cent. is to be charged on overdue payments.

Dried Fruit Industry in Roumania.

Exports of home-grown fruit from New Zealand have ranged during the six years 1895-1900 between 1,200 and 1,700 cwts., having been only 400 cwts. in 1894. The greater portion of this goes from Christchurch. With the view of

New Zealand Fruit Exports

ascertaining which varieties of apples are specially suited for export, prizes were offered in 1899 by the New Zealand Department of Agriculture for exhibits of this fruit, which were stored in cold chambers, and the awards made after examination of the apples three months later. The judges considered the experiment to be one of great value, and that it demonstrated the possibility of keeping apples by a system of cold storage for a considerable period.

[Report of the New Zealand Department of Agriculture, 1900.]

The total number of experiment stations in Prussia in 1898 was 33, including one maintained by the German Agricultural Society; one chemical laboratory belonging to the Union of the Beet Sugar Trade; one station belonging to the Royal Pomological Institute; and one Institute for Industrial Bacteriology. The remainder included 15 general experiment stations, and 7 devoted especially to seed testing, 4 to experiments in relation to dairying, 2 to experiments in relation to plants, etc., and one to the improvement of moor and bog land. The total income of these 28 stations amounted in 1898 to £41,396, which was made up by Government grants amounting to £10,421; provincial grants to £3,182; grants from agricultural societies of £1,695; whilst the income from other source amounted to £26,097. The fifteen experiment stations devoted to general investigations accounted for over two-thirds of the above total, their income amounting to £27,276, and the sum accorded to them by the State to £5,360.

[Landwirtschaftliche Jahrbücher, App. II., 1900.]

His Majesty's Consul at Naples reports that it has been decided by the Italian Minister of War that all captains of infantry of more than four years' service shall in future be mounted. This decision has an important bearing on the horse trade in Great Britain, and esp

Experiment Stations in Prussia.

Demand for Army Horses in Italy.

cially in Ireland, where a considerable proportion of chargers are purchased by the agents of the Italian Government, who subsequently re-sell them on easy terms to the officers. The type of horse purchased for cavalry and other mounted officers is of the hunter class, to the value of about £80. A less expensive animal would be equally suitable for officers of the line, and it is thought that there should be a brisk demand for such animals when the new regulation comes into force.

[Foreign Office Report, Annual Series, No. 2,550.]

According to the preliminary returns of the Norwegian census of December 3rd, 1900, the total population of the Kingdom of Norway on that date was 2,231,395 persons, as compared with 2,000,917 on January 1st, 1891, the last enumeration thus showing an increase of 230,478. The distribution of the population in the rural and urban districts at the two dates shows that of the total increase the towns accounted for 146,305 and the country districts for 84,173 persons, the augmentation in the former having been from 478,226 to 624,531, and in the latter from 1,522,691 to 1,606,864. The relative growths of towns and country were therefore at the rates of 30.6 and 5.5 per cent. respectively.

Oleo oil, which is an important constituent of margarine, is exported in considerable quantities from the United States. From 1884 to 1888 the annual shipments of this oil from American ports varied from 30,000,000 to nearly 46,000,000 lbs.; in 1889 they declined to 28,000,000 lbs., but afterwards gradually increased until 1894, when they amounted to over 123,000,000 lbs. Another drop

United States Exports of Oleo Oil.

to 78,000,000 lbs. took place in 1895; since that year, however, the export has again rapidly increased, and in 1899 exceeded 142,000,000 lbs. New York is the principal port of shipment for oleo oil, but large quantities are sent from Baltimore. The chief purchaser of this product from the United States is the Netherlands, the consignments to Dutch ports in 1899 having been over 86,000,000 lbs., or 60 per cent. of the entire export of that year. In the same year Germany took over 28,000,000 lbs., or about 20 per cent., and the remainder was distributed to Sweden, Norway, the United Kingdom, Denmark, Belgium, and a few other countries.

The Ontario Department of Agriculture publishes in its November Crop Bulletin the average rates of wages paid in the province to farm labourers in 1900. These rates were based on the annual returns made

by the farmers at the beginning of July. The rate for yearly engagements, with board, was £32 5s. 9d., or £51 13s. 4d. without board. These rates are rather above those of the previous four years, which ranged from £30 in 1896 to £31 0s. 10d. in 1899; whilst the payments without board were £50 12s. 6d. in 1896 and 1899, and £49 3s. 4d. and £51 5s. in 1897 and 1898. The monthly wages in 1900 were also the highest in the quinquennium, being £3 9s. with board, and £5 7s. 2d. without board, as compared with £3 4s. 1d. and £5 3s. 10d. in 1899. Domestic servants on the farms averaged 27s. 8d. per month for 1900, against 25s. 9d. in 1899.

REPORTS ON FOREIGN CROPS.

UNITED STATES HARVEST OF 1900.

The *Crop Reporter*, published by the United States Department of Agriculture in January last, gives the following particulars respecting the acreage and production of the principal crops in that country in 1900:—

Crop.	Area.	Production.	
		Total.	Per Acre.
	Acres.	Winchester Bushels.	Winchester Bushels.
Wheat - - -	42,495,385	522,229,505	12'29
Maize - - -	83,320,872	2,105,102,516	25'3
Oats - - -	27,364,795	809,125,989	29'6
Rye - - -	1,591,362	23,995,927	15'1
Barley - - -	2,894,282	58,925,833	20'4
Buckwheat - - -	637,930	9,566,966	15'0
Potatoes - - -	2,611,054	210,926,897	80'8
Hay - - -	39,132,890	Tons. 50,110,906	Tons. 1'28

As compared with 1899, the area under wheat was smaller by 2,097,000 acres and the total produce by 25,074,000 bushels, but there was practically no change in the average yield per acre, viz., 12'29 bushels as against 12'3 bushels. In the case of maize, also, the average yield per acre was the same as in 1899; but the area was larger by 1,212,000 acres, this increase being accompanied by a proportionate increase in production. Oats and rye show little change from the previous year. The yield of barley decreased by about five bushels per acre, which, with an increase of only 16,000 acres in area, accounted for a decline in the total production of

14,456,000 bushels than in 1899. Potatoes, on a somewhat larger area, produced 17,856,000 bushels less, the average yield per acre showing a decline of about eight bushels per acre. Hay exhibits a decrease both in acreage and in production, amounting to 2,196,000 acres and 6,545,000 tons.

CROPS IN INDIA.

The first general memorandum used by the Director-General of Statistics on the Indian wheat crop of the season 1900-1901 states that in Northern India the prospects of the wheat crop could hardly be better. Sowings were made in favourable conditions over a largely increased area, and the winter rains came in time to encourage the anticipation that the yield would be abundant. These remarks applied specially to the provinces which most extensively furnish the export trade with wheat. In the Central Provinces, Berar, and Bombay, on the other hand, conditions were not so favourable. In these provinces the area sown was much smaller than the average, partly because the soil was not moist enough at the sowing season, and partly because the cultivators placed under jawar and other grain much land which ordinarily would have borne wheat. Nor were the prospects in Bombay and Berar very encouraging, for the winter rains which had so benefited the wheat crop in Upper India had not penetrated to those tracts.

As regards particular provinces, the area under wheat in the Punjab was estimated to be about 7,805,000 acres, or 23 per cent. in excess of the area finally reported last year. The crop was in very good condition, and, improved as it had been by recent rain, an excellent yield was expected. The area in the North-West Provinces and Oudh was estimated to exceed the normal by about 20 per cent.; prospects were good, and rain, which in December was wanted to improve them, had since fallen generally. In the Central Provinces, too much rain had interfered with the preparation of the land; nevertheless some recovery over the very small

acreage of the previous year was expected in most districts though larger areas than usual had been devoted to jawar and other crops. A moderate yield was expected with early rain, which had subsequently fallen. In Bombay the area was reported as greatly below the average, although exceeding the previous year's abnormally low figure; the crop was reported to be fair generally. In Sind the area was 5 per cent. below the average, but sowings were still in progress; the crop was generally in good condition. In Berar the prospects were not favourable, the area was estimated as hardly more than half the normal, and a poor yield was anticipated.

THE ARGENTINE HARVEST OF 1900-1901.

According to the official *Boletín* issued by the Argentine Ministry of Agriculture, preliminary estimates of the results of the wheat harvest of 1900-1901 in Argentina indicated that the crop was not so abundant as in the previous year. The probable production of wheat and flax in the four chief provinces of the Republic is estimated as follows, the figures being subject to subsequent revision and correction:—

	Wheat. Tons.	Flax. Tons.
Santa Fé	884,000	275,000
Buenos Ayres	872,000	113,000
Cordoba	554,000	105,000
Entre Rios	88,000	24,000
	2,398,000	517,000

The *Buenos Ayres Standard* of January 20th last states that the wheat harvest in the entire Republic is officially estimated to have produced 2,542,000 tons, of which 1,712,000 tons will be available for export.

CROP PROSPECTS IN FRANCE.

A report relating to the condition of the crops of winter wheat and rye in France during the month of January last was published in the *Journal Officiel* of the 8th ult.

The acreage of winter wheat is reported to be larger than

in 1900 in 19 departments, the increase ranging from one to five per cent. in 15 departments, and from six to ten per cent. in the four others. The acreage has not varied in 43 departments, but 20 show a decrease ranging from one to five per cent., 3 from six to ten per cent., and there is a diminution of twelve per cent. in one department.

As regards winter rye, the increase is greater than 1900 by ten per cent. in one department, and by five per cent. or less in four departments. No change has taken place in 54 departments, but 21 departments show a diminished acreage of five per cent. or less. The decrease ranges from five to ten per cent. in four departments, and it reaches twenty per cent. in the case of Ille-et-Vilaine.

The condition of the winter wheat crop is returned as "very good" in eleven departments, "good" in sixty, "medium" in thirteen, and "passable" in two. The corresponding number of departments is 15, 63, 6, and 1 respectively, as regards the winter rye crop.

THE NORWEGIAN HARVEST OF 1900.

A report has been published by the new Agricultural Department of Norway furnishing the results of the past year's harvest in that country. The estimated yields of the principal crops are shown below, together with the estimated average production of the five years 1886-1890:—

	1900. Bushels.	Average 1886-90. Bushels.
Wheat and rye	1,159,000	1,164,083
Mixed corn	1,406,000	1,400,732
Barley	3,801,000	4,077,378
Oats	9,222,000	9,461,198
Potatoes	22,216,000	23,039,013

CROPS IN RUSSIA.

The Central Statistical Committee of the Ministry of the Interior have recently issued the following estimate of the

production of the chief cereals and potatoes in 1900 in the 64 Governments of European Russia, Poland, and Caucasia, the corresponding figures for 1899 being added for comparison:—

Production, 1900.

Government.	Wheat.	Rye.	Barley.	Oats.	Potatoes.
	Qrs.	Qrs.	Qrs.	Qrs.	Qrs.
50 European Governments	39,876,000	66,391,000	22,432,000	76,251,000	26,500,000
10 Polish Governments	2,458,000	7,361,000	2,203,000	5,239,000	8,289,000
4 Caucasian Governments	7,078,000	872,000	1,123,000	1,767,000	363,000
Total, 1900	49,412,000	105,124,000	67,858,000	23,257,000	25,152,000
do. 1899	46,763,000	102,318,000	66,058,000	22,904,000	23,686,000

The same authority also gives the following as the total production of other cereals in the 64 Governments:—Buckwheat, 4,090,000 qrs.; millet, 7,882,000 qrs.; maize, 3,997,000 qrs.; spelt, 1,151,000 qrs.; and peas, 3,063,000 qrs.

CROPS IN NOVA SCOTIA.

The following figures are given in the Nova Scotia Provincial Crop Report for November, 1900, as the area and production of the chief crops in that province in 1900.

Crop.	Area.	Production.
Hay	602,200 acres	733,350 tons
Oats	107,950 "	1,941,000 bushels
Wheat	16,395 "	189,340 "
Barley	15,080 "	246,800 "
Potatoes	42,500 "	5,312,500 "
Roots	8,740 "	1,810,500 "

THE ONTARIO HARVEST OF 1900.

The official report on the harvest of Ontario for the year 1900 indicates that the total area under the principal crops

in the province was 8,795,953 acres, as compared with 8,753,926 acres in the previous year.

The following table shows the acreage and production of the principal crops, with the relative figures for the previous year and the average for the period 1882-1900.

Crop.	Area.			Production.		
	1900.	1899.	1882-1900 Average.	1900.	1899.	1882-1900 Average.
	Acres.	Acres.	Acres.	Bushels.	Bushels.	Bushels.
Autumn Wheat	1,068,640	1,049,691	917,696	23,369,737	14,439,827	18,491,171
Spring do.	376,905	398,726	465,314	6,940,333	7,441,137	7,231,037
Barley	577,810	490,374	620,241	16,009,751	14,830,891	16,196,877
Oats	2,398,834	2,363,778	1,954,884	89,693,327	89,897,724	68,319,271
Rye	142,213	137,824	114,211	2,357,635	2,284,846	1,851,300
Buckwheat	102,570	132,082	100,741	1,874,261	2,203,299	1,941,359
Potatoes	169,754	168,148	160,255	21,476,439	19,933,366	19,596,662
Hay and Clover	2,526,566	2,305,422	3,397,659	3,133,045	3,490,705	1,310,706

The apple crop yielded 36,993,017 bushels, or an average of 5.68 bushels per tree of bearing age, as compared with 3.02 bushels per tree in the previous year. The number of these trees was 6,518,048, and there were also 3,430,670 young trees.

The yield of tobacco was estimated at 2,854,900 lbs. from 2,477 acres, or 1,153 lbs. per acre. The area under flax decreased, there being only 5,790 acres under this crop, as against 7,103 in 1899. Orchards and gardens accounted for 339,411 acres, while there were 10,687 acres of vineyards.

The animals enumerated in the province on July 1st last included 617,309 horses, 2,429,330 cattle, 1,797,213 sheep, and 1,771,641 swine.

CROPS AND LIVE STOCK IN MANITOBA IN 1900.

The Report of the Department of Agriculture of Manitoba, published in December last, in speaking of the yield of wheat in 1900, says that never in the history of the Province has the harvest been gathered and threshed under such unfavourable

conditions, whilst up to the first week of July the drought was so severe that many acres of land sown with wheat were ploughed up as it was believed that the crop would not be worth cutting. The average yield was returned at 8.9 bushels per acre, but only a small percentage of the crop graded as "No. 1 hard"; a considerable part was graded "No. 2 hard"; but the greater part was "No. 3 hard" and inferior qualities.

The following table gives the final results of the harvest of cereals, potatoes, and roots in the past year, together with the figures for 1899, and it will be seen that in the case of wheat and oats the yield was less than one-half that of the previous year, whilst the production of the other crops was not much better.

Crop.	Area.		Production.	
	1900.	1899.	1900.	1899.
	Acres.	Acres.	Bushels.	Bushels.
Wheat	1,457,396	1,629,995	13,025,252	27,922,230
Oats	429,108	575,136	8,814,312	22,318,378
Barley	155,111	182,912	2,939,477	5,379,156
Potatoes	16,880	19,151	2,226,880	3,236,395
Roots	7,482	10,079	1,452,780	2,670,108

The yield of flax was 164,313 bushels, of rye 25,792 bushels, and of peas 9,048 bushels.

The numbers of live stock in the Province compared very favourably with those of 1899, the returns showing 118,629 horses, 237,560 cattle, 25,816 sheep, and 77,912 pigs, or an increase of 15,974 horses, 17,312 cattle, and 11,901 pigs, but a decrease of 7,276 sheep. The production of dairy and creamery butter during 1900 was 3,338,431 lbs., or an increase, in spite of the unfavourable season, of 981,382 lbs. over the production of 1899. The out-turn of factory cheese was also greater and amounted to 1,021,238 lbs., or 172,671 lbs. more than in the previous year.

PARLIAMENTARY PUBLICATIONS.

Report of the Departmental Committee on Milk and Cream Regulations. (Cd. 491. Price 7½d.)

This is the Report of the Departmental Committee appointed by the Board of Agriculture to inquire and report as to what regulations, if any, may with advantage be made by the Board under Section 4 of the Sale of Food and Drugs Act, 1899, for determining what deficiency in any of the normal constituents of genuine milk or cream, or what addition of extraneous matter or proportion of water, in any sample of milk (including condensed milk) or cream, shall for the purposes of the Sale of Food and Drugs Acts, 1875 to 1899, raise a presumption, until the contrary is proved, that the milk or cream is not genuine. The Committee consisted of the following members: Lord Wenlock (Chairman), Mr. G. Barham, Mr. G. Cowan, Major P. G. Craigie, Mr. S. W. Farmer, Mr. Shirley F. Murphy, Professor Thorpe, F.R.S. and Mr. J. Augustus Voelcker, Ph.D. The report of the majority, which is signed by seven of the members of the Committee, contains the following principal recommendations:—

- (i) That regulations under Section 4 of the Food and Drugs Act, 1899, be made by the Board of Agriculture with respect to milk (including condensed milk) and cream.
- (ii) (a) That in the case of any milk (other than skimmed, separated, or condensed milk) the total milk-solids in which, on being dried at 100 degrees Centigrade, do not amount to 12 per cent., a presumption shall be raised, until the contrary is proved, that the milk is deficient in the normal constituents of genuine milk.
- (b) That any milk (other than skimmed, separated, or condensed milk), the total milk-solids in which are less than 12 per cent., and in which the amount of milk-fat is less than 3·25 per cent., shall be deemed to be so deficient in milk-fat as to raise a presumption, until the contrary is proved, that it has been mixed with separated milk or water, or that some portion of its normal content of milk-fat has been removed. In

calculating the percentage amount of deficiency of fat the analyst shall have regard to the above-named limit of 3·25 per cent. of milk-fat.

- (c) That any milk (other than skimmed, separated, or condensed milk) the total milk-solids in which are less than 12 per cent., and in which the amount of non-fatty milk-solids is less than 8·5 per cent., shall be deemed to be so deficient in normal constituents as to raise a presumption, until the contrary is proved, that it has been mixed with water. In calculating the percentage amount of admixed water the analyst shall have regard to the above-named limit of 8·5 per cent. of non-fatty milk-solids, and shall further take into account the extent to which the milk-fat may exceed 3·25 per cent.
- (iii) That the artificial thickening of cream by any addition of gelatine or other substance shall raise a presumption that the cream is not genuine.
- (iv) That any skimmed or separated milk in which the total milk-solids are less than 9 per cent. shall be deemed to be so deficient in normal constituents as to raise a presumption, until the contrary is proved, that it has been mixed with water.
- (v) That any condensed milk (other than that labelled "machine-skimmed milk" or "skimmed milk," in conformity with Section 11 of the Food and Drugs Act, 1899) in which either the amount of milk-fat is less than 10 per cent., or the amount of non-fatty milk-solids is less than 25 per cent., shall be deemed to be so deficient in some of the normal constituents of milk as to raise a presumption, until the contrary is proved, that it is not genuine.

The Committee also submit expressions of opinion on certain other points raised before them in evidence.

Mr. S. W. Farmer signs the report with a reservation in favour of seasonal standards for milk; Mr. G. Barham presents a minority report.

The evidence taken by the Committee has also been issued as a separate parliamentary publication. [Cd. 484. Price 3s. 8d.]

Departmental Committee on Agricultural Seeds — Report (Cd. 489.) Price 2d.

This Departmental Committee was appointed by the Board of Agriculture to inquire into the conditions under which agricultural seeds are at present sold, and to report whether any further measures can with advantage be taken to secure the maintenance of adequate standards of purity and germinating power. The Committee consisted of the following members: The Earl of Onslow (Chairman), Sir W. T. Thiselton-Dyer, Sir Jacob Wilson, Mr. R. A. Anderson,

Mr. R. Stratton, Mr. L. J. Sutton, Mr. J. Watt, and Mr. D. Wilson. In their Report they observe that in their opinion no widespread complaint of the quality of seeds sold throughout the country has been brought under their notice; on the contrary, it was universally admitted that a marked and continuous improvement in the trade as carried on by the larger merchants has been witnessed in the last twenty years.

They think that every encouragement should be given to seed merchants to give a guarantee with the seeds they sell, and that farmers should be advised to buy only subject to such guarantee, and to test the seeds they have purchased. In order to reduce to a minimum all difficulties in the way of such practice, they recommend the establishment of one central seed-testing station, under Government auspices, whose practice and procedure should be laid down and from time to time revised by a small committee of experts. The charges at this station should be moderate and so fixed that seed merchants should be encouraged to sell subject to free re-testing of their seeds by the purchaser, should he desire it.

Sir W. Thiselton Dyer and Mr. L. J. Sutton sign the Report subject to certain reservations.

Agricultural Statistics, Ireland.—Extent in Statute Acres and Produce of the Crops in 1900. [Cd. 340.] Price 5½d.

The returns of the produce of the cereal crops in Ireland in 1900 all show a decrease as compared with the previous year, the greatest relative decline being shown by barley, to the amount of four and a half bushels per acre. The potato harvest was very poor, the production (both total and per acre) being just two-thirds of that of the preceding year, while a lower average yield per acre has only been recorded four times in the 20 years 1881-1900. Roots and flax were better than in 1899, while grass yielded about the same as in the previous year.

As compared with the average of the preceding ten years, however, most crops were better, only barley and potatoes.

yielding below the average. This appears from the following table:—

Area, Production, and Yield per Acre of the Principal Crops in Ireland.

	Area.		Production.		Yield per Acre.	
	1900. Acres.	1890-99 Acres.	1900. Bushels.	1890-99 Bushels.	1900 Bushels.	1890-99 Bushels.
Wheat . . .	53,821	57,941	1,682,284	1,791,210	31'3	30'9
Oats . . .	1,105,050	1,205,182	50,289,661	52,111,130	45'5	41'2
Barley . . .	173,996	171,124	6,225,782	6,590,414	35'8	38'5
Bere . . .	177	254	5,602	7,697	31'6	30'3
Rye . . .	11,407	12,932	273,551	304,173	24'0	23'5
			Tons.	Tons.	Tons.	Tons.
Potatoes . . .	654,079	714,613	1,841,832	2,574,365	2'8	3'6
Turnips . . .	297,859	304,934	4,426,427	4,468,155	14'9	14'6
Mangel Wurzel and Beet Root	68,803	52,949	1,186,582	818,124	17'2	15'4
					Stones.	Stones.
Flax . . .	47,451	69,323	10,181	12,418	34'3	28'7
(Clover, Sainfoin and Grasses under rotation)	607,380	633,871	1,366,236	1,343,749	Tons.	Tons.
					2'2	2'1
(Permanent Pasture or Grass not broken up in Rotation)	1,558,335	1,517,375	3,847,732	3,332,810	2'5	2'3

The returns of beekeeping for 1899 show a very great increase over all preceding estimates; the total production of honey amounting to 745,692 lbs., as compared with 526,734 lbs. in 1898, and an average of only 306,731 lbs. for the ten years 1889-98. It may be noted that during this period the quantity of honey returned as having been produced in hives with movable combs has increased more rapidly than that produced in other hives. The number of stocks brought through the winter of 1899-1900 is given as just over 31,000, equally divided between hives with movable combs and other hives. 4,873 lbs. of wax were manufactured in 1899, as against 5,048 lbs. in 1898.

Local Taxation Returns, Scotland. Annual Returns for the Year 1898-99. [H.C. 319.] Price 2s. 11d.

This volume is the nineteenth annual return under the Local Taxation Returns (Scotland) Act, 1881, and contains abstracts of the receipts and expenditure of the various local authorities of Scotland for the year 1898-99.

In a memorandum and summary of the returns, it is stated that the revenue, excluding loans, of the various local authorities amounted in 1898-99 to £10,531,092, as compared with £10,184,388 in the preceding year. Of this sum £4,343,211, or 41·2 per cent., was derived from assessment; £1,878,945 (17·8 per cent.) from Imperial subventions and payments; £1,191,031 (10·5 per cent.) from tolls, dues, fees, and fines; and the remainder from miscellaneous sources. The total expenditure not defrayed out of loans was £10,520,847; and the expenditure met out of borrowed money was £3,069,376.

The amount of debt of local authorities in Scotland outstanding at the close of the financial year 1898-99 was £39,258,964, as compared with £37,062,590 in 1897-98. In addition, the capitalised value of annuities of burghal authorities remaining at the close of 1898-99 was £5,096,624.

In 1897-98 the total loans of local authorities in Scotland amounted to £8 15s. per head of the estimated population; in 1898-99 they rose to £9 4s. 5d. per head; and the capitalised value of the annuities in 1897-98 and 1898-99 represented £1 4s. 2d. and £1 3s. 11d. per head respectively.

PRICES OF LIVE STOCK AS RETURNED UNDER THE WEIGHING OF CATTLE ACT.

The particulars furnished to the Board of Agriculture by the returns made under the Markets and Fairs (Weighing of Cattle) Act, 1891, during the last quarter of 1900, enable the complete figures for that year to be presented in the table appended hereto (p. 538). These figures afford not only an opportunity of tracing the course of the market values of cattle during the three months ending with December last and during the year then ended, but with the data obtained under the comparatively modern system of live weight prices in the eight years for which statistics, more or less tentative, have been available as the result of the legislation on this subject during the closing years of the past century.

Parliament, by passing in 1887 the Markets and Fairs (Weighing of Cattle) Act, recognised the necessity of requiring certain facilities for weighing live animals to be provided in markets and fairs, and the amending Act of 1891 gave powers to the Board of Agriculture to obtain, under certain conditions, and from a certain number of typical places, information relating to the number and value of animals so weighed.

By Sections 3 and 4 of the Act of 1891 market authorities and live stock auctioneers in the scheduled towns were placed under obligation to make returns of the number of animals exposed for sale and the number weighed, with the weights and prices of these so far as they were able to ascertain them. The places first selected for this statistical inquiry were fourteen in England and five in Scotland, but in 1893, by the addition of Carlisle and Falkirk, the number of returning markets was raised to the total of twenty-one, now shown on page 538. These places, as will be seen, comprise some of the principal live stock markets in the kingdom, and in order

to fairly represent the general movements of prices the list also includes places representing the characteristic trade of smaller markets. The number of live stock exposed for sale at the scheduled places necessarily varies from year to year. The total of horned cattle shown has ranged from a million to a million and a quarter head. The number of sheep exposed for sale has varied from 4,194,000 to 4,855,000 during the eight years, and that of pigs from 139,000 to 455,000. But it is obvious from the infrequent reference to weight in the sale of either of the last two descriptions of live stock, that the weighbridge has as yet too restricted a use to enable reliable comparative statistics of the current prices of sheep or of pigs to be obtained. Comments on the new basis of price records, secured by the legislation of 1891, are therefore necessarily confined to the case of horned cattle.

Although the public weighing of farm stock in Great Britain has increased much less rapidly than the more enthusiastic advocates of the legislation of 1887 and 1891 anticipated, the returns for the past eight years indicate a measure of progress in the application of the weighbridge to the sale of horned stock, which, if slow, has been steady. The following statement gives the number of cattle entering the markets, with the number and proportion of those returned as having been weighed either before or after sale:—

Years.	Number Entering.	Number Weighed.	Proportion of Number Weighed to Number Entering.
			Per Cent.
1893	1,219,208	92,492	7.59
1894	1,203,533	96,344	8.01
1895	1,186,149	100,033	8.43
1896	1,000,014	109,184	9.93
1897	1,115,183	111,767	10.02
1898	1,263,991	138,652	10.97
1899	1,236,091	139,482	11.28
1900	1,187,603	141,611	11.92

The number returned as weighed in 1900 is thus not only absolutely larger than in any preceding year, but also in a distinctly greater proportion than before to the number entering the markets.

It has been frequently pointed out in previous numbers of the *Journal* that the extent to which the practice of public weighing prevails varies greatly in localities. In Scotland it has been from the first very much more in favour than in England. Only 6.33 per cent. of the cattle entering the 15 scheduled English markets in 1900 were returned as weighed, while 30.79 per cent. were so returned in the six scheduled markets in Scotland. The recent figures, however, show that while in Scotland the returns indicate a comparatively small extension of the practice, in England the movement toward the more accurate method of sale, though slight, has always been progressive. In Scotland the percentage weighed was 26.86 in 1893 and 30.79 in 1900, while in England the percentage has risen from 2.22 in 1893 to 6.33 in 1900.

Although the figures above referred to furnish an indication of the use of the weighbridge in connection with the sale of cattle, the weighings are not in every instance accompanied by the prices obtained. Prices are, however, furnished in an increasing proportion of the animals weighed. The "weighed and priced" cattle have risen from 4.70 to 8.78 per cent. of the total number entering the scheduled markets in the past eight years.

Animals.	1900.	1899.
	No.	No.
CATTLE:		
Entering markets	1,187,603	1,236,091
Weighed	141,611	139,482
Prices returned	124,648	124,552
Prices returned with quality distinguished	104,318	103,613
SHEEP:		
Entering markets	4,325,613	4,681,602
Weighed	43,581	48,643
Prices returned with quality distinguished	36,312	42,154
SWINE:		
Entering markets	442,216	455,056
Weighed	2,196	2,205
Prices returned with quality distinguished	2,120	2,070

Comparing more closely the returns of last year with those for 1899 it appears that fewer cases were reported of the weighing of sheep and pigs at the scheduled places, but that in the case of cattle, while the numbers entering the markets were distinctly smaller, both the number weighed and the number priced were larger than before.

From several of the scheduled places the returns of transactions always have been and still are insignificant. In markets such as Bristol, York, Lincoln, and Birmingham the owners of live stock seem content to make little or no use of the facilities for weighing their cattle, and in such transactions as have occurred in Ashford, Norwich, and Salford, the market authorities appear unable to ascertain the values of any proportion of the stock that have been weighed. Nevertheless the data available in other centres are sufficient to afford the basis for an interesting record of prices. Those for the past year may be shown as follows:—

PLACES.	INFERIOR or Third Quality.			GOOD or Second Quality.			PRIME or First Quality.		
	Number.	Price per Stone.		Number.	Price per Stone.		Number.	Price per Stone.	
		s. d.	s. d.		s. d.	s. d.		s. d.	s. d.
Carlisle	1,602	3 5½	27 6	1,806	3 10½	31 2	6,215	4 4½	35 2
Leicester	18	4 1	32 8	201	3 9	30 0	473	4 3	34 0
Leeds	21	3 6½	28 6	192	3 8½	29 8	568	4 3½	34 4
Liverpool	225	3 3½	26 0	1,471	3 10	30 8	7,740	4 5	35 4
London	13	3 3½	26 6	1,418	4 1½	34 10	3,672	4 11	39 4
Newcastle	5	2 4½	27 0	894	4 5½	35 8	1,586	4 10	38 8
Shrewsbury	560	3 7½	29 2	738	4 1½	33 2	842	4 6½	36 6
Aberdeen	4,704	3 5	27 4	7,926	4 4	34 8	8,566	4 9½	38 2
Dundee	1,621	3 4½	27 0	4,802	4 4½	35 2	2,031	4 8½	37 10
Edinburgh	10	3 10	30 8	14,019	4 6½	36 4	756	4 9½	38 4
Falkirk	639	3 10	30 8	1,774	4 4½	34 10	1,390	4 8½	37 8
Glasgow	1,041	4 1	32 8	3,937	4 3	34 0	9,090	4 7½	36 10
Perth	10	4 5	35 4	571	4 6½	36 4	567	4 10	38 8

The average prices for the year ranged, it will be seen, for prime or first quality cattle from 34s. per cwt. (4s. 3d. per stone) at Leicester to 39s. 4d. per cwt. (4s. 11d. per stone) at London. For second quality beasts the range was from

29s. 8d. per cwt. (3s. 8½d. per stone) at Leeds to 36s. 4d. per cwt. (4s. 6½d. per stone) at Edinburgh and Perth. The returns for cattle of third quality are in many cases based on numbers too small to possess statistical value, and consequently the extreme range possesses little interest. Fluctuations in the mode of classification also occur. In the case of Leicester a few "inferior" beasts, being on two occasions the only animals returned from that market, were higher in price than the average of cattle graded second quality in other weeks. But it is evident that apparent inconsistencies of this kind may occasionally occur when small numbers are concerned and the movement of market values is at all active.

Comparing the prices in 1900 with those prevalent at the several markets in 1899 the following figures appear:—

PLACES.	INFERIOR or Third Quality.		GOOD or Second Quality.		PRIME or First Quality.	
	1900.		1899.		1900.	
	Per Cwt.	s. d.	Per Cwt.	s. d.	Per Cwt.	s. d.
Carlisle	27 6	26 10	31 2	30 8	35 2	34 6
Leicester	32 8	28 2	30 0	30 2	34 0	34 4
Leeds	28 6	28 0	29 8	28 10	34 4	32 2
Liverpool	26 6	24 6	30 3	30 0	35 4	33 6
London	26 6	26 4	34 10	33 8	39 4	38 0
Newcastle	27 0	28 4	35 3	32 8	38 8	36 2
Shrewsbury	29 2	28 2	33 2	31 2	36 6	34 10
Aberdeen	27 4	25 4	34 8	37 2	38 2	36 10
Dundee	29 0	26 4	35 2	32 10	37 10	35 2
Edinburgh	30 8	30 0	36 4	34 6	38 4	36 0
Falkirk	30 8	29 4	34 10	33 2	37 8	35 2
Glasgow	32 8	31 8	34 0	33 0	36 10	35 4
Perth	35 4	30 2	36 4	33 0	38 2	35 6

The rise in values on the average of the year is very evident. At every place on the list, with the single exception of Leicester, the price of first and second quality cattle was on the whole higher than in the preceding year, the increase being especially marked in Scotland.

During the past two years something like a general

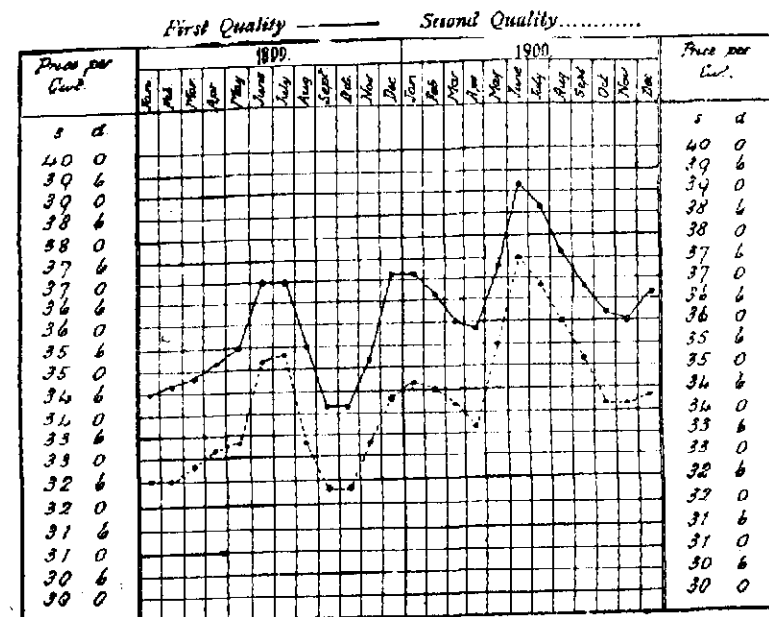
average price has been obtained by summarising, month by month, the prevailing prices of first and second quality cattle, as represented in the aggregate of the returns from the thirteen places above specified. This now affords a fairly reliable indication of the general trend of market values throughout that period. The following table shows the course of average live weight prices per hundredweight, so ascertained, for each month of the years 1899 and 1900.

Months.	Good, or Second Quality. Per cwt.		Prime, or First Quality. Per cwt.	
	1900.	1899.	1900.	1899.
	s. d.	s. d.	s. d.	s. d.
January	34 8	32 6	37 2	34 6
February	34 6	32 6	36 8	34 8
March	34 2	32 10	36 0	34 10
April	33 8	33 2	35 10	35 2
May	35 6	33 4	37 4	35 6
June	37 6	35 2	39 2	37 0
July	36 10	35 4	38 8	37 0
August	36 0	33 4	37 8	35 6
September	35 2	32 4	36 10	34 2
October	34 2	32 4	36 2	34 2
November	34 2	33 4	36 0	35 2
December	34 4	34 4	36 8	37 2

The considerable rise of values thus shown to have occurred in the summer months of 1900 was followed by a decline, and the mean live weight price at the whole of the selected markets stood at a lower level at the end than at the commencement of the year. The diagram on the opposite page traces the course of these prices.

In commenting on these returns for 1899 it was noted with satisfaction that there had been a considerable increase in the number of recorded sales of fat cattle at an agreed on

Diagram showing the Course of Average Live Weight Prices of Horned Cattle in each Month of 1900 and 1899.



price per cwt. or per stone live weight.* It has to be noted that there was in 1900 some decrease, the number so returned being 14,023. This is 2,821 less than in the preceding year, but with that exception the figures for 1900 are the largest returned in any year since the Act came into operation. The places at which actual sales by live weight were reported during the year as having taken place were Liverpool, London, Newcastle, Wakefield, Dundee, Edinburgh, Falkirk, and Glasgow, nearly half of these transactions being now reported from the last-named place.

There were also 694 store cattle sold by actual live weight at Leicester, Dundee, Edinburgh, and Glasgow. The total number of store cattle weighed at the scheduled places during 1900, for which prices were returned, was 11,396, of which 9,610 were sold at Shrewsbury. The prices realised ranged from 27s. 6d. to 38s. 10d. per cwt.

The usual tables giving details for each of the scheduled places for the complete year 1900, and for the fourth quarter, are appended.

* Journal, Vol. VI., p. 539.

I.—CATTLE, SHEEP, and SWINE, *entering and weighed at the Markets and Marts of the undermentioned Places, in the YEAR 1900, as returned under the Markets and Fairs (Weighing of Cattle) Act, 1891 (54 & 55 Vict. c. 70).*

PLACES.	Cattle.			Sheep.			Swine.		
	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.
ENGLAND.	No.	No.	No.	No.	No.	No.	No.	No.	No.
Ashford . . .	12,795	100	—	115,677	15	—	22,778	—	—
Birmingham . .	26,975	26	—	74,934	—	—	218,427	—	—
Bristol . . .	40,216	—	—	98,973	—	—	9	—	—
Carlisle . . .	69,615	9,623	9,623	293,120	—	—	16,877	—	—
Leicester . . .	61,594	1,218	1,030	82,759	83	83	7,197	1	1
Leeds . . .	30,773	1,181	1,181	122,302	2,527	2,527	969	20	—
Lincoln . . .	8,449	13	10	60,210	—	—	13,180	109	84
Liverpool . . .	55,353	8,736	8,736	367,120	2,749	2,749	—	—	—
London . . .	77,355	13,955	5,103	477,250	6,924	113	6,565	—	—
Newcastle-upon-Tyne	98,703	2,725	2,725	337,668	2	2	45,838	1,684	1,684
Norwich . . .	107,606	136	—	183,195	—	—	25,571	—	—
Salford . . .	116,528	2,974	—	545,356	—	—	4,194	—	—
Shrewsbury . . .	51,422	11,901	11,850	90,289	49	—	28,644	54	50
Wakefield . . .	72,823	6,244	2,567	194,369	—	—	2,100	18	—
York . . .	85,823	—	—	182,419	—	—	2,857	—	—
SCOTLAND.									
Aberdeen . . .	48,321	20,869	20,069	203,275	25,510	25,510	15,230	—	—
Dundee . . .	17,696	9,437	9,437	27,859	3,599	3,599	3,116	—	—
Edinburgh . . .	79,442	28,038	*13,859	222,638	—	—	8,947	—	—
Falkirk . . .	19,333	3,812	3,812	11,166	—	—	122	—	—
Glasgow . . .	75,284	14,142	13,366	376,460	871	477	6,230	2	2
Perth . . .	48,885	7,324	*1,148	256,576	1,244	1,244	13,312	299	299
TOTAL for ENGLAND	916,022	57,989	41,827	3,225,641	19,349	5474	395,259	1,895	1,819
TOTAL for SCOTLAND	271,581	83,622	*62,491	1,099,972	31,232	30,838	46,957	301	301
Total . . .	1,187,603	141,611	*104,318	4,325,613	43,581	36,312	442,216	2,196	2,120

* Prices for 14,154 cattle in addition to the above were quoted from Edinburgh and for 6,176 cattle from Perth, but without distinguishing the quality.

II.—CATTLE, SHEEP, AND SWINE, *entering and weighed at the Markets and Marts of the undermentioned Places in the FOURTH QUARTER of 1900, as returned under the Markets and Fairs (Weighing of Cattle) Act, 1891 (54 and 55 Vict. c. 70).*

PLACES.	Cattle.			Sheep.			Swine.		
	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.	Total Number entering the Markets or Marts.	Number Weighed.	Number Weigh'd for which Prices were given.
ENGLAND.	No.	No.	No.	No.	No.	No.	No.	No.	No.
Ashford . . .	1,358	21	—	24,171	—	—	6,593	—	—
Birmingham . .	5,347	—	—	13,361	—	—	65,647	—	—
Bristol . . .	12,111	—	—	18,066	—	—	—	—	—
Carlisle . . .	20,742	2,225	2,225	57,814	—	—	1,742	—	—
Leicester . . .	15,881	473	415	25,344	60	60	1,828	1	1
Leeds . . .	7,214	299	299	22,640	—	—	—	—	—
Lincoln . . .	2,230	—	—	11,340	—	—	2,709	—	—
Liverpool . . .	20,432	3,451	3,451	82,063	484	484	—	—	—
London . . .	23,860	4,913	1,452	90,080	1,811	—	4,235	—	—
Newcastle-upon-Tyne	27,181	477	477	76,871	—	—	15,645	344	344
Norwich . . .	41,733	22	—	30,661	—	—	7,069	—	—
Salford . . .	34,412	1,040	—	87,667	—	—	1,246	—	—
Shrewsbury . . .	15,793	3,465	3,465	19,330	—	—	7,336	—	—
Wakefield . . .	20,610	2,570	794	35,710	—	—	—	—	—
York . . .	27,767	—	—	82,500	—	—	21,994	—	—
SCOTLAND.									
Aberdeen . . .	13,358	3,421	3,421	31,519	7,175	7,175	3,652	—	—
Dundee . . .	4,052	2,154	2,154	7,102	778	778	981	—	—
Edinburgh . . .	22,727	8,090	*4,076	51,735	—	—	2,514	—	—
Falkirk . . .	3,030	980	980	4,110	—	—	38	—	—
Glasgow . . .	20,971	3,880	3,619	98,081	137	117	1,639	—	—
Perth . . .	12,384	1,452	*272	86,531	289	288	3,287	75	75
TOTAL for ENGLAND	284,666	18,966	12,578	677,928	2,355	544	118,564	345	345
TOTAL for SCOTLAND	76,722	21,988	*16,524	279,082	8,378	8,458	12,116	75	75
Total . . .	361,388	40,954	*29,102	957,010	10,733	8,902	130,680	420	420

* Prices for 4,023 cattle in addition to the above were quoted from Edinburgh, and for 1,120 cattle from Perth, but without distinguishing the quality.

III.—CATTLE, SHEEP, AND SWINE, *entering, weighed, and priced at the Scheduled Places in Great Britain, in the FOURTH QUARTERS of 1900 and 1899.*

Animals.	4th Quarter, 1900.	4th Quarter, 1899.
CATTLE :	No.	No.
Entering markets	361,388	365,787
Weighed	40,954	37,558
Prices returned	34,305	32,777
Prices returned with quality distinguished .	29,102	25,595
SHEEP :		
Entering markets	957,010	1,047,291
Weighed	10,733	11,109
Prices returned with quality distinguished .	8,902	9,824
SWINE :		
Entering markets	130,680	142,938
Weighed	420	457
Prices returned with quality distinguished .	420	439

IV.—*Prices of FAT CATTLE in the FOURTH QUARTER of 1900.*

PLACES.	INFERIOR or Third Quality.			Good or Second Quality.			PRIME or First Quality.		
	Number.	Price per Stone.	Price per Cwt.	Number	Price per Stone.	Price per Cwt.	Number	Price per Stone.	Price per Cwt.
Carlisle	440	s. d. 3 5½	s. d. 27 10	503	s. d. 3 11	s. d. 31 4	1,282	s. d. 4 4½	s. d. 35 2
Leicester	—	—	—	104	s. d. 3 8	s. d. 29 4	171	s. d. 4 3	s. d. 34 0
Leeds	4	s. d. 3 8	s. d. 29 4	46	s. d. 3 9½	s. d. 30 4	249	s. d. 4 4	s. d. 34 8
Liverpool	29	s. d. 3 0	s. d. 24 0	502	s. d. 3 8½	s. d. 29 8	2,920	s. d. 4 3½	s. d. 34 4
London	—	—	—	622	s. d. 4 3½	s. d. 34 2	830	s. d. 4 10½	s. d. 38 10
Newcastle	2	s. d. 3 0	s. d. 24 0	218	s. d. 4 1	s. d. 32 8	257	s. d. 4 8	s. d. 37 4
Shrewsbury	215	s. d. 3 7½	s. d. 29 0	176	s. d. 4 0½	s. d. 32 4	116	s. d. 4 5	s. d. 35 4
Aberdeen	1,123	s. d. 3 3½	s. d. 26 4	1,812	s. d. 4 4½	s. d. 35 0	2,395	s. d. 4 9½	s. d. 38 2
Dundee	441	s. d. 3 4	s. d. 26 8	1,271	s. d. 4 4½	s. d. 35 2	426	s. d. 4 9½	s. d. 38 6
Edinburgh	8	s. d. 4 0	s. d. 32 0	3,508	s. d. 4 4½	s. d. 35 2	186	s. d. 4 9½	s. d. 38 4
Falkirk	379	s. d. 3 9½	s. d. 30 6	380	s. d. 4 3½	s. d. 34 2	221	s. d. 4 7	s. d. 36 8
Glasgow	439	s. d. 4 0½	s. d. 32 6	1,091	s. d. 4 2	s. d. 33 4	1,972	s. d. 4 6	s. d. 36 0
Perth	—	—	—	142	s. d. 4 6	s. d. 36 0	130	s. d. 4 9½	s. d. 38 4

V.—*Comparative Statement of the Prices of FAT CATTLE in the FOURTH QUARTERS of 1900 and 1899.*

PLACES.	INFERIOR or Third Quality.		GOOD or Second Quality.		PRIME or First Quality.	
	1900.	1899.	1900.	1899.	1900.	1899.
	Per Cwt.	Per Cwt.	Per Cwt.	Per Cwt.	Per Cwt.	Per Cwt.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Carlisle	27 10	26 6	31 4	31 0	35 2	36 4
Leicester	—	—	29 4	30 6	34 0	34 10
Leeds	29 4	28 0	30 4	29 0	31 8	32 6
Liverpool	24 0	24 0	29 8	32 4	34 4	33 6
London	—	26 4	34 2	33 4	38 10	38 8
Newcastle	24 0	—	32 8	33 0	37 4	35 10
Shrewsbury	29 0	28 10	32 4	31 4	35 4	35 4
Aberdeen	26 4	24 8	35 0	34 2	38 2	38 2
Dundee	26 8	24 10	35 2	33 6	38 6	36 6
Edinburgh	32 0	30 0	35 2	34 4	38 4	37 8
Falkirk	30 6	29 0	34 2	32 0	36 8	35 8
Glasgow	32 6	31 4	33 4	32 2	36 0	34 10
Perth	—	32 4	36 0	34 0	38 4	36 4

PRICES OF MEAT, CORN, AND DAIRY PRODUCE.

AVERAGE PRICES of DEAD MEAT, per Stone of 8 lbs., at the LONDON CENTRAL MEAT MARKET, during the Fourth Quarter of 1900, and during the Months of December, 1900, and January and February, 1901.

(Compiled from the prices quoted weekly in the *Meat Trades Journal*.)

DESCRIPTION.	4TH QUARTER 1900.	DECEMBER 1900.	JANUARY 1901.	FEBRUARY 1901.
BEFF:—	s. d. s. d.	s. d. s. d.	s. d. s. d.	s. d. s. d.
Scotch, short sides - - -	4 4 10 4 8	4 2 10 4 6	4 1 10 4 5	4 0 10 4 4
„ long sides - - - - -	4 0 11 4 3	3 11 11 4 2	3 10 11 4 0	3 11 11 4 2
English - - - - -	3 8 11 3 10	3 7 11 3 10	3 9 11 3 11	3 9 11 3 11
Cows and Bulls - - - - -	2 0 11 3 2	2 1 11 3 2	2 2 11 3 3	2 2 11 3 3
American Birkenhead killed - -	3 6 11 3 9	3 6 11 3 9	3 6 11 3 9	3 7 11 3 9
„ Deptford killed - - -	3 7 11 3 10	3 7 11 3 10	3 7 11 3 10	3 8 11 3 11
American Refrig. hind-quarters -	3 10 11 4 0	3 9 11 3 11	3 8 11 3 10	3 7 11 3 9
„ „ fore-quarters - - -	2 8 11 2 10	2 8 11 2 9	2 8 11 2 10	2 9 11 2 10
Australian, Frozen hind-quarters -	2 5 11 2 7	2 4 11 2 6	2 5 11 2 6	2 4 11 2 5
„ „ fore-quarters - - -	2 2 11 2 3	2 2 11 2 3	2 2 11 2 3	2 2 11 2 3
New Zealand „ hind-quarters - -	2 7 11 2 9	2 6 11 2 8	2 7 11 2 8	2 5 11 2 7
„ „ fore-quarters - - -	2 2 11 2 3	2 3 11 2 4	2 3 11 2 4	2 3 11 2 3
River Plate „ hind-quarters - -	— „ —	— „ —	2 5 11 2 7	2 6 11 2 8
„ „ fore-quarters - - -	— „ —	— „ —	2 3 11 2 3	2 2 11 2 3
MUTTON:—				
Scotch, Prime - - - - -	4 4 11 4 9	4 4 11 4 8	4 7 11 4 11	4 8 11 4 11
English, Prime - - - - -	4 1 11 4 6	4 0 11 4 6	4 4 11 4 9	4 6 11 4 11
Ewes - - - - -	2 11 11 3 5	2 11 11 3 6	3 5 11 3 10	3 7 11 4 1
Continental - - - - -	3 9 11 4 3	3 9 11 4 3	4 1 11 4 6	4 3 11 4 6
New Zealand, Frozen - - -	2 6 11 3 0	2 9 11 3 3	2 9 11 3 4	2 7 11 3 3
Australian, Frozen - - - -	2 4 11 2 0	2 6 11 2 8	2 6 11 2 9	2 6 11 2 8
River Plate, Frozen - - - -	2 5 11 2 0	2 6 11 2 8	2 6 11 2 8	2 6 11 2 8
LAMB:—				
English - - - - -	4 5 11 4 9	— „ —	— „ —	— „ —
New Zealand, Frozen - - -	3 4 11 3 7	4 0 11 4 2	3 8 11 4 5	4 2 11 4 6
VEAL:—				
English - - - - -	4 5 11 4 9	4 6 11 4 9	4 9 11 5 0	4 8 11 5 0
Foreign - - - - -	3 11 11 4 3	4 0 11 4 4	4 3 11 4 7	4 2 11 4 7
PORK:—				
English, best - - - - -	4 3 11 4 7	4 2 11 4 7	4 0 11 4 5	4 2 11 4 7
„ secondary - - - - -	3 7 11 4 1	3 7 11 4 0	3 7 11 3 11	3 8 11 4 0
Foreign - - - - -	3 7 11 4 1	3 7 11 4 0	3 7 11 3 11	3 8 11 4 0

AVERAGE PRICES OF DEAD MEAT, per Stone of 8 lbs., at the LONDON CENTRAL MEAT MARKET, during the Years 1896 to 1900 inclusive.

(Compiled from the prices quoted weekly in the *Meat Trades Journal*.)

DESCRIPTION.	1896.	1897.	1898.	1899.	1900.
BEFF:—	s. d. s. d.	s. d. s. d.	s. d. s. d.	s. d. s. d.	s. d. s. d.
Scotch, short sides - - -	4 0 10 4 4	4 2 10 4 5	3 11 10 4 3	4 3 10 4 6	4 5 10 4 8
„ long sides - - - - -	3 7 11 3 10	3 10 11 4 1	3 8 11 3 10	3 11 11 4 1	4 0 11 4 3
English - - - - -	3 6 11 3 9	3 8 11 3 10	3 6 11 3 8	3 9 11 3 11	3 10 11 4 0
Cows and Bulls - - - - -	1 10 11 2 8	2 1 11 2 11	2 0 11 2 2	2 0 11 2 10	2 1 11 2 2
American, Birkenhead killed	2 11 11 3 3	3 3 11 3 6	3 1 11 3 5	3 5 11 3 8	3 8 11 3 10
„ Deptford killed - - -	2 11 11 3 3	3 3 11 3 6	3 2 11 3 5	3 6 11 3 9	3 8 11 3 11
Argentine „ „ - - -	2 2 11 2 8	2 8 11 3 1	2 7 11 2 11	3 0 11 3 4	3 2 11 3 6
American Refrig. hind-qrs	3 2 11 3 7	3 6 11 3 9	3 6 11 3 9	3 7 11 3 10	3 10 11 4 0
„ „ fore-qrs. - - - -	1 10 11 2 1	2 3 11 2 5	2 2 11 2 5	2 4 11 2 6	2 8 11 2 10
Australian, Froz'n hind-qrs	1 8 11 1 10	2 1 11 2 3	1 11 11 2 1	2 1 11 2 4	2 5 11 2 7
„ „ fore-qrs - - - - -	1 3 11 1 4	1 7 11 1 9	1 6 11 1 8	1 8 11 1 9	2 1 11 2 2
New Zealand, hind-qrs. - -	— „ —	— „ —	2 2 11 2 4	2 3 11 2 6	2 7 11 2 9
„ „ fore-qrs. - - - -	— „ —	— „ —	1 8 11 1 10	1 9 11 1 11	2 2 11 2 3
MUTTON:—					
Scotch, Prime - - - - -	4 2 11 4 7	4 4 11 4 10	4 1 11 4 8	4 5 11 4 11	4 9 11 5 2
English, Prime - - - - -	3 10 11 4 4	4 2 11 4 7	3 10 11 4 5	4 2 11 4 8	4 6 11 4 11
Ewes - - - - -	2 9 11 3 3	3 1 11 3 6	2 9 11 3 3	3 1 11 3 6	3 4 11 3 9
Continental - - - - -	3 5 11 3 10	3 9 11 4 1	3 7 11 3 11	3 9 11 4 2	4 1 11 4 6
River Plate, Town killed	3 0 11 3 3	3 3 11 3 5	3 0 11 3 3	3 3 11 3 6	3 5 11 3 8
New Zealand, Frozen - - -	1 11 11 2 5	1 10 11 2 4	1 9 11 2 6	1 11 11 2 8	2 4 11 2 9
Australian, Frozen - - - -	1 7 11 1 8	1 7 11 1 9	1 8 11 1 10	1 10 11 2 0	2 3 11 2 4
River Plate, Frozen - - - -	1 7 11 1 9	1 7 11 1 9	1 8 11 1 9	1 11 11 2 0	2 3 11 2 5
LAMB:—					
English - - - - -	3 1 11 6 1	5 4 11 6 2	4 10 11 5 9	5 0 11 6 2	5 6 11 6 4
New Zealand, Frozen - - -	2 9 11 3 3	2 9 11 3 1	3 7 11 3 5	2 11 11 3 3	3 1 11 3 5
VEAL:—					
English - - - - -	4 0 11 4 8	3 11 11 4 6	4 2 11 4 7	4 4 11 4 9	4 4 11 4 9
Foreign - - - - -	3 4 11 3 11	3 4 11 3 10	3 7 11 4 0	3 8 11 4 2	3 10 11 4 3
PORK:—					
English, best - - - - -	3 0 11 3 5	3 10 11 4 2	3 11 11 4 3	3 6 11 3 11	3 10 11 4 2
„ secondary - - - - -	2 5 11 2 11	3 2 11 3 7	3 5 11 3 10	3 0 11 3 5	3 4 11 3 9
Foreign - - - - -	2 5 11 2 11	3 2 11 3 7	3 5 11 3 10	3 0 11 3 5	3 4 11 3 9

AVERAGE WHOLESALE PRICES of CATTLE and SHEEP, per Stone of 8 lbs., sinking the offal, at the METROPOLITAN CATTLE MARKET, during each Quarter of 1900, with the Mean Prices for the Year.

PERIOD.	CATTLE.			SHEEP.		
	Inferior.	Second.	First.	Inferior.	Second.	First.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1st Quarter, 1900	2 11	4 1	4 9	3 5	5 1	5 10
2nd Quarter, "	3 1	4 1	4 9	3 5	5 7	6 4
3rd Quarter, "	3 2	4 3	4 11	3 3	5 4	6 0
4th Quarter, "	2 11	4 2	4 10	3 2	5 1	5 10
Year "	3 1	4 2	4 10	3 4	5 3	6 0

AVERAGE WHOLESALE PRICES OF BEEF and MUTTON, per Stone of 8 lbs., by the Carcase, at LIVERPOOL and GLASGOW, during each Quarter of 1900, with the Mean Prices for the Year.

PERIOD.	LIVERPOOL.*				GLASGOW.†			
	BEEF.		MUTTON.		BEEF.		MUTTON.	
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1st Quarter, 1900	2 6	4 0	4 0	5 6	3 2	4 2	4 4	5 4
2nd Quarter, "	2 10	4 2	4 0	5 8	3 6	4 0	4 10	5 10
3rd Quarter, "	2 8	4 0	3 4	5 0	3 0	3 10	4 0	4 10
4th Quarter, "	2 8	3 10	3 0	4 10	3 0	3 10	3 0	4 8
Year "	2 8	4 0	3 7	5 3	3 2	3 11	4 0	5 2

* Compiled from information furnished by the Medical Officer of Health, Liverpool. The prices quoted are for Carcases of Animals slaughtered at the Liverpool Abattoir, and do not apply to Imported Meat.

† Compiled from information furnished by the Principal of the Veterinary College, Glasgow.

BERLIN MARKET.

AVERAGE PRICES of CATTLE and SHEEP (First Quality Dead Weight) in the BERLIN CATTLE MARKET in the under-mentioned Months of 1900 and 1901, together with the mean prices for the Year 1900.

MONTHS.	CATTLE.		SHEEP.	
	Per Cwt.		Per Cwt.	
	s. d.	s. d.	s. d.	s. d.
December, 1900	63 2	to 67 11	62 5	to 66 6
Mean of the Year 1900	63 9	" 67 8	62 8	" 66 2
January, 1901	62 10	" 66 5	60 1	" 63 2
February, 1901	62 10	" 66 2	58 10	" 61 10

NOTE.—The above prices have been compiled from the weekly returns published in the *Deutsche Landwirtschaftliche Presse*.

PARIS MARKET.

AVERAGE PRICES of CATTLE, SHEEP, and SWINE (Medium Quality) in the PARIS CATTLE MARKET in the under-mentioned Months of 1900 and 1901, together with the mean prices for Year 1900.

MONTHS.	OXEN.	CALVES.	SHEEP.	PIGS.
	Per Cwt..	Per Cwt.	Per Cwt.	Per Cwt.
LIVE WEIGHT.				
December, 1900	s. d. 29 1	s. d. 44 5	s. d. 32 0	s. d. 35 3
Mean of the Year 1900	27 10	41 9	33 6	39 9
January, 1901	28 8	46 3	31 10	34 1
February, 1901	28 6	45 2	33 11	34 0
DEAD WEIGHT.				
December, 1900	s. d. 49 2	s. d. 71 10	s. d. 66 2	s. d. 49 11
Mean of the Year 1900	46 9	69 9	67 5	56 7
January, 1901	48 7	77 5	65 2	48 9
February, 1901	48 1	75 4	67 10	48 3

NOTE.—The above prices have been compiled from the weekly returns published in the *Journal d'Agriculture Pratique*.

CHICAGO.

PRICES of CATTLE at CHICAGO per Cwt. (Live Weight) in the under-mentioned Months of 1900 and 1901, with the Mean Prices for the Year 1900.

Months.	Good Dressed Beef and Shipping Steers.		Export Cattle.		Extra Prime Cattle.	
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
December, 1900	22 9	to 25 0	22 7	to 26 0	26 11	to 28 2
Mean of the year 1900	23 8	" 26 1	23 6	" 26 7	27 2	" 28 4
January, 1901	22 8	" 26 3	22 10	" 27 0	27 9	" 29 0
February "	22 1	" 25 4	22 4	" 27 4	28 0	" 29 2

Compiled from the Live Stock Reports issued by Messrs. Clay, Robinson, and Co. of the Union Stock Yards, Chicago, Illinois.

AVERAGE VALUES, per Cwt., of various Kinds of DEAD MEAT Imported into the United Kingdom from FOREIGN COUNTRIES and BRITISH POSSESSIONS in each Quarter of 1900, with the Average Values for the Year.

(Computed from the Trade and Navigation Accounts.)

PERIOD.	BEEF.		MUTTON.	PORK.		BACON.	HAMS.
	Fresh.	Salted.		Fresh.	Salted.		
1st Quarter, 1900	s. d. 39 6	s. d. 27 11	s. d. 31 4	s. d. 42 10	s. d. 24 9	s. d. 37 1	s. d. 45 0
2nd Quarter, "	40 1	26 11	36 3	43 0	24 8	41 6	46 7
3rd Quarter, "	39 1	25 10	34 6	42 1	22 10	43 7	47 10
4th Quarter, "	39 7	26 1	36 4	43 7	25 2	44 10	47 5
Year "	39 7	26 8	34 5	43 0	24 3	41 9	46 10

AVERAGE PRICES of **British Corn** per Quarter of 8 imperial bushels,* computed from the Weekly Averages of Corn Returns from the Returning Markets of ENGLAND AND WALES, pursuant to the Corn Returns Act, 1882, together with the QUANTITIES returned as sold at such Markets, in the under-noted periods of the Years 1900, 1899, and 1898.

QUARTER ENDED	PRICES.			QUANTITIES.		
	1900.	1899.	1898.	1900.	1899.	1898.
Wheat.						
Lady Day	s. d. 25 11	s. d. 26 3	s. d. 31 1	Quart. 868,378	Quart. 868,579	Quart. 699,637
Midsummer	25 9	25 1	41 5	954,497	994,293	557,394
Michaelmas	28 7	25 2	32 8	511,347	754,667	308,279
Christmas	27 4	26 4	27 2	689,261	913,421	1,036,975
Barley.						
Lady Day	s. d. 25 1	s. d. 27 1	s. d. 27 9	Quart. 888,049	Quart. 830,398	Quart. 902,452
Midsummer	24 3	24 6	26 10	91,157	92,648	47,621
Michaelmas	24 3	24 4	25 10	143,552	237,935	99,743
Christmas	25 11	25 6	28 2	2,065,135	2,135,762	2,603,841
Oats.						
Lady Day	s. d. 16 7	s. d. 16 11	s. d. 17 5	Quart. 246,949	Quart. 251,841	Quart. 226,150
Midsummer	18 2	17 6	19 10	110,163	137,834	91,475
Michaelmas	18 7	17 3	19 7	116,880	147,902	78,787
Christmas	17 0	16 4	16 11	237,791	258,183	269,652

* Section 8 of the Corn Returns Act, 1882, provides that where returns of purchases of British Corn are made to the local inspector of Corn Returns in any other measure than the imperial bushel, or by weight or by a weighed measure, that officer shall convert such returns into the imperial bushel, and in the case of weight or weighed measure the conversion is to be made at the rate of 60 imperial pounds for every bushel of wheat, 50 imperial pounds for every bushel of barley, and 39 imperial pounds for every bushel of oats.

CORN PRICES:—ANNUAL AVERAGES.

AVERAGE PRICES of **British Corn** per Quarter of 8 imperial bushels, computed from the Weekly Averages of Corn Returns from the Returning Markets, together with the QUANTITIES returned as sold at such Markets during each of the years 1896 to 1900.

YEARS.	PRICES.			QUANTITIES.		
	Wheat.	Barley.	Oats.	Wheat.	Barley.	Oats.
1896	s. d. 26 2	s. d. 22 11	s. d. 14 9	Quart. 2,111,021	Quart. 3,391,804	Quart. 653,153
1897	30 2	23 6	16 11	2,756,561	3,257,187	550,434
1898	34 0	27 2	18 5	2,602,416	3,633,657	688,064
1899	25 8	25 7	17 0	3,330,961	3,296,744	776,361
1900	26 11	24 11	17 7	2,923,483	3,190,793	711,734

AVERAGE PRICES of **British Corn** per Quarter of 8 imperial bushels, computed from the Returns received under the Corn Returns Act, 1882, in each of the under-mentioned Weeks in 1901, and in the corresponding Weeks in 1900 and 1899.

Weeks ended (in 1901).	Wheat.			Barley.			Oats.		
	1901.	1900.	1899.	1901.	1900.	1899.	1901.	1900.	1899.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Jan. 5	26 5	25 9	27 0	25 4	25 7	28 3	17 2	16 2	17 0
" 12	26 7	25 11	27 2	25 6	25 5	28 2	17 3	16 3	17 1
" 19	26 11	26 0	27 0	25 9	25 8	27 11	17 3	16 2	17 1
" 26	26 10	25 10	26 7	25 6	25 9	27 9	17 6	16 4	17 0
Feb. 2	26 7	25 8	26 6	25 7	25 4	27 2	17 8	16 6	17 0
" 9	26 8	25 10	26 8	25 7	25 3	27 2	17 7	16 5	17 0
" 16	26 4	26 1	26 0	25 4	24 11	26 10	17 7	16 8	16 11
" 23	26 1	26 3	25 7	25 0	25 1	26 7	17 7	16 9	16 11
Mar. 2	25 11	26 4	25 8	25 0	24 6	26 7	17 9	16 10	17 0
" 9	25 9	25 11	25 10	25 4	24 8	26 7	17 7	16 11	16 11
" 16	25 9	25 10	25 10	25 4	24 6	26 3	17 7	16 11	16 10
" 23		25 11	25 4		25 0	26 8		17 1	17 0
" 30		25 10	24 11		24 11	26 2		17 2	16 11
Apl. 6		25 10	24 7		24 10	25 1		17 2	16 11
" 13		25 11	24 6		24 5	25 7		17 8	16 10
" 20		26 0	24 8		24 9	25 2		17 3	17 1
" 27		26 0	25 0		25 2	25 10		17 11	17 5
May 4		25 11	25 3		25 3	24 5		18 0	17 6
" 11		25 11	25 4		24 10	23 11		17 11	17 9
" 18		25 7	25 3		24 5	23 11		18 5	17 10
" 25		25 5	25 2		23 11	23 8		18 2	17 8
June 1		25 5	25 4		24 4	24 4		18 6	18 1
" 8		25 3	25 6		23 8	21 10		18 8	18 2
" 15		25 6	25 7		23 8	23 1		18 11	17 10
" 22		25 9	25 7		23 5	26 2		18 11	17 11
" 29		26 11	25 7		23 4	24 2		19 3	18 0
July 6		27 10	25 7		22 10	21 9		19 5	18 1
" 13		28 7	25 5		23 2	20 4		19 1	17 11
" 20		29 0	25 5		23 8	21 10		19 3	18 0
" 27		29 3	25 2		24 4	22 5		19 9	18 2
Aug. 3		28 10	24 10		23 10	20 9		19 4	18 0
" 10		28 7	24 8		23 7	22 6		19 8	17 9
" 17		28 10	24 7		23 3	26 11		19 11	17 4
" 24		28 10	24 7		24 10	26 5		18 8	17 1
" 31		28 8	25 0		25 2	25 10		18 1	16 7
Sept. 7		28 7	25 5		25 8	26 5		17 10	16 6
" 14		28 4	25 4		25 4	27 1		17 1	16 2
" 21		28 4	25 4		26 0	27 4		17 1	16 1
" 28		28 9	25 6		26 1	26 11		17 2	16 5
Oct. 5		28 9	26 0		26 2	28 0		16 10	16 5
" 12		28 9	27 3		26 2	27 9		17 1	16 5
" 19		28 4	28 2		26 5	27 6		16 11	16 10
" 26		27 11	28 1		26 3	27 4		16 11	16 3
Nov. 2		27 5	27 2		26 3	27 2		16 11	16 7
" 9		27 3	26 7		25 11	26 9		16 10	16 5
" 16		27 1	26 1		25 8	26 4		17 1	16 7
" 23		27 2	25 8		25 10	26 2		17 0	16 7
" 30		27 0	25 7		25 9	25 10		17 2	16 6
Dec. 7		26 10	25 7		25 11	25 10		17 4	16 5
" 14		26 9	25 4		25 7	25 7		17 1	16 1
" 21		26 7	25 6		25 7	25 10		17 2	16 0
" 28		26 4	25 9		25 10	25 5		17 2	16 2

AVERAGE VALUE per IMPERIAL QUARTER OF WHEAT IMPORTED into the UNITED KINGDOM from the under-mentioned Foreign Countries and British Possessions in the years 1898, 1899, and 1900.

COUNTRIES from which Exported.	Average Value per Imperial Quarter.		
	1898.	1899.	1900.
ARGENTINE REPUBLIC	s. d. 37 6	s. d. 27 4	s. d. 28 2
CHILE	35 1	27 5	29 9
GERMANY	36 5	28 0	28 1
ROUMANIA	35 9	29 6	29 9
RUSSIA	34 11	28 8	29 2
TURKEY	31 3	25 6	27 10
U.S. OF AMERICA (Atlantic)	34 7	29 4	29 9
(Pacific)	34 11	28 7	29 1
INDIA, BRITISH	31 11	27 9	29 11
NORTH AMERICA, BRITISH	33 4	29 5	29 10
AUSTRALASIA	—	28 11	29 9

AVERAGE PRICES of WHEAT, BARLEY, and OATS per IMPERIAL QUARTER in FRANCE, and ENGLAND and WALES, in the under-mentioned Months of 1900 and 1901.

MONTH.	FRANCE.	ENGLAND.
WHEAT.		
	Per Qr. s. d.	Per Qr. s. d.
December, 1900	32 11	26 8
January, 1901	32 10	26 8
February, ..	32 9	26 5
BARLEY.		
	Per Qr. s. d.	Per Qr. s. d.
December, 1900	23 0	25 8
January, 1901	22 11	25 6
February, ..	23 0	25 4
OATS.		
	Per Qr. s. d.	Per Qr. s. d.
December, 1900	19 9	17 2
January, 1901	19 11	17 3
February, ..	20 1	17 7

Note.—The prices of French grain have been compiled from the official weekly averages published in the *Journal d'Agriculture Pratique*. The prices of British grain are official averages based on the weekly returns furnished under the Corn Returns Act, 1882.

AVERAGE PRICES OF WHEAT, BARLEY, and OATS, per IMPERIAL QUARTER in BELGIUM in the under-mentioned Months of 1900 and 1901, with Mean Prices for the year 1900.

Month.	Wheat.	Barley.	Oats.
	s. d.	s. d.	s. d.
November, 1900	28 1	23 7	17 10
December, "	28 4	23 7	18 1
Mean of the year 1900	28 4	23 10	19 1
January, 1901	28 3	23 4	18 5

The above prices have been compiled from the official monthly averages published in the *Moniteur Belge*.

AVERAGE PRICES OF WHEAT, BARLEY, AND OATS per IMPERIAL QUARTER at the under-mentioned Markets in the under-mentioned Months of 1900 and 1901, with the mean prices for the year 1900.

Month.	London.	Paris.	Breslau.
WHEAT.			
	Per Qr. s. d.	Per Qr. s. d.	Per Qr. s. d. s. d.
December, 1900	28 1	34 8	29 11 to 33 8
Mean of the year 1900	27 10	34 2	29 6 to 33 3
January, 1901	28 6	34 0	29 9 to 33 5
February, "	27 4	33 9	29 11 to 33 8
Barley.			
	Per Qr. s. d.	Per Qr. s. d.	Per Qr. s. d. s. d.
December, 1900	25 10	23 3	24 0 to 27 3
Mean of the year 1900	25 5	24 0	23 3 to 26 8
January, 1901	26 2	23 3	24 0 to 27 3
February, "	25 4	22 10	24 2 to 27 3
OATS.			
	Per Qr. s. d.	Per Qr. s. d.	Per Qr. s. d. s. d.
December, 1900	18 7	20 11	18 0 to 18 9
Mean of the year 1900	18 4	20 3	17 9 to 18 8
January, 1901	18 7	20 7	18 0 to 18 9
February, "	18 8	20 8	18 3 to 19 0

Note.—The London quotation represents the price of British corn as returned under the Corn Returns Act, 1882; the price of grain in Paris is the official average price of French grain in that city; the quotations shown for Breslau represent the prices of grain of good merchantable quality.

AVERAGE WHOLESALE PRICES of BUTTER, MARGARINE, and CHEESE in the under-mentioned Months of 1900 and 1901.
(Compiled from the Grocer.)

DESCRIPTION.	December, 1900.	January, 1901.	February, 1901.
	Per Cwt.	Per Cwt.	Per Cwt.
	s. d. s. d.	s. d. s. d.	s. d. s. d.
BUTTER:			
Cork, 1sts	103 6 —	111 0 —	—
" 2nds	94 0 —	103 6 —	115 0 —
" 3rds	86 6 —	89 6 —	100 6 —
" 4ths	76 0 —	—	—
* Irish Creamery	112 6 to 117 6	114 0 to 120 0	113 0 to 117 6
Friesland	111 0 to 114 0	114 0 to 120 0	108 0 to 113 0
Dutch Creameries	113 6 to 116 0	114 6 to 120 0	108 0 to 112 0
French Baskets	117 6 to 123 0	115 6 to 120 6	112 0 to 117 0
" Crocks and Firkins	107 6 to 113 6	105 6 to 110 6	101 0 to 107 0
" 2nds and 3rds	99 6 to 103 6	97 6 to 101 0	94 0 to 98 0
Danish and Swedish	123 0 to 126 6	122 6 to 126 0	114 0 to 118 0
Finnish	94 6 to 114 6	93 6 to 110 6	96 0 to 108 0
Russian and Siberian	81 0 to 96 6	80 6 to 94 6	86 0 to 101 0
Canadian and States	77 6 to 97 0	81 6 to 104 6	72 6 to 98 6
Argentine	98 0 to 113 0	93 0 to 111 0	96 6 to 108 0
Colonial, fine	104 6 to 113 6	101 0 to 111 0	100 0 to 110 0
" good and inferior	75 0 to 90 0	77 6 to 97 0	80 0 to 96 0
Fresh Rolls (Foreign)	11 6 to 15 6	11 6 to 16 0	11 0 to 15 6
MARGARINE	41 6 to 68 0	44 0 to 72 0	40 0 to 64 0
CHEESE:			
Cheddar	56 0 to 74 0	57 6 to 73 0	63 0 to 73 6
" Loaf	64 6 to 67 6	66 0 to 68 0	67 6 to 69 6
Cheshire	78 0 to 82 6	78 0 to 84 0	79 0 to 84 0
Wiltshire, Loaf	65 0 to 67 6	66 0 to 68 0	67 6 to 69 6
Double Gloucester	60 0 to 64 0	60 0 to 64 0	60 0 to 64 0
Derby, Factory	50 0 to 56 0	55 0 to 60 0	55 6 to 60 0

* These prices are the averages of the official quotations of the Price Committee of the Irish Co-operative Agency at Limerick for the choicest Irish pure Creamery Butter.

WEEKLY PRICES (WHOLESALE) of VEGETABLES and FRUIT
at COVENT GARDEN MARKET.(Compiled from the *Gardeners' Chronicle*.)

Description.	Week ending							
	February 2nd.		February 9th.		February 16th.		February 23rd.	
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
VEGETABLES—								
Artichokes, Globe, per doz.	6 6	—	3 0	—	3 0	—	3 6	—
" Jerusalem, per sieve.	0 9 to 1 0	—	0 9 to 1 0	—	0 9 to 1 0	—	8 9 to 1 0	—
Asparagus, home-grown, per bundle.	—	—	8 0	—	8 0	—	8 0	—
Beans, Channel Islands, and home, Dwarf, new, per lb.	1 6	—	2 0	—	2 0	—	2 0	—
Beetroot, per bushel.	1 3	1 0	1 3	1 6	1 3	1 6	1 3	1 0
Beet, per dozen.	0 6	—	0 6	—	0 6	—	0 6	—
Broccoli, per bushel.	1 0	1 3	1 0	1 3	0 9	1 0	0 9	1 0
Brussels sprouts, per sieve.	1 0	1 0	1 0	1 0	0 9	1 0	0 9	1 0
Cabbage, per tally.	1 6	1 0	2 0	1 6	0 9	1 0	1 0	1 6
Carrots, per dozen bunches washed, per cwt.	1 9	2 0	1 9	2 0	2 0	2 0	2 0	2 0
Cauliflowers, per doz.	1 1	2 3	0 9	1 6	0 9	1 6	0 9	1 6
Celery, per doz. bunches.	10 0	15 0	10 0	15 0	10 0	15 0	10 0	15 0
" unwashed, per doz.	8 0	10 0	8 0	10 0	8 0	10 0	8 0	10 0
Cress, per doz. punnets.	1 6	—	1 6	—	1 6	—	1 6	—
Cucumbers, per doz.	10 0	18 0	10 0	21 0	8 0	12 0	4 0	8 0
Endive, new French, per doz.	1 6	—	1 6	—	1 6	—	1 6	—
Garlic, new, per lb.	0 2	—	0 2	—	1 6	—	1 0	—
Horseradish, English, per bundle.	2 6	2 0	2 6	2 0	1 6	2 0	1 6	2 0
Leeks, per doz. bunches.	1 6	—	1 6	—	1 6	—	1 6	—
Mint, new, per doz. bunches.	4 0	—	4 0	6 0	—	6 0	—	6 0
Mushrooms, House, per lb.	0 9	0 10	0 9	0 10	0 8	0 10	0 10	—
Onions, picklers, per sieve.	2 0	3 0	2 0	3 0	2 0	3 0	2 0	3 0
" per bag.	3 0	4 6	3 0	4 6	3 0	4 6	3 0	4 6
" English, per cwt.	5 0	—	5 0	—	5 0	—	5 0	—
Parsley, per doz. bunches.	1 0	2 0	1 0	2 0	1 0	2 0	1 0	2 0
Parsnips, per cwt. bag.	2 0	3 6	2 0	3 6	2 0	3 6	2 0	3 6
Potatoes, per ton.	75 0	120 0	85 0	125 0	85 0	125 0	85 0	125 0
" new, per cwt.	12 0	14 0	10 0	11 0	10 0	11 0	10 0	11 0
Radishes, per doz. bunches.	1 0	1 6	1 0	1 6	2 3	—	2 3	—
Rhubarb, York, per doz.	0 10	1 2	0 10	1 2	1 3	1 4	1 3	1 4
Salad, small, per doz. punnets.	1 3	—	1 3	—	1 3	—	1 3	—
Scotch Kale, per bushel.	4 0	—	4 0	—	4 0	—	4 0	—
Seakale, per doz. punnets.	19 0	15 0	19 0	15 0	12 0	—	15 0	19 0
Shallots, new, per lb.	0 2	—	0 2	—	0 2	—	0 2	—
Turnips, per dozen.	1 6	2 0	1 6	2 0	1 6	2 0	1 6	2 0
Turnip Tops, per bushel.	1 0	—	1 0	—	1 0	—	1 0	—
Watercress, per dozen bunches.	0 6	1 0	0 6	1 0	0 6	1 0	0 6	1 0
FRUIT—								
Apples, English, large Cookers, per bushel.	3 0	5 0	3 0	5 0	3 0	5 0	4 0	5 0
" English Various, per bushel.	2 0	4 6	2 0	4 6	2 0	4 6	2 0	4 6
" Blueheims, per bushel.	4 0	6 0	4 0	6 0	4 0	6 0	4 0	6 0
" Nova Scotia, per barrel.	10 0	18 0	10 0	18 0	12 0	18 0	12 0	18 0
Cobnuts, per lb.	0 4	—	0 4	—	0 4	—	0 4	—
Grapes, Alicante, per lb.	0 10	1 9	0 9	1 6	0 10	1 3	0 9	1 6
" Alameda, per doz. lbs.	5 0	7 0	5 0	7 0	5 0	7 0	5 0	7 0
" Colmar, Class A, per lb.	1 6	2 0	1 6	2 0	1 9	2 0	1 9	2 0
" " Class B, per lb.	0 10	1 6	0 10	1 2	0 9	1 3	0 8	1 0
Walnuts, per cwt.	13 0	—	13 0	—	13 0	—	13 0	—

DISEASES OF ANIMALS IN GREAT BRITAIN.
NUMBER of OUTBREAKS of **Foot-and-Mouth Disease** and of **Swine-Fever**, with the Number of **CATTLE** and **SWINE** Slaughtered by order of the Board of Agriculture, in GREAT BRITAIN in each of the under-mentioned periods.

QUARTER ENDED	Foot-and-Mouth Disease.		Swine-Fever.	
	OUTBREAKS Confirmed.	ANIMALS Attacked.	OUTBREAKS Confirmed.	SWINE Slaughtered as Diseased, or as having been exposed to Infection.
	No.	No.	No.	No.
September, 1899	—	—	453	6,645
December, 1899	—	—	358	5,276
March, 1900	7	99	438	4,980
June, 1900	2	24	736	7,600
September, 1900	7	102	409	2,622
December, 1900	5	41	357	2,731

NUMBER of OUTBREAKS reported as having taken place, and Number of ANIMALS returned as having been ATTACKED by **Anthrax** and **Glanders** in GREAT BRITAIN in each of the under-mentioned periods.

QUARTER ENDED	Anthrax.		Glanders (including Farcy).	
	OUTBREAKS Reported.	ANIMALS Attacked.	OUTBREAKS Reported.	ANIMALS Attacked.
	No.	No.	No.	No.
March, 1899	135	247	176	328
June, 1899	153	315	175	263
September, 1899	113	222	261	526
December, 1899	133	202	241	355
March, 1900	140	213	259	486
June, 1900	163	279	286	461
September, 1900	108	223	316	475
December, 1900	159	240	259	437

NUMBER of CASES of **Rabies** in DOGS in GREAT BRITAIN during each of the under-mentioned periods.

THREE MONTHS ENDED	Number of Cases.
30th September, 1899	6
31st December, 1899	2
31st March, 1900	—
30th June, 1900	3
30th September, 1900	3
31st December, 1900	—

DISEASES OF ANIMALS IN IRELAND.

NUMBER of OUTBREAKS of **Pleuro-Pneumonia** and of **Swine-Fever**, with the Number of CATTLE and SWINE Slaughtered by order of the Lord Lieutenant and Privy Council in IRELAND, in each of the under-mentioned periods.

QUARTER ENDED	Pleuro-Pneumonia.			Swine-Fever.	
	OUT-BREAKS Confirmed.	CATTLE found Diseased.	CATTLE Slaughtered as having been exposed to Infection.	OUT-BREAKS Confirmed.	SWINE Slaughtered as Diseased, or as having been exposed to Infection.
	No.	No.	No.	No.	No.
September, 1899	—	—	—	119	2,463
December, 1899	—	—	—	28	495
March, 1900	—	—	—	40	702
June, 1900	—	—	—	78	1,394
September, 1900	—	—	—	69	1,036
December, 1900	—	—	—	39	577

NUMBER of OUTBREAKS reported as having taken place, and Number of ANIMALS returned as having been ATTACKED by **Anthrax**, **Glanders**, and **Rabies** in Ireland in each of the under-mentioned periods.

QUARTER ENDED	Anthrax.		Glanders (including Farcy).		Rabies.	
	OUT-BREAKS REPORTED.	ANIMALS ATTACKED.	OUT-BREAKS REPORTED.	ANIMALS ATTACKED.	CASES REPORTED.	
	No.	No.	No.	No.	DOGS.	OTHER ANIMALS.
September, 1899	1	3	2	4	30	5
December, 1899	—	—	3	4	7	1
March, 1900	1	6	4	5	7	—
June, 1900	1	1	3	7	4	1
September, 1900	—	—	1	1	1	—
December, 1900	—	—	2	2	5	1

PRICES OF WOOL.

AVERAGE PRICES OF ENGLISH WOOL, per pack of 240 lbs., in the under-mentioned Months of 1900 and 1901.

(Compiled from the Economist.)

DESCRIPTION.	December, 1900.		January, 1901.		February, 1901.	
	£ s.	£ s.	£ s.	£ s.	£ s.	£ s.
South Down	8	0 to 11	8	0 to 11	8	0 to 11
Half-breds	6	10 „ 8	6	10 „ 8	6	10 „ 8
Leicester	6	0 „ 7	6	0 „ 7	6	0 „ 6
Kent Fleeces	6	0 „ 7	6	0 „ 7	6	0 „ 6

ORDNANCE SURVEY MAPS OF GREAT BRITAIN AND IRELAND.

The Ordnance Survey are issuing a new series of folding pocket maps for England and Wales on the scale of one inch to the mile. The maps are printed in colours on sheets 18 by 12 inches, mounted on canvas, in a cover or flat, price 1s. each. The one-inch map can also be procured at the same price in black and white, showing outline and contours; or in outline, with hills printed either in black or brown; the outline map has recently been revised. These maps are not only useful for general topographical purposes, but should also prove serviceable to cyclists and pedestrians, since they show all roads, indicating their character and whether metalled or not, footpaths, hills, rivers, towns, villages, railway stations, and local boundaries.

Combined one-inch outline maps have also been published of Bath, Birmingham, Bournemouth, Bradford, Brighton and Worthing, Bristol, Chatham, Clovelly, Derby, Dorchester and Portland, Gloucester and Cheltenham, Huddersfield, Leeds, Leicester, Liverpool, London, Manchester, Nottingham, Plymouth, Rugby, Sheffield and the Peak, Warrington,

Warwick and Leamington, Weymouth, Winchester, Aberdeen, Dundee, Glasgow, the Isle of Wight, the Lake District of England, the New Forest, and South-East Kent. Additional maps are in course of preparation.

These combined maps are based on the revised one-inch map. In most cases they are being published folded in covers, and with the principal roads coloured, at prices varying from 1s. to 1s. 6d.

Cheap maps of counties, groups of counties, or districts are also being published on the $\frac{1}{2}$ -inch scale, with main roads coloured, at 6d. plain, or 9d. if folded in a cover. Kent, Northumberland and Durham are already published, and maps of counties in the South of England will before long be prepared.

There are agents for the sale of Ordnance Survey Maps in most of the chief towns, and maps can be ordered and indexes, etc., seen at many Head Post Offices, in places where there are no agents. They can also be ordered, through any bookseller, from the Director-General, Ordnance Survey Office, Southampton; or in the case of Ireland, from the Officer in Charge, Ordnance Survey, Dublin.

THE "LABOUR GAZETTE."

The "Labour Gazette," the Journal of the Labour Department of the Board of Trade, contains an article each month on the state of employment among agricultural labourers in the various parts of the United Kingdom. Special articles also appear therein from time to time on the rates of wages paid to agricultural labourers, the Hiring Fairs in Great Britain, and on migratory Irish agricultural labourers. The "Labour Gazette" is issued on the 15th of each month, and may be obtained direct from the Publishers, Messrs. Horace Marshall & Son, Temple House, Temple Avenue, London, E.C., at the rate of 2s. per annum, post free. Copies may also be ordered through any newsagent, price 1d. each.

POST OFFICE SAVINGS BANKS, WITH GOVERNMENT SECURITY.

ADVANTAGES OFFERED FOR OLD AGE PENSIONS.

Provision for old age can be made by buying Savings Bank Deferred Annuities from £1 to £100 to begin at any age selected.

RETURN OF PURCHASE MONEY. The Premiums for Deferred Annuities can be returned on application, or on Death before the Annuity begins, if the Contract is taken out on these conditions.

IMMEDIATE PENSIONS. Annuities to begin at once, of any amount from £1 to £100 a year, can be bought through the Post Office Savings Bank. The Purchase Money is payable in a lump sum which is not returnable, and the Pensions are payable half-yearly.

Savings Banks Annuities are payable by half-yearly instalments on the 5th January and the 5th July, or the 5th April and 10th October, according to the date of purchase.

PROCEDURE. A simple form of Proposal, and a form for statement of age, can be obtained at any Post Office Savings Bank. When filled up the forms will be forwarded by the local Postmaster to the Chief Office, London, and a Contract will be issued when the first premium has been paid. Annuity Premiums are payable in the same way as Insurance Premiums, namely, by transfers from Savings Bank accounts.

OLD AGE PENSIONS.—IMMEDIATE LIFE ANNUITIES.

This Table shows the cost of an Immediate Life Annuity of £1, and an Annuity of a larger amount costs a larger sum in exact proportion. For instance, a Pension of £10 a year would cost ten times the amount given below.

AGE at time of Purchase.	Males. Cost of an Immediate Annuity of £1.	Females. Cost of an Immediate Annuity of £1.	AGE at time of Purchase.	Males. Cost of an Immediate Annuity of £1.	Females. Cost of an Immediate Annuity of £1.
5 and under 6	£ s. d. 25 19 0	£ s. d. 27 12 6	44 and under 45	£ s. d. 16 15 8	£ s. d. 18 13 3
6 " 7	25 15 1	27 9 1	45 " 46	16 9 11	18 6 9
7 " 8	25 11 1	27 5 8	46 " 47	16 4 2	18 0 0
8 " 9	25 7 0	27 2 2	47 " 48	15 18 3	17 13 2
9 " 10	25 2 11	26 18 8	48 " 49	15 12 3	17 6 1
10 " 11	24 18 10	26 15 1	49 " 50	15 6 1	16 18 11
11 " 12	24 14 9	26 11 6	50 " 51	14 19 11	16 11 9
12 " 13	24 10 6	26 7 10	51 " 52	14 13 6	16 4 7
13 " 14	24 6 4	26 4 1	52 " 53	14 7 1	15 17 4
14 " 15	24 2 1	26 0 4	53 " 54	14 0 5	15 9 11
15 " 16	23 17 10	25 16 6	54 " 55	13 13 8	15 2 4
16 " 17	23 13 6	25 12 7	55 " 56	13 6 9	14 14 9
17 " 18	23 9 1	25 8 8	56 " 57	12 19 8	14 6 11
18 " 19	23 4 9	25 4 8	57 " 58	12 12 5	13 19 0
19 " 20	23 0 4	25 0 8	58 " 59	12 4 11	13 11 1
20 " 21	22 15 10	24 16 6	59 " 60	11 17 4	13 3 1
21 " 22	22 11 4	24 12 4	60 " 61	11 9 8	12 15 1
22 " 23	22 6 9	24 8 1	61 " 62	11 2 2	12 7 0
23 " 24	22 2 3	24 3 10	62 " 63	10 14 11	11 19 0
24 " 25	21 17 7	23 19 5	63 " 64	10 7 8	11 11 0
25 " 26	21 12 11	23 15 0	64 " 65	10 0 6	11 2 11
26 " 27	21 8 3	23 10 6	65 " 66	9 13 4	10 14 7
27 " 28	21 3 6	23 5 11	66 " 67	9 6 4	10 6 4
28 " 29	20 18 9	23 1 3	67 " 68	8 19 7	9 18 1
29 " 30	20 13 11	22 16 6	68 " 69	8 12 10	9 9 10
30 " 31	20 9 1	22 11 8	69 " 70	8 6 2	9 1 10
31 " 32	20 4 2	22 6 9	70 " 71	7 19 5	8 14 2
32 " 33	19 19 2	22 1 9	71 " 72	7 12 10	8 6 10
33 " 34	19 14 2	21 16 7	72 " 73	7 6 4	7 19 10
34 " 35	19 9 2	21 11 5	73 " 74	7 0 1	7 13 0
35 " 36	19 4 1	21 6 2	74 " 75	6 14 1	7 6 4
36 " 37	18 18 11	21 0 9	75 " 76	6 8 4	6 19 10
37 " 38	18 13 9	20 15 3	76 " 77	6 2 8	6 13 7
38 " 39	18 8 6	20 9 7	77 " 78	5 12 3	6 7 5
39 " 40	18 3 2	20 3 11	78 " 79	5 7 2	6 1 6
40 " 41	17 17 10	19 18 0	79 " 80	5 2 4	5 15 9
41 " 42	17 12 4	19 12 1	80 or any greater age.		5 10 3
42 " 43	17 6 10	19 5 11			
43 " 44	17 1 4	18 19 8			

OLD AGE PENSIONS.—DEFERRED LIFE ANNUITIES.

The Annuity Tables below give the cost of an Annuity of £1, and an Annuity of a larger amount costs a larger sum in exact proportion. For instance, a Pension of £10 a year would cost ten times the amount given below. In this class of Annuities the Purchase Money will be returned on application, or on the death of the nominee, if an instalment of the Annuity shall not have become due. These Pensions can be Deferred any number of years from 10 to 50, and any cost not given below will be furnished on application to the Controller, Post Office Savings Bank, London.

Purchase Money Returnable Scale.

Age at time of Purchase.	Cost of an Annuity of £1 payable after the expiration of 10 YEARS.				Cost of an Annuity of £1 payable after the expiration of 20 YEARS.			
	Males.		Females.		Males.		Females.	
	In 11 Yearly Sums of	In one Sum at time of Purchase.	In 11 Yearly Sums of	In one Sum at time of Purchase.	In 21 Yearly Sums of	In one Sum at time of Purchase.	In 21 Yearly Sums of	In one Sum at time of Purchase.
21 and under 22	£ s. d. 1 12 5	£ s. d. 15 15 9	£ s. d. 1 15 10	£ s. d. 17 0 0	£ s. d. 0 13 0	£ s. d. 10 15 1	£ s. d. 0 14 6	£ s. d. 11 19 3
22 " 23	1 12 0	15 12 10	1 13 5	17 3 7	0 12 10	10 11 0	0 14 3	11 15 6
23 " 24	1 11 7	15 7 11	1 15 0	17 1 1	0 12 7	10 8 4	0 14 0	11 11 9
24 " 25	1 11 3	15 4 0	1 14 7	16 17 0	0 12 5	10 4 10	0 13 9	11 7 10
25 " 26	1 10 10	15 0 0	1 14 0	16 12 11	0 12 2	10 1 4	0 13 6	11 3 10
26 " 27	1 10 5	14 16 0	1 13 9	16 8 8	0 12 0	9 17 10	0 13 3	10 19 9
27 " 28	1 10 0	14 11 11	1 13 4	16 4 4	0 11 9	9 14 5	0 13 0	10 15 6
28 " 29	1 9 7	14 7 10	1 12 10	16 0 0	0 11 6	9 10 7	0 12 9	10 11 3
29 " 30	1 9 2	14 3 9	1 12 5	15 15 6	0 11 4	9 6 10	0 12 6	10 6 10
30 " 31	1 8 8	13 19 6	1 12 11	15 10 11	0 11 1	9 3 1	0 12 4	10 2 6
31 " 32	1 8 3	13 15 3	1 11 5	15 6 3	0 10 10	8 19 2	0 12 0	9 18 1
32 " 33	1 7 10	13 11 2	1 10 11	15 1 6	0 10 7	8 15 2	0 11 9	9 13 8
33 " 34	1 7 5	13 6 8	1 10 5	14 16 7	0 10 4	8 11 2	0 11 5	9 9 2
34 " 35	1 6 11	13 2 3	1 9 13	14 11 7	0 10 1	8 7 0	0 11 2	9 4 6
35 " 36	1 6 6	12 17 9	1 9 5	14 6 6	0 9 10	8 2 10	0 10 11	8 19 11
36 " 37	1 6 0	12 13 3	1 8 11	14 1 3	0 9 7	7 18 6	0 10 7	8 15 2
37 " 38	1 5 6	12 8 7	1 8 4	13 15 10	0 9 4	7 14 1	0 10 4	8 10 4
38 " 39	1 5 1	12 3 11	1 7 9	13 10 4	0 9 1	7 9 6	0 10 0	8 5 5
39 " 40	1 4 7	11 19 2	1 7 2	13 4 10	0 8 9	7 4 10	0 9 9	8 0 7
40 " 41	1 4 1	11 14 4	1 6 7	12 19 2	0 8 6	7 0 2	0 9 5	7 13 8
41 " 42	1 3 7	11 9 4	1 6 0	12 13 7	0 8 3	6 15 7	0 9 2	7 10 9
42 " 43	1 3 0	11 4 3	1 5 6	12 7 11	0 7 11	6 11 2	0 8 10	7 5 10
43 " 44	1 2 6	10 19 1	1 4 10	12 2 1	0 7 8	6 6 9	0 8 6	7 1 0
44 " 45	1 2 0	10 13 9	1 4 4	11 16 3	0 7 5	6 2 4	0 8 3	6 16 0
45 " 46	1 1 5	10 8 4	1 3 8	11 10 3	0 7 2	5 18 0	0 7 11	6 11 0

Purchase Money not Returnable Scale.

21 and under 22	1 19 3	14 2 4	1 13 7	16 1 5	0 11 9	8 5 11	0 12 11	0 10 2
22 " 23	1 19 0	13 18 1	1 13 2	15 19 3	0 10 10	8 0 0	0 12 8	0 15 4
23 " 24	1 18 11	13 13 8	1 12 7	15 14 1	0 10 7	7 18 5	0 12 5	0 11 5
24 " 25	1 18 7	13 9 4	1 12 0	15 8 10	0 10 4	7 14 7	0 12 2	0 11 2
25 " 26	1 18 0	13 4 10	1 12 4	15 4 0	0 10 2	7 10 0	0 11 11	0 10 6
26 " 27	1 18 1	13 0 5	1 11 10	15 0 1	0 9 13	7 6 11	0 11 8	0 10 5
27 " 28	1 17 8	12 15 11	1 11 5	14 15 7	0 9 8	7 3 1	0 11 5	0 10 3
28 " 29	1 17 2	12 11 5	1 10 11	14 11 1	0 9 5	6 19 2	0 11 2	0 10 0
29 " 30	1 16 9	12 6 10	1 10 6	14 6 5	0 9 3	6 15 4	0 10 11	0 9 9
30 " 31	1 16 3	12 2 3	1 10 0	14 1 9	0 9 0	6 11 4	0 10 8	0 9 6
31 " 32	1 15 10	11 17 8	1 9 6	13 16 11	0 8 9	6 7 5	0 10 5	0 9 3
32 " 33	1 15 4	11 13 0	1 9 0	13 12 1	0 8 6	6 3 6	0 10 2	0 9 0
33 " 34	1 14 17	11 8 3	1 8 6	13 7 2	0 8 3	5 19 6	0 9 10	0 8 10
34 " 35	1 14 5	11 3 6	1 8 0	13 2 1	0 8 0	5 15 6	0 9 6	0 8 4
35 " 36	1 13 11	10 18 9	1 7 6	12 16 11	0 7 9	5 11 5	0 9 3	0 8 1
36 " 37	1 13 5	10 13 11	1 7 11	12 11 8	0 7 6	5 7 5	0 8 11	0 7 11
37 " 38	1 13 0	10 9 1	1 6 5	12 6 4	0 7 3	5 3 4	0 8 8	0 7 8
38 " 39	1 12 6	10 4 2	1 6 0	12 0 10	0 7 0	4 19 2	0 8 4	0 7 4
39 " 40	1 12 0	9 19 2	1 5 3	11 13 3	0 6 9	4 15 1	0 8 0	0 7 0
40 " 41	1 11 6	9 14 2	1 4 8	11 9 7	0 6 6	4 10 10	0 7 9	0 6 11
41 " 42	1 11 1	9 9 1	1 4 1	11 3 9	0 6 2	4 6 8	0 7 5	0 6 10
42 " 43	1 10 5	9 4 0	1 3 5	10 17 9	0 5 11	4 2 5	0 7 1	0 6 9
43 " 44	0 10 11	8 18 10	1 2 10	10 11 0	0 5 8	3 18 1	0 6 9	0 6 10
44 " 45	0 10 4	8 13 7	1 2 2	10 5 6	0 5 4	3 13 9	0 6 5	0 6 1
45 " 46	0 10 0	8 8 3	1 1 6	9 19 3	0 5 1	3 9 5	0 6 1	0 5 11

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Number.	Title.
Leaflet No. 1	Mites on Currant and Nut Trees.
" " 2	Vine and Raspberry Weevils.
" " 3	The Turnip Fly or Flea.
" " 4	Caterpillars on Fruit Trees.
" " 5	The Mangel Wurzel Fly.
" " 6	The Field Vole.
" " 7	<i>Out of Print.</i>
" " 8	Farmers and Assessments to Local Rates.
" " 9	Ensilage.
" " 10	Wireworms.
" " 11	The Daddy Longlegs or Crane Fly.
" " 12	The Gooseberry Saw-Fly.
" " 13	Acorn Poisoning.
" " 14	The Raspberry Moth.
" " 15	The Apple Blossom Weevil.
" " 16	The Apple Sucker.
" " 17	<i>Out of Print.</i>
" " 18	Fertilisers and Feeding Stuffs Act.
" " 19	Pea and Bean Weevil.
" " 20	The Magpie Moth.
" " 21	The Warble Fly.
" " 22	The Diamond Back Moth.
" " 23	Potato Disease.
" " 24	The Ribbon Footed Corn-Fly.
" " 25	The Cockchafer.
" " 26	Farmers and the Income Tax.
" " 27	Remission of Tithe Rentcharge.
" " 28	Anthrax.
" " 29	Swine Fever.
" " 30	The Codlin Moth.
" " 31	The Onion Fly.
" " 32	Foul Brood or Bee Pest.
" " 33	Surface Caterpillars.
" " 34	The Woolly Aphis or American Blight.
" " 35	The Celery Fly.
" " 36	Cultivation of Osiers.
" " 37	Rabies.
" " 38	The Carrot Fly.
" " 39	Assessments to Land Tax.
" " 40	The Kestrel or Windhover.
" " 41	The Red Spider or Spinning Mite.
" " 42	The Short-Eared Owl.
" " 43	Titmice.
" " 44	The Common Lapwing, or Plover.
" " 45	The Starling.
" " 46	The Stem Eelworm.
" " 47	The Asparagus Beetle.
" " 48	The Pea Thrips.
" " 49	The Fruit Tree Beetle.
" " 50	Water Wagtails or "Dishwashers."
" " 51	The White or Barn Owl.
" " 52	Gooseberry Blight.
" " 53	The Pear Midge.
" " 54	The Spotted Flycatcher.
" " 55	The Swallow.
" " 56	The Canker Fungus.
" " 57	External Parasites of Poultry.
" " 58	Internal Parasites of Poultry.
" " 59	Improvement of Land Act.
" " 60	The Wood Leopard Moth.
" " 61	Sheep Scab.
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" " 63	Destruction of Charlock.
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