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Proceedings of the Madras Government, Revenue Department, 24th January 1873.

No. 185. Read the following Proceedings of the Board of Revenue, dated 15th July 1872, No. 1,313 :—

Read the following letter from W. R. ROBERTSON, Esq., Superintendent of the Government Farms, to the Secretary to the Board of Revenue, dated Sydapet, 24th April 1872, No. 322 :—

I HAVE the honour to acknowledge the receipt of the Proceedings of Government, dated 5th April 1872, with Government Order No. 561 of the same date, communicating to me Major-General Cotton's memorandum on the Madras Farms, for any observations I may wish to make.

2. With reference to his paragraph 8 I would observe that the substitution of steeping for boiling in the preparation of gram for horses, will not, I fear, become so general as he anticipates. Since the preparation of my report steeped gram has been tried in many stables, and the result has not generally been satisfactory ; some horses eat it readily, but others altogether refuse it. As a general rule I have found that fresh imported horses eat it well, while horses which for years have been accustomed to boiled gram generally refuse it. Some have supposed that gram is less nutritious, as well as less palatable, after being steeped than after being boiled ; but this is a mistake, for quite independent of the fact that boiling renders the albumen of gram insoluble and therefore less digestable, the cells of the pulse are generally violently ruptured during the boiling process and a large quantity of soluble nutritious matters are set free, these are lost in the water and go to form the soup, which is generally appropriated by the horse-keeper for his own use, and represents so much direct loss to the owner of the horse. As most of the horses used in this part of India are imported from countries in which gram is unknown, it would on their first arrival be as easy to accustom them to steeped as to boiled gram. With cattle I have heard of no difficulty in substituting steeping for boiling ; they eat gram readily in either state ; while, a considerable saving is effected by adopting the former process.

3. Referring to the observations in paragraph 17 and in the fifteen following paragraphs, it must be remembered that the present "Madras Farm" will ultimately form but *one* in the set of farms now being organized in this Presidency. The present site possesses *many* advantages, it is close to the seat of Government, is easy of access to residents of Madras or to visitors passing through Madras, the situation is a very healthy one, there is an abundant supply of labour in its neighbourhood, and a fair market in its vicinity ; in the River Adyar it possesses a perennial supply of water, which, at no great expense, could be rendered available for irrigation. The estate now includes nearly 250 acres of arable land in a compact block thoroughly cleared of jungle and other impediments to an improved system of agriculture, divided by straight fences in fields varying from 5 to 30 acres in extent. The division of this land under an "Experimental" and a "Model Farm" allows of a proper separation in these two branches of our work. The estate is well provided with buildings for both experimental and commercial farming ; it is intersected by good roads and is well fenced. The soils, which are certainly very poor, are gradually improving, indeed in some of them a *very* great improvement has taken place, a fine crop of New Orleans Cotton, after maize, is now growing in a field that five years ago could scarcely produce a crop of horse-gram, and, if the present system of management is continued for a few years longer, nearly the whole of the land will become equally as good.

4. On the other hand, the present "Madras Farms" have their drawbacks, the chief of these being the poverty of the soils, want of pasturage, deficient arrangements for irrigation, the presence of a slaughter house in their centre, and a large village of squatters on the western side of the estate causing a great deal of trespass and petty pilfering ; but all these can be remedied; the soils are gradually improving, green crops can be raised to supply the want of pasturage for such animals as it is only desirable to keep here, an anicut across the river Adyar at a higher level than the present one would afford an abundant supply of water during the whole

year, and give ample opportunity for carrying out irrigation experiments, and the slaughter house and village might be removed ; but whether or not, these drawbacks are so easily disposed of, they have little weight in comparison with the many advantages the present site undoubtedly possesses.

5. I regret that I must altogether disagree with the statement in the early part of paragraph 18 that, "the extent of the farm is even now insufficient for the trial of the preliminary experiments in progress." I do not remember a single instance in which I was unable to carry out an experiment except perhaps in cattle-breeding owing to the smallness of the area of land at my disposal. I can at any time set apart 50 acres of land for the experimental trial of such implements as, in the present condition of our agriculture, it is only desirable to introduce; and the Royal Agricultural Society of England seldom requires more than this for trials in which numbers of competitors enter. Indeed, at the annual Show a field of 15 or 20 acres is generally sufficient in which to test the merits of a score of ploughs, or an equal number of mowing and reaping machines, and our trials, I need scarcely say, are conducted on a very *much more modest* scale.

6. Perhaps the statement refers to "cropping experiments," and if so, I cannot do better than refer the Board to the current number of the Journal of the Royal Agricultural Society, in which is recorded the results of seventy-seven cropping experiments made last season, under the direction of Doctor Voelcker, F.R S., F.C.S., etc., Consulting Chemist to the Society ; the total area of these *seventy-seven* experimental plots, the records of which occupy twenty-three pages in the journal, was considerably under *four* acres, or, more accurately, sixty-seven of one-twentieth of an acre in extent, and ten each one-hundredth acre in extent. In my last annual report I recorded, in all, the results of *thirty* special experiments conducted on an area of 120,971 square yards, or nearly 25 acres of land, *the average size of each*, experimental plot *being* 4,028 *square yards* against 247 square yards, the *average size* of *Dr. Voelcker's experimental plots.* We will never require more than one half of the "Experimental Farm" for special experiments, its area being nearly 130 acres. Many of the famous "Experimental Farms" of England and Germany are not half this area. Indeed, for all practical purposes an Experimental Farm of 60 acres is large enough. The area of an experimental plot should altogether depend upon the kind of information the experiment is expected to yield. If we wish to ascertain the result of a peculiar system of cultivation to test the capabilities of certain field implements, then plots of even 10 acres might be too small ; but if, on the other hand, we desire to ascertain the manurial matters our soil needs to enable it to produce good crops of a certain kind, the evidence yielded by small plots of say 200 square yards each, repeated in duplicate or triplicate, is generally far the most conclusive. All conversant with actual field-work are fully aware how in a single field, nay in a single acre, several qualities of soil may be found ; and, to secure anything like an *uniform* soil, chemically and physically it is necessary to limit the area of the experimental plots. Nor is this the *only* reason, for it is equally as important that every operation should be performed on each plot, at about the same time and in an experiment of twenty plots, each consisting of, say, only one acre, this could scarcely be achieved unless at a cost quite out of proportion to the additional value of the results. Seed sown in the early morning on land ploughed before the sun becomes hot would germinate much quicker than seed sown on land ploughed during the noon-day sun ; or a shower of rain might fall on the plots sown in the early morning, giving the seed in them a great start over the seed sown *after* the shower, as in the operations preparatory to sowing a large proportion of the moisture would again be lost by evaporation ; so at harvest all the crops must be secured, and every after operation conducted *simultaneously*, or the results will not be trustworthy. It is always important, but in this country it is *especially* important, in conducting comparative experiments in the field, to pay the closest attention to these details, and, as I have before stated, with large plots this accuracy cannot be attained, while in support of my practice I have the high authority of the Royal Agricultural Society of England, supported by the practice of Dr. Voelcker, the Consulting Chemist of the Society. The latter gentleman, in a lecture delivered before the Members of the Royal Agricultural Society on the conditions to

be observed in conducting agricultural experiments, laid down clearly the principles that should guide the agricultural experimenter in fixing the size of his plots ; he said :—

"The first question that forces itself on our attention is, should experiments in the field be performed on a large or small scale? A good deal may be said in favour of experiments on a large scale ; but, on the whole, I am inclined to think it is not necessary to set aside many acres for purely experimental purposes, and that many of the most instructive and valuable field experiments may be performed within a narrow space. The extent of the area must be determined, in a great measure, by the nature of the crop. Thus crops which we can plant in drills, and which may be kept under better control than others, may be confined to a smaller area than grass crops. In the case of roots, I think the twentieth part of an acre is a useful size. For corn crops I would recommend a quarter of an acre, as also for experiments on grasses, both artificial grasses and permanent pastures.

"If we make experimental plots too large, there is very great difficulty in performing agricultural operations under precisely the same circumstances. All who are acquainted with practical farming must know what a difference of results often arises from a difference of one or two days in time. I have seen a difference of more than six tons of turnips which could be attributed to no other cause than the fact that between the sowing of one plot and of another in the same field, manured precisely alike and under the same mechanical conditions, two days elapsed. Now we know perfectly well that when seed has a chance of springing up and passing successfully through the first stages, we obtain, other circumstances being equal, a better crop than when the ground, or rather the seed-bed, becomes dry, and three weeks perhaps intervene before the plant has a fair chance of making a start.

"Three weeks tell very much on crops which, like our root crops, have but a short time for growth. But as it is impossible to cultivate a whole field precisely alike to secure the same conditions throughout a large area, it is, I believe, on the whole, best to confine field trials on arable lands, to plots amounting to the twentieth part of an acre."

I have quoted Dr. Vœlcker at this length, as he is undoubtedly our best authority on the subject, while similar views to those he expressed are held by Liebig and the most eminent of our Agricultural Chemists and Farmers.

7. But the statement that the area of the Farm is insufficient, may refer to the enterprise as a commercial speculation, and the following lines, from the same paragraph—"Farming on the scale of gardening is altogether delusive when made the basis from which to calculate farm profits"—seem to countenance this view, though I altogether fail to see how these remarks bear on our case ; and if it was from this aspect that the writer viewed our work, his conclusion is not to be wondered at ; but until last year when we commenced the "Model Farm," we never professed to conduct a Commercial Farm. Our work on the Experimental Farm is, and always has been, purely experimental, purely educational. Had we attempted to farm for profit, it would have been impossible to have undertaken the many experiments which in the early part of the memorandum are so highly applauded. The fact is, our undertaking is yet far from having reached the commercial stage in its existence. We are yet but on the very brink of the enquiry, and General Cotton himself admits this, for in the latter part of his paragraph 20 we read, "and the list of subjects touched upon in their account of the Infant Farm at Sydapet can hardly give the faintest idea of the multitude of questions that will have to be investigated"; but throughout the memorandum there is so much confusion in referring to work of an experimental or of a commercial character, that I feel the greatest difficulty in dealing with the various assertions it contains. As a commercial experiment the new "Model Farm" is undoubtedly on a sufficiently large a scale to test the question thoroughly ; its area is, I should suppose, at the least, *four times as great as the average size of the ryots holding.* At any rate, its area is twice as great as the average size of Farms in England : the late Census Commissioners having declared that the average size of an English Farm is only 60 acres, while 65 per cent. of all the farms in that country *are below* 100 acres in extent, and

yet he would be a bold man who would venture to assert that English farming is not conducted on sound commercial principles. The following figures referring to Ireland, whose agriculture in many respects resembles the agriculture of this country, may not be without interest:—

	Farms.
Not exceeding one acre	48,653
One and not exceeding five acres...	82,037
Five and not exceeding fifteen acres	176,368
Fifteen and not exceeding thirty acres	136,578
Over thirty acres in extent	158,135
Total ...	601,771

If we have erred in the size of our new "Commercial Farm" it is in making it *too* large; it should, I think, have approximated in size more nearly to the average size of a ryots holding; but such small public farms would be difficult to conduct; we *must* have trained men to work them, and it is necessary to take up such an area of land as will keep within reasonable bounds the cost per acre for management. In the case of Ireland, Government, in fixing the area of land to constitute the Commercial Farms connected with their Agricultural Schools, have been guided by the average size of farms in that country; some of these Government Farms are only about 30 acres in extent, while, with the exception of that of 140 acres at the Central Institution, I know of none as large as that we have just started.

8. A gigantic farm such as General Cotton advocates, on which experimental and commercial work could be conducted on dry crops and wet crops, in cattle breeding and in grazing, in dairying and in stall-feeding, in steam ploughing, steam threshing, etc., would, I fear, put Government to an enormous expenditure without any corresponding results. No agriculturist would recommend such a scheme. We must have *small* farms or "Experimental Stations" scattered about in each district of the Presidency, the object of each farm being to encourage and develope rather than to revolutionize local agriculture. In a grazing district we might specially devote our attention to cattle and sheep breeding; in a mixed grazing and corn district we might turn our chief attention to dairying and stall-feeding; in a wet land district to irrigation with a view to get the largest return, with the least expenditure of water; in cotton districts to the improvement of cotton culture, and so on. We have in England grazing districts devoted to cattle breeding, sheep breeding or dairying; corn-producing districts in which wheat and beans or barley and turnips are produced, etc., etc. The agricultural practice of a district is altogether regulated by its local peculiarities; no farmer would attempt to combine all these different branches of agriculture on *one* farm, for the circumstances which would suit one branch might be altogether opposed to the success of another.

9. The illustration given in paragraph 19 in support of the assertion in the previous paragraph is not a happy selection; *the result was mentioned incidentally*; no experiment was made; on neither a physiological nor a commercial question was information sought or obtained; I merely recorded the fact that some cotton seed collected from a plot growing in a wild state was sown on a certain area of land, and that it yielded so much cotton, and no conclusion of any sort was offered. Had I had 1,000 acres of land at my disposal, I could not have done more than I did, for the seed collected was *only sufficient* for the area of ground sown.

10. The greater portion of the soil of the Madras Farms is certainly light and naturally unfitted for the production of seed; but there are some moderately good soils, especially on the new farm, on which good seed is produced, and a *really good* soil fitted for the *immediate* production of seed would be difficult to meet with and could not be secured except at a very high price. We cannot hope to meet with sites and soils possessing *all* the advantages we could wish; we must make the best of our circumstances, and if some of our soils are naturally poor, grow seed only on the best, and by careful management gradually fit the inferior soils for the production of seed. A really good seed soil is altogether an artificial creation, the result of the skill and enterprise of the farmer.

11. As to irrigation experiments on the Madras Farms, an anicut across the River Adyar, at a higher level than that now in existence with distribution channels cut through the farms, is all that is needeed to provide a *perennial* supply of water. Having the water-supply in our own hands we could husband our resources, and would be in a very different position than when, as in the case of the commercial farm, drawing a supply from a tank owned by a number of cultivators each bent on getting as large an *immediate* supply as possible regardless of the *duration* of the supply. Such an anicut was proposed years ago, and the ground has been inspected at least twice with the view of preparing estimates.

12. In paragraph 26, General Cotton is in error in supposing that my house and a homestead were erected for 500£. The cost of my residence exceeded this sum. He evidently alludes to the "Model Farm Homestead" which includes only an Overseer's cottage, though this cost only about 200£.

13. The last few paragraphs of the memorandum advocate that the steam plough, threshing machines, large four-horse corn drills, etc., I had reported as useless in the *present stage* of Indian agriculture, should be hired out to the ryots. If it was intended to crush all enterprise and confirm the ryot in his prejudice against the use of improved machines and implements, I could suggest no better course than that proposed. Far better bury at Sydapet these evidences of mistaken zeal, than scatter them over the country, where even if brought into satisfactory operation, they could perform work only at 100 per cent. greater cost than the ryot has heretofore paid; or if unsuccessful would only intimidate and alarm those who, under other circumstances, might be induced to make use of an improved tool or implement. To effect any real good by the introduction of improvements in the implements or tools of the ryot, we must act with great caution. It is true that during the past ten years steam ploughing has made great progress in England, but even yet a very inconsiderable proportion of the arable land of England is so ploughed, while in the greater part of Scotland and Ireland the steam plough has not yet been seen. But even granting that steam ploughing is now thoroughly established in England, it does not follow that a similar success would attend its introduction here. In England labour is dear, fuel cheap, the expense of keeping plough animals great, the land is well laid out for steam cultivation, each farm is generally well supplied with internal roads, repairs to the engine or ploughing apparatus can readily be made, and, generally, the cost of repair is moderate. In India labour is not one-fourth so costly, fuel is scarce and dear, plough animals can be kept at a very moderate cost, the farms are not provided with internal roads, a very large expenditure would be necessary before the land could be brought into a suitable state for the proper working of a steam plough, while repairs would cause disastrous delays and be excessively costly. In England a steam plough in the hands of the owner under good management pays fairly; but when owned by a number of persons, even though these are residents on adjoining farms on the same estate are part proprietors and have a common interest in guarding the plough against accidents and unnecessary delays, the results are not so satisfactory; I should suppose that there are the most favourable circumstances under which a steam plough could be employed by a *number* of persons, and yet the income is seldom equal to the expenditure. One of the most favourable instances of the kind is that of the tenants on the Acklington Estate of His Grace the Duke of Northumberland, full details of which were recorded in the Journal of the Royal Agricultural Society for 1870. A double set of self-propelling engines, with the necessary apparatus, was purchased from Mr. Fowler of Leeds, at a cost of 1,526£. It was hired out to its proprietors (the tenants) at the following rates:—

	Shillings.	Rupees.
Ploughing	10	= 5
Cultivating	5	= 2½

The earnings during the year amounted in all to £574-2-7, while the expenditure amounted to £604-10-10, showing a loss amounting to £30-8-3. Where in this country could such favourable circumstances be met with, a number of enterprising tenants, living on adjoining

farms, each holding from 300 to 500 acres, this land being laid out in large well shaped fields bounded by good roads and straight fences and consisting of soils that for years had been deeply ploughed and cultivated, coal at 8 shillings per ton, and above all the active interest and good-will of the users of the plough who are pecuniarily interested in its success, and yet with all these very favourable circumstances the plough caused a loss of 300 Rupees on one year's operations, though a sum equal to 5 *Rupees* per acre was charged for ploughing. In this country under equally favourable circumstances, the work could not be done at a less cost than 50 per cent. in excess of the cost in Northumberland. With the wretched make-shift we possess, which would require nearly 30 pair of cattle to remove it from field to field, we certainly could not pay expenses at a charge less than 10 *Rupees* for each acre ploughed. If the object in introducing the steam plough is to benefit the ryot, I really cannot see in what possible way good is likely to result. If the ryot is so inclined, he can with good cattle and an improved plough perform work far superior to anything he now does at a cost not exceeding one-sixth of the sum that he would be charged for having his land steam-ploughed. If, as is more than hinted at in the memorandum, the ryot is to be charged for having his land ploughed by our apparatus at the rate at which he could with his own cattle plough the same land, then who is to make up the loss of something like 9 *Rupees* on each acre ploughed by steam ? I can quite understand that it is sometimes good policy to work a newly introduced machine even at a loss, in order that it may be brought before those whom it is intended to benefit, who in course of time, by becoming purchasers, may in some-way directly or indirectly repay the outlay ; but what prospective advantage can possibly result from Government working a steam plough even one of *modern* make in the rural districts of this country ? The 2,000 or 3,000 Rupees required *annually* to make up the loss on each year's work could be used in many ways much better calculated to benefit the ryot. If a number of ryots resident on the stiff cotton soils, *the only soils on which the superiority of steam-ploughing would be fully appreciated*, could be induced to co-operate together with the view of employing a steam plough, where would they get the capital ? Fowler's double-engine set, the best for such a purpose, costs about 1,600 £ in England, and probably could not be set up in an agricultural district in this country at a less cost than 20,000 Rupees. Under the most favourable circumstances in England a steam plough double-engine set owned by a number of persons will during the year plough about 600 acres and cultivate about other 600 acres, or in all plough about 900 acres. The Northumberland plough before alluded to ploughed in one year 560 acres and cultivated 350 ; assuming that one such district can be found in which the ordinary ryot holds on an average 30 acres of arable land one half only of which would be set aside for the steam plough, leaving the other half to be ploughed by the cattle he *must* keep for carting and other necessary work, a steam plough double-engine set would do the work of sixty such ryots, each of whom would be called upon to raise 333 Rupees as his share of the capital needed to purchase the plough, a sum that few would be able to raise, as the money realized by the sale of the pair of cattle the steam plough would displace would go but a very short way while at the end of each year each shareholder would have a call amounting to Rupees 120 to meet, in order that the loss on each year's operations may be cleared off. There is another aspect from which the matter may be viewed, the loss of manure in substituting steam for cattle in cultivating the soil. A reduction of two head of cattle on every 30 acres of land would, if *proper* means were taken to preserve the manure, represent a loss of 24 cart-loads during the year, or, as the ryot uses it, representing a diminution of at the least 5 acres in the area of land annually manured on each such holding. The great want of Indian agriculture is more *fed*-stock, more and better manure ; as yet we cannot hope te see the ryot engaged in feeding stock with the same object as the British Farmer ; but we may hope to see him adopt a more liberal diet in feeding his working bullocks and exercise greater wisdom in utilizing their manure. I have written with some degree of confidence regarding the proposed introduction of the steam-plough, as, besides two years personal experience in steam ploughing, I have given much attention to the matter, and have at hand copious details of the financial and general results of at the least a score of steam-plough enterprises.

Proceedings of the Madras Government, Revenue Department,
24th January 1873.

14. I regret that I must also disagree with General Cotton as to the advisability of sending threshing, sowing, and chaff-cutting machines over the country for employment on hire. In some parts of England such machines have done well when so employed, the threshing machine especially. However, over a considerable portion of the area of England and Scotland, and over the greater part of Ireland, the flail is still used in threshing. When engaged in reporting on the agriculture of Ireland about five years ago, I scarcely found a threshing machine south or west of Dublin, the corn being chiefly threshed by the flail, and, in many districts, winnowed by the wind as in this country. On the estate in the north of Ireland, with which I was connected for several years, a travelling threshing machine was purchased for the use of the tenants, but *they seldom used it*, though at their service *free of cost* ; as the explanation they offered for this *seeming* want of intelligence appear to me to resemble very closely the reasons our ryots would advance against the use of a threshing machine, it may be as well that I should quote them here. They were, first, the trouble of getting the threshing machine to their farms having to borrow horses to assist their own ; the difficulty of getting their horses to go steadily at work in which they were so seldom engaged ; the expense of employing a number of additional people to assist in keeping the machine fully employed ; the absence of sufficient accommodation to admit of the *large* quantity of grain threshed in one day being stored in safety ; loss in the feeding value of the straw, a supply sufficient to last several months being threshed at one opportunity, it being a well ascertained fact that newly threshed straw is always more palatable to stock ; the greater expenses—cash out of pocket— of threshing by the machine and the difficulty of husbanding their income when receiving in one sum what would under other circumstances have been received in *half a dozen* payments, distributed over as many months. I cannot altogether admit the soundness of these arguments, but they contain much that is true. In Ireland, on wet and stormy days, and in the mornings when it is not light until 7 o'clock, it is customary to use the flail : outside work is then impossible, and the cultivator and his single labourer are usefully employed under cover, the straw is threshed almost as needed for the stock, the grain is marketed in small quantities bringing in a *regular* income, while the farmer utilizes time which, he imagines, would otherwise have been lost. It is true that the circumstances of the ryot are not altogether the same as those of the tenants of a small farm in Ireland, still there is much in the circumstance of each of a similar character, and many of the objections raised by the Irish tenants against the use of a threshing machine would apply with much greater force when used by the ryot. But there is another aspect from which this matter can be viewed ; the threshing machine as now constructed *is altogether unfitted* for threshing the crops of the Indian farmer. It must be remembered that while the British farmer grows *three principal crops*, wheat, barley, and oats, which together occupy upwards of ten-and-a-half millions (93 per cent.) of the 12-million acres of land annually under grain and pulse crops in the United Kingdom, crops the threshing machine was especially invented to thresh, the ryot on the other hand grows a *great variety* of crops scarcely two of which bear such a resemblance to each other as do the three crops of the British farmer. Paddy, wheat, and raggy are the only crops that the machine threshes satisfactorily ; but of our 20-million acres in this Presidency under cereal and luguminous crops, these three crops only occupy about 6½ million acres or under 33 per cent. of the whole, and even in threshing these crops the ryot will in most cases be able to thresh more cheaply with the flail, which will continue to be the case as long as three men can be hired to perform a day's work for a *shilling*. Cholum and cumboo can also be threshed in a very satisfactory manner by the machine, when the straw has been cut one foot below the head and the heads are regularly arranged ; but this is costly work, the crop must be harvested *twice*, first the heads and foot of straw and afterwards the remainder of the straw, and in arranging the heads much time is lost. Our other crops cannot be threshed by the machine ; in some cases the straw is so weak it winds around the drum ; in others the grain is too small and too tightly enveloped in the husk. Although we have on the Madras Farms three threshing machines made by well-known makers, I seldom use them, as, taking our crops all round, *I can thresh cheaper by the flail* ; and if this is our experience under circumstances

far more favourable than those of the ryot, it is scarcely to be expected that any good will result from sending out threshing machines to seek employment amongst ryots.

15. Many of the arguments used in the two previous paragraphs may be used in discussing the propriety of sending out for a similar purpose our large four-horse corn drills, etc. Before a corn drill can be employed the land must be *well* ploughed and cultivated ; as well might we send our drills to sow the highways, or as send them to sow behind a country plough, even if the ryot could spare five men and six head of cattle from his ploughing to work the drill. We have recently made some small seed drills each at a cost of about 30 Rupees, with which we can drill an ordinary field at a less cost than with our pondrous 700-Rupee machines. I see no better prospect for large chaff cutting machines. In most districts paddy straw alone is used for feeding, and it would be a simple waste of time to chaff it. Our cattle, and I believe most of the cattle in this Presidency, are only too glad to get it ; the fault is that we cannot give half as much as they would be glad to eat. The case is very different in England, where the difficulty is *to get cattle to eat straw*, rendering it necessary to chaff it for mixing with pulped roots, linseed, gruel, etc., etc. For cutting maize, cholum, or cumboo straw a chaff cutter would be useful to the ryots ; but this would only be in some districts, and only chaff cutters of the simplest construction should be used.

16. In discussing questions of thissort it is well always to remember that in this part of India manual labour is as little costly as bullock labour, and that even for ploughing the heaviest kind of agricultural work, we can, on such soils as we have in some parts of the "Madras Farms," *plough with men as cheaply as we can with cattle*; while on the roads men can in drawing carts, compete successfully with horse or bullock labour. If these facts were but thoroughly realized, we would hear little of the importance of introducing labour-saving machines. I fully admit that much can be done to improve the implements, etc., of this part of India ; but, I believe, it will rather be by improving the plough, the mumuttee, the grass knife, and the smaller tools, which are used by the million, that we will effect any good ; we must take the implements and tools which are already in use and endeavour to improve these ; thus we find in different parts of the Presidency a considerable difference in the blade of the mumuttee, in the length of the handle, or in the angle at which the blade is set ; we must ascertain which is best adapted for general use ; a slight improvement in such a tool, used by thousands and tens of thousands, would be a far greater success than to succeed in getting employment for our costly drills, chaff-cutters, etc.

17. I regret exceedingly the great length of this letter, but I feel that it is of the utmost importance that the views expressed in General Cotton's memorandum should be *thoroughly* discussed. We are about to launch a very important agricultural enterprise, and it is of the greatest importance that there should in this country be no difference of opinion as to the way in which the work is to be conducted.

SUBMITTED to Government with reference to G. O., 5th April 1872, No. 561.

2. The Board are of opinion that Mr. Robertson has satisfactorily shown that the Government Farm at Sydapet is neither so badly situated as General Cotton considers it, nor so much too small for its purpose as he supposes. Mr. Robertson's remarks upon General Cotton's proposals for the utilization of the steam plough are also, in the Board's opinion, to the purpose, and his observations upon the use of the agricultural machinery generally, are corroborative of opinions which have been very generally expressed by the District Officers when reporting on the subject.

3. It is to be regretted, however, that Mr. Robertson has permitted himself to animadvert in so flippant a manner upon some of General Cotton's proposals and remarks. Such a style of criticism applied to an Officer of General Cotton's experience and standing, is unbecoming.

4. The Board trust that Mr. Robertson will avoid such mistakes in future, and it would be well also that he should endeavour to condense his official reports a little more than he has done on the present occasion.

No. 186. ORDER THEREON, 24th January 1873, No. 93.

Miscellaneous.

ORDERED that the foregoing Proceedings be forwarded to the Secretary of State with reference to his despatch dated 20th December 1871, No. 39, with the intimation that the Governor in Council shares the views expressed by Mr. Robertson in his letter of 24th April 1872.

2. It is to be regretted that the Revenue Board should have characterized Mr. Robertson's language in the letter above referred to as flippant. This letter is of a practical character, and the Governor in Council fails to see in it the flippancy referred to by the Board.

(True Extract.)

(Signed) D. F. CARMICHAEL,
Secretary to Government.

To the Board of Revenue.

Exd. F. R. Bantleman.

This must, I conclude,
go home — or is likely to
feed Cotton's letter. I
pity those Lancashire
weavers — & am sorry that
the Ky should have cha-
racterised the Lancashire
as fickle & unthankful. I do not see
the fickleness, while I
do see the practical cha-
racter of the whole. Feel
Cotton is a theorist, with
too much of the sanguine in
his temperament. L. D. L. 18/11

No 2501.

W. 93-

24th Jany 1873

Ordered that the foregoing Proceedings be forwarded to the Secy of State with reference to his Despatch dated 20 Decr 1871 No 39 with the intimation that the Govr in Council quite shares the views expressed by Mr Robertson in his letter of 24th April 1872.

It is to be regretted that

that the Revenue Board should have characterised Mr Robertson's language in the letter above referred to as flippant. This letter is of a practical character, and the Govt in C. fails to see in it the flippancy referred to by the Bd

H. Board of Revenue 27 Jan 73