Scott. II-27—60,000

K

GPH (1949) Department

Ms SERIES.

G.O. NO. 2584 Edn

Dated 13 [illegible]

[Despatch Abstract.]

Education - Conservation of Natural Resources - Information for UNESCO - Papers - Recorded.

Back Papers.

No.	Department.	Date.	G.O.	No.	Department.	Date.

Further Papers.

	Department.	Date.	G.O.	No.	Department.	Date.

IMMEDIATE.

No.F.78-41/49-A.I.
GOVERNMENT OF INDIA
MINISTRY OF EDUCATION

NEW DELHI 3, THE 21st MARCH, 1949.

From Dr. Tara Chand M.A., D. Phil.,
Secretary to the Government of India.

To

5) The Secretary to the Government of Madras,
Education & Public Health Department, Madras.

Sir,

The Economic and Social Council of the United Nations is to convene a Scientific Conference on the conservation and utilization of National Resources in the month of June 1949. The confirmity of the Resolution at the third General Conference held at Beirut, 1949 the United Nations Educational, Scientific and Cultural organization have forwarded the enclosed "request for information" to this Ministry for transmission to non-Governmental organizations and competent individuals in this field for necessary action. Your reply may kindly be forwarded by 1st May, 1949, direct to the Fundamental Education Division of Unesco, 19, Avenue Klober, Paris 16, with a copy to this Ministry.

Yours faithfully

T.K.Hingorani

for Secretary.

LS/17/3/49.

UNITED NATIONS EDUCATIONAL,
SCIENTIFIC AND CULTURAL ORGANIZATION

25 MAR 1949

3

EDUCATION FOR CONSERVATION OF NATURAL RESOURCES

Request for information.

In preparation for the Scientific Conference on the Conservation and Utilization of Natural Resources convened for June, 1949, by the Economic and Social Council of the United Nations, and in which Unesco is to participate, the Director-General is anxious to collect information on the following subjects:

I - Education for the Conservation and Better Use of Natural Resources.

(a) The function of education in promoting the conservation and better use of Natural resources.

(b) Educational methods, techniques and media designed for this purpose.

II - Experiences in the Training of Teachers and Extension Workers to Play Their Part in Conservation Programmes.

Unesco is interested in the organization of training courses and methods used for the training of extension workers to teach the principles and practice of resource conservation, especially in economically less developed areas.

Unesco is interested both in work done through the schools and also in adult education programmes.

Natural resources are considered as comprising: soil and land resources including crops and cattle, water, forests and other vegetal cover, game, fish, marine resources, fuel and mineral resources, etc.

The Director-General of Unesco would therefore be glad to receive reports on the subjects set out under I and II, if possible accompanied by photographs or other illustrative material, samples of curricula textbooks or teaching materials, such as films, film strips, broadcast programmes or recordings.

In addition, it would be helpful to have the names and addresses of the main government departments, governmental or private organisations actively interested in these subjects; and names, addresses and subject fields of specialists in education for the conservation of natural resources, with a list of their principal works already published or in preparation.

Replies should reach the Fundamental Education Division,
Unesco House,
19 Avenue Kleber,
Paris 16eme - France

before May 31, 1949.

C.no 23428 E2/49.

Copy to the Secy to the Govt of Madras Edn Department.

Letter/ Ref 23428 E2/49-2 Edn 9/4

To

The Registrar, Madras University Chepauk, Andhra / Annamalai / Annamalai

Govt

UNESCO - Edn for Conservation of natural resources.

I am directed to forward a copy of letter No. F. 78-41/49. A.1 dt. 3. (with enclosure) from the Govt of Madras Edn for necessary action.

Y.f.

6/4/49

Draft II

Memo no 23428 E2/49-3 Edn 9/4.4.49

UNESCO - Edn for Conservation of natural resources.

Ref to Govt of Madras Edn. No. F. 78-41/49. A.1 dt. 21.3.49

Edn no. 23428 E2/49-1 dt 6.4.49

A copy of the letter cited is forwarded to the DPI/ as in the cited letter he is requested to furnish the required information urgently.

6/4/49

Govt dt 5.4.49

To D.P.I.
" D.A.
" D.A.H
~~Director of Industries~~
D2 C7

Govt dt 5.4.49

Govt dt 5.4.49

Note a copy ftf. Govt : Who may see the drafts before issue.

6/4/49

37890 D2
7.445

Dev. Dept.

The letter bearing No. D.Dis.No.X.1-524/49 dated 25-4-1949 from the Director of Agriculture, Chepauk, Madras, and enclosure at page 3/c and the drafts at page 4/c may be perused and the file returned to this Dept.

AS I / AS II / AS III

Dy. Secy. would also may have a copy of the letter from U.N.E.S.C.O.

Dy. Secy.

E.H.

E.2

The drafts overleaf may now issue.

14/4

Dev. No. 3789 Dis/49-1

ASST. SECRETARY TO GOVERNMENT
14 APR 1949
EDUCATION AND PUBLIC HEALTH

29080

Through A.I
A II
A III
A IV
A V
E
F

11.4.49

AGRICULTURAL DEPARTMENT.

From
R.M. Sundaran Esq., I.C.S.,
Director of Agriculture,
Chepauk, Madras.

To
The Joint Secretary to Government,
Education and Public Health Department
Madras.

D.Dis.No.X.1-524/49 dated 25-4-1949.

Sir,

Sub:-United Nations Educational Scientific and Cultural Organisation - Education for Conservation of Natural Resources.

Ref:-Government Memo.No.23428 E.2/49-3 Education, dated 14-4-49.

I furnish herewith the information called for in the Government Memo. cited above.

(SD) R.M. Sundaran,
Director of Agriculture.

32422

True copy/Forwarded/By order

EPH(E)

Replies are still due from the D.P.I., D.A.H. and D.I. & C. They may be reminded. A draft memo is submitted for approval.

JV.27-4. 1/5/49. 10.5.49

11/5

GAZETTED ASSISTANT.

INFORMATION ON EDUCATION FOR CONSERVATION OF NATURAL RESOURCES.

1 (a)(i) Soil and land: The Department of Agriculture of th Province in Cooperation with the other concerned departments, as b doing work on soil and land for crop production. Research on e several aspects of Agriculture has been in progress. Recently work and the supply of seeds and manures to the cultivators, reclama of virgin land for crop production and unproved methods of culti for better yields has been intensified under the "Grow More Food Campaign.

(ii) Water:

The main function of water as a natural resource is in crop production. There are about 9 million acres of arable land under irrigation in this Province, the total cultivated area being about 32 million acres. The important river irrigation systems are the Cauvery Mettur Project, the Krishna and Godavari Delta system, the Periyar system and the Bhavani Project commanding a total area of about 4 million acres. The rest of the irrigated area is fed by tanks and wells and this is an important feature of the Province, some of the tanks being as big as 10 square miles in area.

With the advent of the Grow More Food Campaign a number of schemes have been launched in the Presidency with a view to the utilisation of water to the greatest extent possible. The Lower Bhavani and the Tungabadhra irrigation Projects have been taken up recently and are in progress. The latter is of special importance since it seeks to irrigate a wast area of dry lands in the Ceded Districts, a tract which has been threatendd by recurring famines due to the failure of monsoon. The Ramapadasagar Scheme is one of the biggest nultipurpose irriga projects.

The Government of Madras through the Department of Agricultur is subsiding a scheme for digging wells for irrigation purposes. Efforts are also made for clearing silted up and defunct tanks.

(iii) Forests: This is attended to by the department of Forests. Afforestation, protected and controlled grazing, utilisation of Forest products, games etc. are the problems which are being tackled by the Department.

(iv) Soil Erosion: As in other parts of India, soil erosion is a threatening problem in this province also. Recently the Government have brought and a publication dealing with this subject "Soil Erosion Hand Book" published by the Superintendent, Government Press Madras.

(v) Marine and Fresh Water resources.

The Government of Madras have very recently created a separate department called the department of Fisheries for exploring marine & fresh water resources, especially fish for food.

(vi) Cattle: This is dealt with by the department of Animal Husbandry with the aid of the Department of Agriculture. The main Problems on which work is in progress are the prevention of infectious diseases and the breeding of cattle for milk production and animal-Power.

1(b) So far as Agricultural Education of this province is concern in addition to the Agriculture classes in Secondary Schools there are the Agricultural Colleges at Coimbatore and Bapatla and the Agricultural Training School at Orathanad (Tanjore District) The two Agricultural Colleges at Coimbatore and Bapatla train pre-graduate students for the B.Sc. Agriculture Degree of the Madras and

P.T.O.

Andhra Universities to which they are affiliated. The course lasts for three years and includes a study of Agriculture and cognate sciences of Agricultural Chemistry, Agricultural Entomology, Agricultural Botany, and Animal Hygiene and Engineering in relation to Agriculture. There are provisions for admitting 96 students for each year class. Hostel Residence is compulsory. The course is fully practical and there are well equiped farms attached to the Colleges in addition to the laboratories and workshops and Veterinary hospitals. The students are taken on tours in the Presidency for acculr studies concerning special problems like soil erosion irrigation etc. Lantern slide lectures also form part of teaching aids. The staff of these Colleges are well qualified officers of the Agricultural Departmenf of this province. Students are admitted to these Colleges from the neighbouring states and Provinces also. A copy of the prospectus giving full particulars regarding courses of study and qualifications for admission. is enclosed.

The Agricultural Demonstrators of the department of Agriculture who are graduates of the Agricultural College, form the link between the Research workers and the cultivators. They educate the former in all aspects of Agriculture based on improved and scientific methods. Field demonstration, lantern lectures, pamphlets and leaflets, exhibitions etc. are the aids adopted for the purposes.

II. A list of Specialists and Officers who are interested in Agricultural Education are given below.

(1) Principals, Agricultural Colleges, Coimbatore and Bapatla.

(2) Cotton Specialist & Vice Principal, Coimbatore.

(3) Lecturers in Agriculture, Agricultural Colleges, Coimbatore and Bapatla.

(4) Government Agricultural Chemist, Coimbatore.

(5) Government Entomologist, Coimbatore.

(6) " Mycologist, "

(7) " Lecturing & Systematic Botanists, Agricultural Colleges, Coimbatore & Bapatla.

(8) Paddy Specialist, Coimbatore.

(9) Millet Specialist, Coimbatore.

(10) Oil Seeds Specialist, Coimbatore.

(11) Pulses Specialist, "

(12) Research Engineer, "

(SD) R.M. Sundaram,
Director of Agriculture.

True copy/Forwarded/By order

GAZETTED ASSISTANT.

JV.27-4.

6

EPH(E)

Memo No. 23428 E2/48-4 Edn. dt. 11/5/49.

Sub UNESCO - Edn for Conservation of natural resources.

Ref. Govt. Memo 23428 E2/48-3 Edn dt

The attention of the D.P.I (letter as in despatch entry) is invited to the Govt. Memo and he is requested to furnish the information called for therein, ~~as the reply is due in the UNESCO by 31st May'49~~.

To
The D.P.I.
" D.A.H.
" D.I.E.

13/5

81/13/5 CF

7/5/49

10.5.49

11/5/49

12

No.3576 C1/49 Office of the Director of Industries & Commerce, Chepauk, Madras d/13-6-49.

From

The Director of Industries and Commerce, Chepauk, Madras.

To

The Joint Secretary to Government, Education & P.H. Department, Fort St. George, Madras.

Sir,

Sub:-United Nations Educational Scientific and cultural Organisation - Education for conservation of natural resources

Ref:-Government F & P.T. Memo. No.23428 F2/49-3 Edu. dated 14th April 1949.

In this Department Education for conservation of natural resources is not stressed in any institution and therefore I have no useful information to furnish to the Unesco.

for Director of Industries and Commerce, Madras.

EPH
E2

15

UNESCO - Edn for Conservation & natural resources.

Ref Gen Memo no. 23428 E2/49.4 Edn & 11.

Memo to 23428 E2/49-5 Edn & 30.6

The DPI/DAH is asked to state when this activity may be expected by Govt.

Govt
27.6.49

Clear
29.6.49

DPI
28/6/49

To the DPI/DAH

16

Lrs.

Lrs.No.3161-II/49.

Animal Husbandry Departme
Triplicane P.O. Madras,
Dated 18-7-49.

From
T.J. Hurley Esq., OBE., MRCVS., DVSM., IVS.,
Director of Animal Husbandry, Madras.

To
The Joint Secretary to Government,
Education and Public Health Department,
Madras.

Sir,

Sub: United Nations Educational Scientific and cultural organiza
Education for conservation of natural resources.
Ref: Government Memorandum No.23428-E2/49-3,Education dated
14th April 1949.

I furnish below the information required in respect of this

SECRETARIAT DEPARTMENT
55?5
10 JUL 1949
EDUCATION AND PUBLIC HEALTH

I. Education for the conservation and better use of natural resources.

(a) and (b). The Madras Veterinary College affords facili for training in two courses of Veterinary education, namely (i) the B.V.Sc., degree course and (ii) the Veterinary and Livestock Inspectors Course. In the former, theoretical and practical instruction is given to students for qualifying for the B.V.Sc., degree of the Madras Unive sity; in the latter, men are trained in Animal Husbandry matters so as make them suitable for livestock and Veterinary Work in the villages the Province.

The function of both the above mentioned courses of educati is to train men to carry out Veterinary work in the Province in or conserve all animal wealth, (one of the natural resources of the coun by treatment and protection of animals against both contagious and non contagious diseases and improving their quality by better management, selective breeding and proper feeding.

The methods of education followed in the college are theor cal,oral and practical for which all facilities are available in the College. Apart from this, the general public are also educated in Vet nary matters through cattle shows, magic lantern lectures, propaganda charts, leaflets and radio talks.

II. Experience in training of teachers and extension workers to play their part in conservation programme.

No extension lectures have so far been organised by this Department. Copies of the prospectus for both the courses mentioned against item I and a set of leaflets in English are enclosed.

Yours faithfully,

T.J. Hurley 18/7

Director of Animal Husbandry, Madras.

PT.18-7.

18.7.49.

EP

UNESCO. Edn for Conservation of natural resources.

Ref Govt Memo no. 23428 E2/49.5 Edn 9 3

Memo no 23428 E2/49.6 Edn 9 25.7.49

The D.P.I is requested to expedite this reply to the memo read above.

Replies from the Educational Heads of Deptts have been received.

To D.P.I

22-7-49

25/7/49

Education Department.

From

The Director of Public Instruction,
Madras



The Secretary to the Government of Madras,
Education and Public Health Department,
Fort St. George, Madras.

R.C.No.977-L4/49 dated 3rd August, 1949.

59902

UNITED NATIONS EDUCATIONAL SCIENTIFIC AND CULTURAL ORGANISATION—
Education for conservation of natural resources.
Reference:-Government Memorandum No,23428-E2/49-3 Education dated 14..4..1949.

—

With reference to the Government Memorandum cited above, I have the honour to submit herewith the copies of the remarks of the Principals of Engineering College, Guindy and Presidency College, Madras on the subject.

Yours faithfully,

For Director of Public Instruction.

ks.4.8.

—

Copy of letter R.C.No.156-B1/49 dated 2.7.1949 of the Principal, College of Engineering,Madras 15 to the Director of Public Instruction,M

Subject:- UNESCO - Education for conservation of Natural Resources.
Ref:-Your Pros. R.C.No.977-L4/49 dated 30..4..1949.

I am of opinion that the conservation and better use of natural resources should be promoted in our educational institutions. The importance of this subject cannot be too much stressed. It is imperative that our youngmen-Scientists, engineers, doctors etc. who are the potential nation-builders should receive adequate education in the methods of conservation of natural resources. Much of the country's wealth and prosperity its teeming millions will depend upon how far we are able to conserve the natural resources for the betterment of the country. Hence, I welcome the efforts of the UNESCO in this direction.

As far as this college is concerned, the programme of study in this college which is training Civil, Mechanical, Electrical, Tele-Communicati and Highway Engineers upto the Degree standard, is already very heavy and it will not permit of the ~~xxxxxx~~ inclusion of the subject of conservatio of natural resources in the regular curriculla of studies for the stude However, I may mention that the authorities of this institution have been keeping in view the importance of this subject and have been trying to train the students in this subject in their ~~xxxx~~ extra-Curricular activities ~~x~~ whenever an opportunity presents itself. For example, this college is having a number of Associations-technical,language,cultural etc Distinguished educationists, Engineers, Technicians, Psychologists, politi are often invited by these Associations to deliver lectures to the studen current topics of varied importance. Last year, under the auspices of the and every day prominent experts in different walks of life were invited t give lectures on various matters. These were very much appreciated both b staff and students and it is hoped that by such methods, it will be possi to promote the Conservation of natural resources. There is a Co-operative Power-farm in this college. The bulk of the work in organising and running this Farm is carried out by the students of this college. Similarly, the students are asked to shoulder their share of responsibility in the run of the college Hostel which has got about 1000 students. In these, th students gain valuable experience in successfully getting through particular thing with the available resources. Further the college spacious and conforta'le visual education hall which is fitted with

modern equipment such radiogram, Loud-speaker etc. There is also a Cinema projector by which the students are entertained as well as educated by means of valuable technical, Scientific, Social and Cultural films. Thus Visual Education forms an important part in this college. There is an open Access Library which has got 13,000 books and 200 technical journals and periodicals. The students have easy access to these and they spend quite a lot of time in going through these Journals and other books and keeping themselves abreast of the developments in the World.

During December 1948, this College organised an Engineering Exhibition. Crowds came in thousands to see the Exhibition. The entire exhibition has been filmed and is in the custody of the college. It is expected that Exhibition of a similar nature will be held annually in this college. It would be a good idea to have a special stall in the Exhibition to display statics and other important data etc. to give a vivid idea of the method adopted by the UNESCO in the Conservation of natural resources. It is therefore requested that further arrangements may be discussed to see of this possible.

From the above it will be seen that although this college does not have a subject Conservation of natural resources-in the regular curricula of study, yet, in practice, the authorities have been taking every opportunity to give the students training in the methods of conserving the natural resources, in their extra curricular activities. However, to bring home to the students, the importance of Conservation of natural resources of a Country, series of lectures by eminent people may be arranged in the College for the benefit of the staff and students. Any help that the UNESCO might offer in this direction would be warmly welcomed. A copy of the last College Magazine is herewith sent to get an idea of the extra Curricular activities in the College.

/True copy/.

II.

Copy of letter R.C.No.470/49 dated 20th July from the Principal, Presidency College, Madras to the Director of Public Instruction, Madras.

Subject:- UNESCO - Education for conservation of Natural Resources.
Ref:-Your Pros.R.C.No.977-L4/49 dated 30..4..1949.

The Botany department of this college does not work in any direction actively to be associated with education for conservation of natural resources. Part of the teaching work of this department is based on field studies. To cover this part, tours are undertaken by the students preparing for a degree in the subject under the guidance of the staff-members. Different in land and coastal places in South India are chosen for the purpose. In addition to collection of Botanical specimens during these tours, a study is made of the way in which the different groups of plants are distributed in the different habitats. Plants collected during these tours are, in part, dried and preserved for reference in the departmental Herbarium. A part of the collection is preserved in fluids and is arranged in the departmental Museum. Another part of the collection is utilised for class practicals. It is therefore, submitted that the work of this department is on lines not directly to be related to "conservation of natural Resources".

Subjects set out under I and II donot fall within the scope of the curricula for the courses in the Zoology department. However some work is done on organisms & resources during field work and study of the economic aspect of the subject, the question of conservation of Natural resources or education for the same, has not so far arisen.

/True copy/.

For Director of Public Instruction.

Circ. 234 & 52/49

Education for Conservation of Resources. Information for UC

From UC, Ministry of Edn.
No. F. 78-41/49. A.1 & 21.8.49

Copies of UC's letter (enclosure) on pts 1-4 of, were communicated to Universities for necessary action. Copies also forwarded to UC, DPI & DA to furnish necessary information. Their reports have been received now. The Govt requests to forward UC reply by 1.5.49 direct to Fundamental Edn Division of UNESCO, a copy to them. The materials asked for UC were not received in time and it does not seem to be necessary to send any report. The papers may be returned

2

Use.

Cordu No 2584 Edn. 13.8.49 Subs.

Recorded.

Edn. Conservation & Natural Resources.
Info. for Unesco.
Paper Recorded.

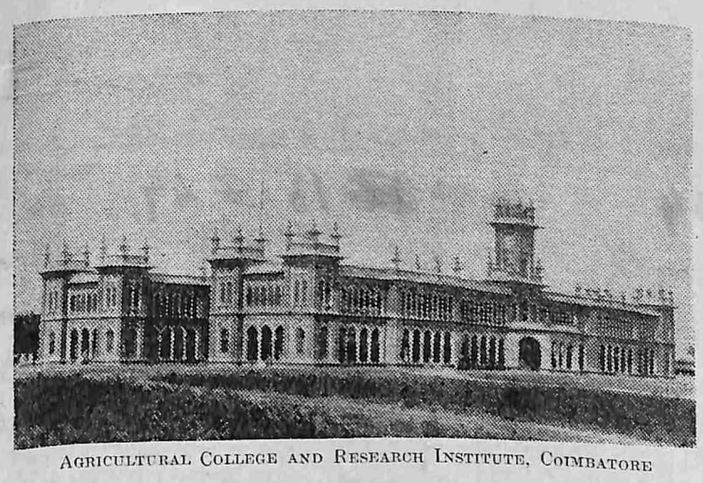
DRS 12/8/49

8.49 This is very unsatisfactory
as pictures remain a date is fixed
for a reply, we should endeavour
to obtain we consult the deadline.
Their report. If time limit is not
observed, orders should be taken
so that d.d.o. may come, if necessary

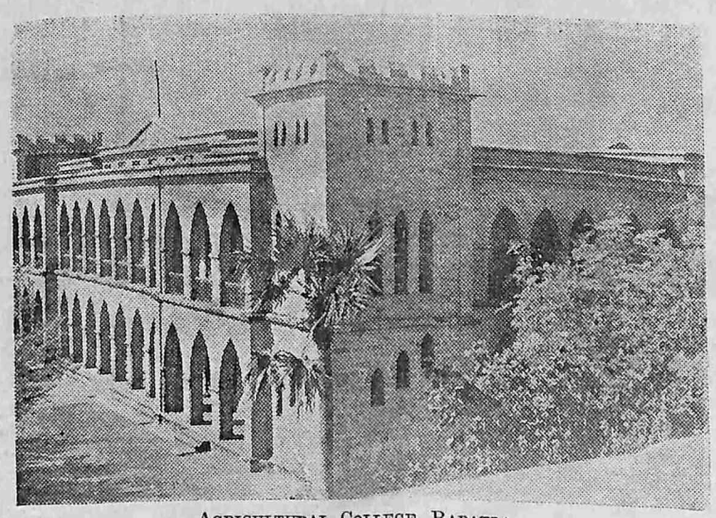
12/8

PROSPECTUS OF THE AGRICULTURAL COLLEGE AND RESEARCH INSTITUTE, COIMBATORE AND BAPATLA

13



AGRICULTURAL COLLEGE AND RESEARCH INSTITUTE, COIMBATORE



AGRICULTURAL COLLEGE, BAPATLA

The two colleges are being run by the Madras Agricultural Department for the training of young men in the Science of Agriculture. The training given is in the theoretical as well as the practical aspects of Agriculture leading to a Degree Course of Bachelor in Science (Agriculture).

The Coimbatore Agricultural College and Research Institute is in the Madras University area. the Bapatla Agricultural College in the Andhra University area.

RULES OF THE AGRICULTURAL COLLEGE, COIMBATORE.

14

[*N.B.*—These rules are subject to such alterations as may from time to time be ordered.]

OBJECT.

1. The college is intended for the scientific and practical training of those who intend to make agriculture their main profession.

CONTROL.

2. The responsibility for the discipline and management of the college is vested in the Principal, under the control of the Director of Agriculture, Madras.

COURSES OF INSTRUCTION.

B.Sc. Ag. Degree Course, Madras University.

3. The course extends over a period of three years and provides for a thorough training in practical agriculture on scientific principles, together with the teaching of the fundamental sciences allied to agriculture. The college is affiliated to the University of Madras and this course leads up to the Degree of Bachelor of Science in Agriculture.

Students of each year form a separate class. At present the number of students admitted each year is restricted to ninety-six including three seats for lady students.

ADMISSION.

4. Students from all parts of India, without distinction of caste or nationality, are eligible for admission, but preference will be given to those from the Madras Presidency. An endeavour will be made to ensure, as far as possible, that all parts of the Presidency are fairly represented. Selections for this course will be made by the Principals of the Agricultural Colleges, Coimbatore and Bapatla. Candidates for admission will be interviewed at the following centres in the latter half of June on the dates that will be notified :—

Bapatla Madras and Coimbatore.

QUALIFICATIONS FOR ADMISSION.

5. (*a*) Candidates for this course shall be required to have passed the Intermediate Examination in Arts and Science of this or other Universities having offered as optional *chemistry* and any two of the following subjects :—

(1) Mathematics.
(2) Physics.
(3) Natural Science.
(4) Botany.
(5) Zoology including human physiology.
(6) Agriculture or any examinations accepted by the Syndicate of the Madras University as equivalent thereto.

All applications for admission should be made in the prescribed form and must reach the Principal, on or before the 15th June every year. Application form will be sent on receipt of stamped and addressed envelope. (No loose stamps accepted.)

Candidates must have *attained the age of* 17 *years* at the time of joining the College and their applications must be accompanied by the following certificates in original—

(i) University certificates (in original) ;

(ii) Leaving certificate from the head of the institution last attended ;

(iii) Testimonials of good character covering the previous two years ;

(iv) Certified copy of the marks secured at the University examination (Intermediate), and

(v) Chalan of Rs. 5 (Rupees five only), towards registration fee paid to the credit of "XXIX *a*, Agricultural Receipts—Agricultural College and Research Institute" in any Government treasury or into any branch of the Imperial Bank of India.

Selected candidates should, before joining the College, produce a certificate of physical fitness granted by a registered medical practitioner and a vaccination certificate showing that the candidate has been vaccinated or has had smallpox after the age of ten.

(*b*) Students who have failed in the University Examination for the Degree of Bachelor of Science in Agriculture may be re-admitted at the discretion of the Principal, on payment of the fees prescribed in rule 7.

TOURS.

6. Students may be taken on tours of enquiry to such places as may be fixed by the Principal, under the orders of the Director of Agriculture. During such tours they shall be entitled to free carriage of themselves by road and rail. All other expenditure shall be borne by the students themselves.

FEES.

7. (i) Students admitted from the Madras Presidency and Coorg shall be charged a tuition fee of Rs. 40 per term, or Rs. 120 per annum, a lodging fee of Rs. 2-4-0 per mensem. In addition a sum of about Re. 1 will be charged per mensem for electric lights.

In the case of re-admission of students who were prevented from sitting for the University examination on account of illness or other causes beyond their control, the lower fee of Rs. 40 per term or Rs. 120 per annum be shall charged in addition to the lodging fees and lighting charges. In the case of students who sat and failed in the examination and also of students who were not allowed to appear for the examination for unsatisfactory progress in studies, the combined fee of Rs. 50 per term or Rs. 150 per annum shall be charged.

The fees are payable in advance within a fortnight of the commencement of the term. In default of punctual payment, a fine of annas two for each day of default will be levied.

In the case of students of the second and third year of the B.Sc. Ag. Course, however, who will be away on tour at the commencement of the term, the tuition and other fees may be paid within three days of their return from tour.

(ii) Students from other parts of India including Indian States whether admitted for the first time or re-admitted after failure, will be charged a fee of Rs. 400 per term, payable in advance for tuition.

(iii) All students shall pay a combined subscription of Rs. 9 every year to the Athletic Club and Reading Room, payable in three equal instalments along with the College fees.

(iv) Every student on joining the College, shall deposit a sum of Rs. 10 as caution money to cover fines, breakage, etc., if any. Any balance at the credit of the student shall be repaid at the end of the course.

SCHOLARSHIPS.

8. The following scholarships will be awarded :—

(A) Eight scholarships of the value of Rs. 30 each per mensem will be awarded annually and will be distributed as shown below :—

(i) Three scholarships to students from the Muslim community.

(ii) Three scholarships to students from the backward and such other communities as are not adequately represented in the Agricultural Department.

(iii) Two scholarships to the students who obtain (in the aggregate) the highest number of marks in the two terminal and final University examinations in the first year course.

Note.—In the absence of duly qualified candidates from the abovementioned communities the vacant scholarships, if any, will be awarded to poor and deserving candidates irrespective of the community to which they belong provided they come from families actually engaged in agriculture.

(B) Two scholarships of the value of Rs. 40 each per mensem will be awarded to students from the Scheduled Castes. The recipients of these scholarships will also be exempted from payment of fees for the course.

Note.—Students to whom the scholarships are awarded should give a written undertaking that they will not on taking the B.Sc. Agriculture Degree, apply for employment elsewhere than in the Agricultural Department except with the written permission of the Director of Agriculture, Madras.

The terms under which the scholarships in (A) and (B) are granted shall be as follows :—

(*a*) the student should belong to the Madras Presidency ;

(*b*) he must be prepared to study for the whole course and work for the Degree of Bachelor of Science in Agriculture of the Madras University ;

(*c*) each scholarship shall be held conditionally on the good behaviour of the holder and his satisfactory progress in the studies ; and

(*d*) a student already in the enjoyment of a scholarship from local body or private person shall not be eligible for a Government scholarship.

(C) The Pentland Scholarship.

(D) Arcot Rajagopala Mudaliar Vellala Students' Scholarship (Occasional).

(E) The Dr. S. Rangachari Technical Scholarship

BOOKS AND DRESS.

9. Each student must provide himself with his own books and sets of drawing and dissecting instruments, and other materials required for practical work in the field and in the laboratories.

Each student on joining the College must provide himself with the uniform prescribed for games and ceremonial occasions. This will cost about Rs. 15 and should not require renewal during his course. He must also provide himself with the customary dress for field work, viz., khaki coat, shorts, shirt and tie which will cost about Rs. 15 per set.

TERMS.

10. The College year comprises three terms of studies as follows :—

First term.—15th June to 16th September.

Second term.—4th October to 21st December.

Third term.—4th January to 28th March.

The first year classes are made up on the 2nd July.

The certificate of attendance required by the University examinations will be granted only to students who have—

(*a*) kept three-fourths of the attendance for three terms put together in each year ;

(*b*) shown satisfactory progress in their studies ; and

(*c*) paid all demands against them that are due under the College Rules.

N.B.—The calculation will be made on the number of working days and attendance as shown in the attendance registers, fractions of less than half a day being disregarded.

EXAMINATIONS.

11. All students shall appear at examinations as required by the College authorities and shall not be held to have completed their course unless they sit for examinations and show fair progress to the satisfaction of the Principal.

Students will not, except in very special cases, be allowed to absent themselves from College examinations and if they fare badly in them, will not be permitted to appear for the University examinations.

The University Regulations for the conduct of examinations for the Degree of Bachelor of Science in Agriculture and the marks required for a pass will be found on a reference to the University Calendar.

CERTIFICATES.

12. A student who qualifies himself for the Degree of Bachelor of Science in Agriculture will receive his University Diploma in the usual course at a University Convocation.

Every student who completes the course shall, whether he succeeds or fails in the examination, be granted a leaving certificate by the Principal.

PRIZES.

13. Thirteen prizes, called the Robertson, the Clegstoun, the Kees, the Diwan Bahadur R. Raghunatha Rao, the D'Silva, the Goschen, the Anstead, the Rao Bahadur K. S. Venkatarama Ayyar, the Sampson, the M. K. Nambiar, the Old Cuddapah District Agricultural Association and the Diwan Bahadur L. D. Swamikannu, Rao Bahadur N. S. Kolandaiswami Pillai Memorial prizes are awarded at the College.

LEAVE.

14. Leave of absence shall be obtained only on application to the Principal in the prescribed form.

The vacations at the College are—

(i) Midsummer vacation from 1st April to 14th June.

(ii) Michaelmas holidays from 17th September to 3rd October.

(iii) Christmas holidays from 22nd December to 3rd January.

The occasional holidays allowed by the Educational Rules shall, at the discretion of the Principal, apply to the College.

PUNISHMENTS.

15. Students are liable to punishment by the Principal for breaches of discipline, neglect of their studies, general failure to profit by the course of instruction, or for any other sufficient reason.

All cases of explusion or permanent or temporary rustication ordered by the Principal shall be reported to the Director of Agriculture whose decision shall be final.

HOSTEL.

16. All students are required to reside in the hostel attached to the College.

They shall ordinarily have their meals in one of the hostel messes which will be arranged by the Warden.

Every student shall, on joining the mess deposit a sum of Rs. 50 the balance of which will be refunded when the student leaves the College. A monthly fee of annas twelve to cover expenses of management, etc., must be paid by each student whether he joins a mess or not.

On joining a mess, or on every occasion on which the mess advance has been adjusted to pay up arrears, a registration fee of Re. 1 is payable.

PROSPECTS OF SUCCESSFUL CANDIDATES.

Holders of the Degree of Bachelor of Science in Agriculture will be eligible for the following appointments in the Agricultural Department, but no appointments of any kind are guaranteed :—

Subordinate Service.

(i) Farm Managers of the Agricultural Research Stations, Agricultural Demonstrators, Assistants in the Science sections or Teaching Assistants in the Agricultural College.	Rs. 75—7½—105 E.B. 120—10—170 E.B. 170—15/2—200.

Madras Agricultural Service.

(ii) District Agricultural Officers, Superintendents of Agricultural and Research Stations, Assistant Research Officers, or Lecturers in the Agricultural College.	Rs. 200—30/2—260—40/2 —500—50/2—700.

RULES OF THE AGRICULTURAL COLLEGE, BAPATLA.

[*N.B.*—These rules are subject to such alterations as may from time to time be ordered.]

OBJECT.

1. The college is intended for the scientific and practical training of those who intend to make agriculture their main profession.

CONTROL.

2. The responsibility for the discipline and management of the college is vested in the Principal, under the control of the Director of Agriculture, Madras.

COURSES OF INSTRUCTION.

B.Sc. Ag. Degree Course.

3. The course extends over a period of three years and provides for a thorough training in practical agriculture on scientific principles, together with the teaching of the fundamental sciences allied to agriculture. The college is affiliated to the Andhra University and this course leads up to the Degree of Bachelor of Science in Agriculture.

Students of each year form a separate class. At present the number of students admitted each year is restricted to ninety-six including three seats reserved for lady students.

ADMISSION.

4. Students from all parts of India, without distinction of caste or nationality, are eligible for admission, but preference will be given to those from the Madras Presidency. An endeavour will be made to ensure, as far as possible, that students from the Andhra University area are fairly represented. Selections for this course will be made by the Principals of the Agricultural Colleges, Coimbatore and Bapatla. Candidates for admission will be interviewed at the following centres in the latter half of June on the dates that will be notified :—

Bapatla, Madras and Coimbatore.

QUALIFICATIONS FOR ADMISSION.

5. (*a*) Candidates for this course shall be required to have passed the Intermediate Examination in Arts and Science of the Andhra or other Universities having offered as optional *chemistry* and any two of the following subjects :—

(1) Mathematics.
(2) Physics.
(3) Natural Science.
(4) Botany.
(5) Zoology including human physiology.
(6) Agriculture or any examinations accepted by the Syndicate of the Andhra University as equivalent thereto.

All applications for admission should be made in the prescribed form and must reach the Principal, on or before the 15th June every year. Application form will be sent on receipt of stamped and addressed envelope. (No loose stamps accepted.)

Candidates must have *attained the age of 17 years* at the time of joining the College and their applications must be accompanied by the following certificates in original—

(i) University certificates (in original);

(ii) Leaving certificate from the head of the institution last attended;

(iii) Testimonials of good character covering the previous two years;

(iv) Certified copy of the marks secured at the University examination (Intermediate), and

(v) Chalan of Rs. 5 (Rupees five only), towards registration fee paid to the credit of "XXIX. Agricultur—Agricultural Receipts—Post-war Reconstruction—Agricultural College, Bapatla" in any Government treasury or into any branch of the Imperial Bank of India.

Selected candidates should, before joining the College, produce a certificate of physical fitness granted by a registered medical practitioner and a vaccination certificate showing that the candidate has been vaccinated or has had smallpox after the age of ten.

(b) Students who have failed in the University Examination for the Degree of Bachelor of Science in Agriculture may be re-admitted at the discretion of the Principal, on payment of the fees prescribed in rule 7.

TOURS.

6. Students may be taken on tours of enquiry to such places as may be fixed by the Principal, under the orders of the Director of Agriculture. During such tours they shall be entitled to free carriage of themselves by road and rail. All other expenditure shall be borne by the students themselves.

FEES.

7. (i) Students admitted from the Madras Presidency and Coorg shall be charged a tuition fee of Rs. 40 per term, or Rs. 120 per annum, a lodging fee of Rs. 2-4-0 per mensem.

In the case of re-admission of students who were prevented from sitting for the University examination on account of illness or other causes beyond their control, the lower fee of Rs. 40 per term or Rs. 120 per annum shall be charged in addition to the lodging fees and lighting charges. In the case of students who sat and failed in the examination and also of students who were not allowed to appear for the examination for unsatisfactory progress in studies, the combined fee of Rs. 50 per term or Rs. 150 per annum shall be charged.

The fees are payable in advance within a fortnight of the commencement of the term. In default of punctual payment, a fine of annas two for each day of default will be levied.

In the case of students of the second and third year of the B.Sc. Ag. Course, however, who will be away on tour at the commencement of the term, the tuition and other fees may be paid within three days of their return from tour.

(ii) Students from other parts of India including Indian States whether admitted for the first time or re-admitted after failure, will be charged a fee of Rs. 400 per term, payable in advance for tuition and lodging.

(iii) All students shall pay a combined subscription of Rs. 9 every year to the Athletic Club and Reading Room, payable in three equal instalments along with the College fees.

(iv) Every student on joining the College, shall deposit a sum of Rs. 10 as caution money to cover fines, breakage, etc., if any. Any balance at the credit of the student shall be repaid at the end of the course.

SCHOLARSHIPS.

8. The following scholarships will be awarded :—

(A) Eight scholarships of the value of Rs. 30 each per mensem will be awarded annually and will be distributed as shown below :—

(i) Three scholarships to students from the Muslim community.

(ii) Three scholarships to students from the backward and such other communities as are not adequately represented in the Agricultural Department.

(iii) Two scholarships to the students who obtain (in the aggregate) the highest number of marks in the two terminal and final University examinations in the first year course.

Note.—In the absence of duly qualified candidates from the abovementioned communities the vacant scholarships, if any, will be awarded to poor and deserving candidates irrespective of the community to which they belong provided they come from families actually engaged in agriculture.

(B) Two scholarships of the value of Rs. 40 each per mensem will be awarded to students from the Scheduled Castes. The recipients of these scholarships will also be exempted from payment of fees for the course.

Note.—Students to whom the scholarships are awarded should give a written undertaking that they will not on taking the B.Sc. Agriculture Degree, apply for employment elsewhere than in the Agricultural Department except with the written permission of the Director of Agriculture, Madras.

The terms under which the scholarships in (A) and (B) are granted shall be as follows :—

(a) The student should belong to the Madras Presidency ;

(b) he must be prepared to study for the whole course and work for the Degree of Bachelor of Science in Agriculture of the Andhra University ;

(c) each scholarship shall be held conditionally on the good behaviour of the holder and his satisfactory progress in the studies ; and

(d) a student already in the enjoyment of a scholarship from local body or private person shall not be eligible for a Government scholarship.

BOOKS AND DRESS.

9. Each student must provide himself with his own books and sets of drawing and dissecting instruments, and other materials required for practical work in the field and in the laboratories.

Each student on joining the College must provide himself with the uniform prescribed for games and ceremonial occasions. This will cost about Rs. 25 and should not require renewal during his course. He must also provide himself with the customary dress for field work, viz., khaki coat, shorts, shirt and tie which will cost about Rs. 25 per set.

TERMS.

10. The College year comprises three terms of studies as follows :—

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(a) kept three-fourths of the attendance for three terms put together in each year ;

(b) shown satisfactory progress in their studies ; and

(c) paid all demands against them that are due under the College Rules.

N.B.—The calculation will be made on the number of working days and attendance as shown in the attendance registers, fractions of less than half a day being disregarded.

EXAMINATIONS.

11. All students shall appear at examinations as required by the College authorities and shall not be held to have completed their course unless they sit for examinations and show fair progress to the satisfaction of the Principal.

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CERTIFICATES.

12. A student who qualifies himself for the Degree of Bachelor of Science in Agriculture will receive his University Diploma in the usual course at a University Convocation.

Every student who completes the course shall, whether he succeeds or fails in the examination, be granted a leaving certificate by the Principal.

PRIZES.

13. Two prizes, called Lt. P. V. Krishniah Chowdary's the Director B. V. Nath's Medal Fund and Sri Brahmandan Venkata Lakshmi Narayana Rao's Medal Fund are awarded.

LEAVE AND APPLICATION.

14. Leave of absence shall be obtained only on application to the Principal in the prescribed form.

The vacations at the College are—

(i) Midsummer vacation from 1st April to 14th June.

(ii) Michaelmas holidays from 17th September to 3rd October.

(iii) Christmas holidays from 22nd December to 3rd January.

The occasional holidays allowed by the Educational Rules shall, at the discretion of the Principal, apply to the College.

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15. Students are liable to punishment by the Principal for breaches of discipline, neglect of their studies, general failure to profit by the course of instruction, or for any other sufficient reason.

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On joining a mess, or on every occasion on which the mess advance has been adjusted to pay up arrears, a registration fee of Re. 1 is payable.

PROSPECTS OF SUCCESSFUL CANDIDATES.

Holders of the Degree of Bachelor of Science in Agriculture will be eligible for the following appointments in the Agricultural Department, but no appointments of any kind are guaranteed :—

Subordinate Service.

(i) Farm Managers of the Agricultural Research Stations, Agricultural Demonstrators, Assistants in the Science sections or Teaching Assistants in the Agricultural College. Rs. 75—7½—105 E.B. 120—10—170 E.B. 170—15/2—200.

Madras Agricultural Service.

(ii) District Agricultural Officers, Superintendents of Agricultural and Research Stations, Assistant Research Officers, or Lecturers in the Agricultural College. Rs. 200—30/2—260—40/2—500—50/2—700.

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MADRAS VETERINARY COLLEGE.

PROSPECTUS, 1949-50.

B.V.Sc. Degree Course.

I. General.—The College affords theoretical and practical instruction for taking the Degree of Bachelor of Veterinary Science (B.V.Sc.) of the Madras University. The academic year of the College commences from July. Candidates seeking admission to the College must not be under 17 years of age on the date of commencement of the academic year. In ordinary circumstances no person over 22 years of age will be admitted. Candidates are admitted to the College by selection by the Board constituted by the Government. Applications for admission should be made in writing in the appended form and should be submitted so as to reach the Principal not later than the ~~10th June 1949~~ 2.7.49 accompanied by the certificates required in instructions printed on the reverse of the application form. In the event of a candidate being found fit to appear for selection, he will be informed of the particular day and the hour when and the place at which he should present himself for personal selection. Candidates, on admission, will be on probation for the first year of the course and may be removed, if found to be unsatisfactory.

Eligibility for admission.—Candidates seeking admission to this course should satisfy the conditions laid down in rule "I. General." All candidates irrespective of their community, should have passed the Intermediate Examination in Arts and Science of the Madras University or an examination accepted by the Syndicate as equivalent thereto having offered Chemistry or Natural Science as one of the optional subject.

Duration of the course.—The course for the Degree of B.V.Sc. shall extend for a period of four academic years and one term (ordinarily consecutive).

Academic terms.—The academic year shall consist of three terms: July to September; October to December and January to March, except in the case of the final year when it shall be four terms and shall in addition extend from April to June.

2. The examinations for the Degree shall consist of a Preliminary; Intermediate, Part I; Intermediate, Part II and a Final Examination. The examination shall be held twice a year in the months of April and October for Preliminary, Intermediate, Part I, Intermediate, Part II and in June and December for the final B.V.Sc.

COURSE OF STUDY.

B.V.Sc. Preliminary.—A candidate for this examination shall undergo a course of instruction in the following subjects extending over one academic year :—

(*a*) Biology.

(*b*) Chemistry.

(*c*) Animal Husbandry, Part I (Handling and Shoeing).

Candidates who have passed the Physical or Natural Science group of the B.A., B.Sc., B.Sc. (Hons.) or B.A. (Hons.) Degree Examination of this University with Chemistry or Zoology as their main optional subject and Botany as the subsidiary for Zoology or an examination of any other Indian University accepted by the Syndicate as equivalent thereto shall be exempted from undergoing the course and the examination in the respective subjects in which they have passed the Degree Examinations, provided, however, that exemption in the case of graduates of other Universities shall be restricted to not more than one subject which shall be the main subject in which they have obtained the highest proficiency. Such candidates shall however, be required to pay the fee prescribed for the whole examination. At the end of the first year course of study, the students shall have to undergo a course of practical training in a Farm for one and a half months during the vacation.

B.V.Sc. Intermediate, Part I.—A candidate for this examination shall undergo a course of instruction in the following subjects extending over an academic year except in the subjects of Anatomy (including Histology and Embryology) and Physiology (including Experimental Physiology and Biochemistry) in which the courses of instruction shall extend over the first and second years of study :—

(*a*) Anatomy including Histology and Embryology.

(*b*) Physiology including Experimental Physiology and Biochemistry.

(*c*) Animal Husbandry, Part II (Hygiene).

(*d*) Parasitology.

No candidate shall be admitted to the B.V.Sc. Intermediate, Part I Examination unless he has passed the B.V.Sc. Preliminary Examination and has undergone a course of instruction in the prescribed subjects including practical training for one and a half months in a Farm.

At the end of the second year course of study, the students shall have to undergo a course of practical training in a Farm for one and a half months during the vacation.

B.V.Sc. Intermediate, Part II.—A candidate for this examination shall undergo a course of instruction in the following subjects extending over an academic year, except in the subjects of Pathology and Bacteriology—(including Immunology) and Pharmacology (including Materia Medica and Pharmacy) in which the courses of instruction shall extend over the second and third years of study :—

(*a*) Pathology and Bacteriology including Immunology.

(*b*) Pharmacology including Materia Medica and Pharmacy.

(*c*) Animal Husbandry, Part III (Nutrition and Dairy Science).

No candidate shall be admitted to the B.V.Sc. Intermediate, Part II Examination unless he has passed the B.V.Sc. Intermediate, Part I Examination, has undergone a course of instruction in the prescribed subjects including practical training for one and a half months in a Farm, and produces a certificate of hospital attendance for one academic year.

At the end of the third year of study, the students shall have to undergo a course of practical training in a Farm for one and a half months during the vacation.

B.V.Sc. Final.—A candidate for this examination shall undergo a course of instruction in the following subjects extending over four terms except in the subjects of Surgery and Medicine in which the courses of instruction shall extend over the third and fourth years of study :—

(*a*) Medicine including Therapeutics and Toxicology.

(*b*) Surgery including Soundness, Obstetrics and Veterinary Jurisprudence.

(*c*) Animal Husbandry, Part IV (Genetics and Breeding).

(*d*) Meat Inspection.

No candidate shall be admitted to the B.V.Sc. Final Examination unless he has passed the B.V.Sc. Intermediate, Part II Examination, has undergone a course of instruction in the prescribed subjects including practical training for one and a half months in a Farm spent during vacation at the end of the third year of study and two months during the fourth term of the final year and produces a certificate of hospital attendance for three terms.

Fees.—(*a*) A tuition fee of Rs. 120 per annum shall be levied from the Presidency students including Coorg. A tuition fee of Rs. 550 per annum shall be levied from the students coming from Indian States and other Governments. A sum of Rs 8 towards Sports fee, Rs. 5 towards Medical Association fees, and As. 12 being the fee for Medical Inspection shall be levied from all the students of Madras Presidency and Coorg', Indian States and other Governments. Students who reside in the hostel should pay a caution fee of Rs. 10 towards [illegible] er charges, etc. The above fees are [illegible]ion.

"Scholarships of the value of R[illegible]
each per mensem shall be awarded
50% of the students of all communi[illegible]
in accordance with the principle of
communal rotation, subject to a maxi-
mum of 25 in each class. When held by
members of backward classes, the scho-
larship shall be of the value of -
Rs.40/- per mensem".

		RS.
	..	25
	..	30
	..	30
	..	50
[illegible]ions.		15
	..	20

[illegible]rom all students residing [illegible] every month a General Fund subscription [illegible] will be required to pay varying from Re. 1 to Rs. 1-8-0 and water charges from Re. 1 to Re. 1-8-0. electric current charges boarding charges for each student will generally be between Rs. 45 and Rs. 50 per mensem. A mess caution money of Rs. 60 also must be paid when admitted.

Prospects of service.—The scale of pay of the Veterinary Assistant Surgeons is Rs. 140—5—200—10—250 in the Animal Husbandry Department, Madras, and they have a fair prospect of employment in the Government of Madras, other Provinces, States and Municipalities.

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LEAFLET No. 1.

CIVIL VETERINARY DEPARTMENT, MADRAS.

Some Common Ailments of Cattle.

Introduction.—The following notes have been compiled at the suggestion of several district officers for the benefit of ryots and other people who own cattle and are unable to obtain professional advice easily for their animals when they are attacked by one or more of the ailments to be described. Only three diseased conditions are described in this leaflet but further leaflets will be prepared on the same subject if they are thought to be of any use. It is not pretended that the description of the diseases and their treatment is an exhaustive one, but it is hoped that what is said will be sufficient in some cases to cure the disease, and in others to keep it within reasonable limits until professional advice can be obtained. In this connexion, it may be stated here that veterinary advice can be obtained now by anyone in the Madras Presidency by writing to the Tahsildar or other Revenue official who will inform the Veterinary Assistant Surgeon in charge of the taluk. In the case of bona fide agricultural animals, the advice can be obtained free; while in others, the owner will have to pay the conveyance charges of the assistant and a small fee.

1. *Wounds.*—Wounds may be of many kinds and of any size—but the important point in the treatment of them all is the same, viz., they must be kept clean. The first thing to do is to wash the part either with an antiseptic like phenyle in water or, if no antiseptic is obtainable, with ordinary clean water, which has been boiled.

This will remove any dirt that has got into the wound and enable one to see if there are in it any other foreign bodies, which of course should also be removed.

If the wound is in the region of the abdomen, a part of the intestines may be protruding, in which case, after washing them thoroughly, they should be put back and the wound stitched up. In some cases, blood vessels may be served. This will be recognized by the great amount of bleeding which takes place, and, to stop this, the wound cavity should be plugged with clean tow or soft cloth and the lips of the wound stitched together over this.

In some parts of the body, such as the limbs, a tight bandage can be put on over all, which will also help to stop the bleeding.

In most other cases, it is unnecessary to stitch up a wound, for it will heal just as quickly without stitches providing it is kept clean. A wound heals more quickly if the hair is clipped or shaved off the edges of it. A wound should be cleaned at least once a day with the antiseptic lotion or clean boiled water, and, to prevent flies or dirt of any kind settling on it between the dressing

periods, if possible, a piece of clean cloth should be bandaged over it loosely.

If this is not possible, a little margosa oil painted on with a feather will keep away the flies.

In neglected cases, the wound may be infested with maggots and proud flesh may have formed. In such cases, the wound should be cleaned as previously described and the maggots removed by means of pincers obtainable from local goldsmiths. Afterwards, turpentine or saturated camphor oil should be applied. This will kill any maggots that may have escaped being removed. After all the maggots have thus been got rid of, the part should be washed with water to which some common salt has been added and dressed with margosa oil. If there is any proud flesh, it should be touched daily with bluestone (copper sulphate) until the growth disappears. Afterwards, the wound may be treated as described above.

Custard applé leaves made into a paste and applied over the wound and kept in position by bandage. This kills the maggots and this treatment to be continued for two or three days so that all the maggots are killed and wounds get healthy. Powdered sweet flag (ಜಿಗ) can also be used in case of wounds affected with maggots.

After the wound has been cleaned of maggots, charcoal powder may be dusted over the part as a dry dressing to help healing quicker.

2. *Yoke gall.*—This is perhaps the commonest affection which ryot is likely to meet with amongst his working cattle.

It is common, because it is very easily caused, but it should be remembered that it is particularly easy to prevent it becoming bad in most cases if the advice given below be followed.

The gall always begins in the first place as a bruise or chafe, or by dirt being rubbed *into* the skin by the yoke.

If, therefore, care is taken to balance the load properly so as to prevent bruising, and the yoke and the skin of the animal are kept clean, the number of cases should be considerably reduced. With the best attention however cases will occur, and then, whatever the cause is, the most important thing to do is to rest the animal until completely cured, or at least give it only work which does not require a yoke to be placed on its neck, *e.g.*, threshing.

It is impossible for the neck to get well while a yoke is on it, and if it does not get well it will get worse, eventually becoming so bad as to prevent the animal doing any work at all.

In the very early stages, the condition should be recognized by finding a small inflamed and painful patch where the yoke rests on the neck, perhaps accompanied by removal of some of the hair. If the animal is rested at once, there is little else to do but wash

the place thoroughly and apply such things as cold water. Keep pouring cold water on the part continuously for about an hour twice daily. After the part is dried thoroughly, apply camphorated oil, which is made by dissolving camphor in gingelly or coconut oil until all pain disappears and the hair grows again. If the animal is not rested, the bruise or chafe grows into a soft and very painful swelling under the skin which rapidly increases in size if the work is continued. Owing to the pain which an animal in this state suffers, most owners will now stop work and wish to treat the condition. The most successful treatment at this stage is to put on a mild blister of mustard powder and chilly powder (3 parts of the former and 1 of the latter) made into a paste with water. If the swelling contains pus, the blister will cause it to burst and discharge the pus; and, if not, it will cause the contents of the swelling to be absorbed. If the swelling bursts, the opening must be treated as an ordinary wound until it heals, which will take a long time. In the case of those which do not burst after absorption of the fluid contents, a small hard lump usually remains. This is a great nuisance for when the animal is put to work this is very apt to be bruised by the yoke and swell up again.

After each attack of this kind, the lump becomes bigger until at last it prevents the yoke being used at all, and then the only thing to do is to have it removed by a professional man.

The operation wound however takes a long time to heal, so that the necessity for treating this condition properly in the early stages is very obvious.

Indigo made into a thin paste either with coconut oil or water and applied before the animals are put to yoke toughens the skin and prevents the formation of yoke galls. Immediately after the animals are unloosened from yoke, common salt in fine powder can be applied with friction to the yoke bed which hardens the skin and this prevents the falling of the skin into very many folds which is one of the causes for the formation of yoke galls.

3. *Broken horn.*—Injuries to the horn may result in—

(*a*) Detachment of the horn or sheath.

(*b*) Fracture of the horn.

Causes.—The condition is usually caused by the yoke striking against the horn, especially when driven fast down a decline, the cart being badly balanced, or by fighting with other animals.

If the injury results only in detachment of the horn or sheath, the inner structure, *i.e.*, the horn core, remains intact showing a raw red surface.

Treatment of detachment of the horn.—The exposed horn core should be gently washed daily with some phenyle lotion or with clean water which has been boiled and cooled. After drying, apply

some liquid tar. The animal should not be yoked until the sheath has re-grown.

Fracture of the horn is more serious because in this condition the horn core is also affected. The seriousness of the case depends upon the part of the horn broken. The lower the fracture the more serious it is, owing to the danger of blood and other things escaping into the cavities in the skull below.

Treatment of fractured horn.—If the fracture is not near the root of the horn and if the entire thickness of it is not broken, then it is advisable to attempt to secure the union of the horn. In order to accomplish this successfully, the broken ends should be fixed together in position as soon after the accident as possible. Before bringing the broken ends together, the wound should be carefully cleaned with an antiseptic, such as phenyle lotion or boiled and cooled water. Then the ends should be fixed in position gently and carefully. A fairly tight bandage should be applied round the horn binding the broken ends together. Over this, another tight bandage should be applied and covered by a dressing of liquid tar. The bandage should be kept in position for about three weeks and the animal in the meanwhile must not be yoked.

If however the entire thickness of the horn is broken through and is only hanging by the horny sheath, then it is useless to attempt to save the horn. The hanging piece should be severed by a clean sharp knife. The part will bleed profusely. To arrest this, several thickness of bandage dipped on cold water should be applied. The after-treatment is that of an ordinary wound, special attention being paid to keeping the inside clean. A good plan is to have a leather cap made to fit over the stump after dressing.

Shed horn.—The application of a clean bandage dipped in sugar solution 20 grains to an ounce of water with certain amount of pressure hardens the horny tissue. The bandage may be kept in position for nearly a week without removal but requires only remoistening of the bandage at the end of the period. The bandage cloth also can be removed with the least pain or inconvenience to the animal afterwards, only it requires complete wetting.

MADRAS,
11*th April* 1940.

T. J. HURLEY,
Director of Veterinary Services.

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CIVIL VETERINARY DEPARTMENT, MADRAS.

Some common ailments of cattle—*cont.*

4. *Constipation.*—This condition in cattle is usually associated with derangement of the digestive organs, such as engorgement of the first portion of the stomach with dry food.

Constipation is also usually present in all conditions affecting the general health of the animal.

Causes.—As remarked above, the causes are various. The most common cause is the accumulation of a dry and hard mass of food in the stomach. This may occur when an animal gains access to a food it is fond of and overeats itself.

Again animals suffer from constipation if they are fed on coarse fibrous fodder and when the supply of water is insufficient.

Symptoms.—The prominent symptom is the passage of a small quantity of dung in small hard pellets after a certain amount of straining or there may be a total stoppage of the bowels. The animal's appetite is suspended, it does not chew the cud, appears to be dull and, in some cases, it may show evidence of suffering pain.

Treatment.—Take 1 to 1½ lb. of common salt, dissolve in two pints of warm water, add 2 to 2½ tolas of powdered ginger to it and then administer the whole quantity. Allow the animal plenty of water to drink. The bowels should begin to act in about 8 to 12 or 16 hours. If the animal shows any pain, add 2 tolas of powdered pepper to the mixture. If the above purgative does not move the bowels in 36 hours, castor oil 10 ounces with 30 drops of croton oil or 30 croton seeds powdered may be given.

It is not advisable to give straw or grain food until the bowels become normal again but a little green grass will do no harm.

It is preferable to give bran mashes until the bowels begin to act freely again. When this occurs, give to an adult animal 1¼ tola each of ginger and pepper in powder with ½ tola of nux vomica seeds powdered in the feed once a day for a week. (Nux vomica seeds can be had in bazaar but require to be steamed or fried before powdering.) In the case of calves, the administration of 2 to 4 ounces of castor oil will relieve the constipation.

5. *Diarrhœa.*—Strictly speaking, diarrhœa should be considered as a systom of a disease and not as a disease in itself. Cases however are met with among village cattle having diarrhœa apparently from injudicious feeding. This may be called simple diarrhœa.

Causes.—It generally arises from the animal having taken some unwholesome fodder or foul water during the dry season

when grass is scarce and the animals are in a semi-starved condition. Foreign bodies and acrid herbage picked up and eaten may produce diarrhœa. It is also produced in cattle grazing on the first shoots of young grass immediately after the rains have set in. It should not, however, be forgotten that diarrhœa is a symptom of several other diseases, such as Rinderpest, which, as everyone knows, is very contagious, or it may be due to parasites in the intestinal canal.

Symptoms.—It is recognized by the frequent passage of watery motions and the soiling of the tail and the hind legs. The general health of the animal in the beginning is not perceptibly affected. If the diarrhœa continues, then the animal becomes unthrifty, loses condition, the belly is tucked up, the coat stares, and there may be slight straining.

Treatment of simple diarrhœa.—First give the animal 10 to 20 ounces of castor oil depending upon the size, to get rid of the irritation. This alone may stop it. If further treatment is found to be necessary give ½ to 1 tola of catechu, chalk 1½ to 2 tolas and ginger 1 tola—well powdered and thoroughly mixed in a pint of warm rice gruel. The animal should be given only rice conjee or bran mashes and clean water to drink. If Rinderpest or any other disease is suspected, this should be reported to the Tahsildar or to the nearest Veterinary Assistant Surgeon.

6. *Hoven.*—Hoven is distension of the stomach with gas or wind. This condition is commonly met with in cattle. It is due to fermentation of the articles of food in the stomach. The mischief is often brought on by feeding on wet grass or other green fodder.

Hoven also results from irregular feeding such as giving an animal a food to which it is not accustomed. It may occur when cattle overeat themselves on the succulent and tender grass which springs up after early rains and especially so when the animals are in half-starved condition.

Formation of gas always occurs to a certain extent in the stomach of cattle but, when formed in large quantities, distressing symptoms follow.

Symptoms.—The first thing noticed, perhaps, is a bloated condition of the hollow of the left flank, which if tapped with the fingers produces a drumlike sound. The animal shows signs of uneasiness and pain by frequently lying down and getting up and rumination which is a sign of health is suspended. If not relieved early, breathing becomes more difficult every moment and the swelling increases rapidly; at last the animal falls down and dies from suffocation.

Treatment.—This should consist in arresting the fermentation and further formation of gas and the expulsion of the gas already formed. The following may be given. Take 2 ounces of oil of turpentine and 20 ounces of castor oil, mix these thoroughly and administer. If turpentine is not available, half a tola each of camphor and asafœtida well powdered may be substituted for turpentine. This should have the desired effect. This dose is for an adult animal.

For smaller animals, such as calves, proportionately smaller doses should be given.

If, however, there is no appreciable relief within an hour, half the above dose may be repeated, viz., 1 ounce of turpentine in 10 ounces of castor oil or powdered ginger 2 to 2½ tolas, powdered pepper 1 to 1¼ tolas with country liquor 4 to 5 ounces and water 1 pint may be given. After the symptoms have disappeared, the animal should not be given its usual food for several days. For 12 to 24 hours afterwards, the animal should be given easily digestible liquid food preferably conjee made with rice. For the next 2 or 3 days, a little powdered dried ginger and soda (or baking powder), say 2 tolas of ginger and 4 tolas of soda, may be given dissolved in some water in the form of a drench or this may be mixed with the animal's food; or a powder consisting of ginger 2 tolas, chiretta 2 tolas, omum 1 tola and nux vomica ¾ to 1 tola may be given in the feed for 3 to 5 days. If the symptoms are very alarming and a professional man is not at hand, the best way to give relief to the animal is to stab deeply the flank with a clean knife at the most swollen part on the left side, at a point equidistant from the last rib, the point of the hip and the back-bone and hold the knife in position while the gas escapes. The wound will probably heal up well if the knife used is a clean one.

7. *Retention of placenta.*—The retention of the placenta or "after-birth" for some considerable time after the calf is born is a condition requiring attention, although it is not uncommon in cows to retain the after-birth for 24 hours or even more without any ill effect.

Causes.—Retention frequently follows abortion and cases of protracted labour. Old cows are very liable to this condition for want of the necessary strength in consequence of debility.

Symptoms.—In this country, for about 24 hours, the retention of the placenta needs no interference. If not expelled by that time, interference is necessary to avoid serious complications. A portion of the membrane is found to be hanging down from the extenal genital orifice or vulva. The animal shows signs of

uneasiness by stamping with the feet and whisking the tail; and there may be ineffectual attempts at straining to expel the membrane.

Treatment.—If the animal is very much exhausted and weak, administer 10 ounces of arrack in an equal quantity of cold water. Give one measure of cumbu flour boiled and mixed with 2 lb. of jaggery; or okra capsules about 15 to 20 tolas, gingelly seeds 10 tolas and jaggery 10 tolas, well mixed in one or two pints of conjee, may have a good effect. Failing all this, recourse must be had to removal by traction. This should be done by a professional man but if no professional aid can be obtained proceed as follows :—Take two pieces of thin flat stick about a foot long. Place the piece of the after-birth which is hanging down in between the two sticks which should be gripped tightly at each end with the hands and turn them round so as to roll up the after-birth on them. This will bring the sticks up against the animal's vulva, and gentle traction should now be exerted and an attempt made to turn the sticks round still more. Great force should, on no account, be used, but if the sticks cannot be turned round any more the attempt should be discontinued and repeated the next day. Nothing else need be done after removing the placenta beyond supporting the strength of the animal by giving conjee. The appetite usually remains good, and in two or three days' time the animal can be put on her usual diet.

MADRAS,
26*th March* 1939.

P. T. SAUNDERS,
Director of Veterinary Services.

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CIVIL VETERINARY DEPARTMENT, MADRAS.

SOME COMMON AILMENTS OF CATTLE—*cont.*

8. *Lameness.*—When an animal which has no pain in any of its limbs is made to move it will be observed that it steps firmly and puts weight equally on all its limbs.

If there is any pain it will attempt to put less weight on the affected limb or limbs, either while standing, walking or trotting or at all times, and then it is said to be lame in one or more of its legs.

The most important thing to remember in lameness is that the animal must be rested completely until the lameness disappears, or it will invariably get worse. It should therefore be kept in a shed or yard and supplied with food while it is lame.

In order to detect and treat lameness one must first observe the animal when it is standing still. Note if it points any of its legs, i.e., extends one leg in advance of its fellow, or even keeps a foot off the ground entirely, as it may do if the pain is very severe.

If it is not possible to decide from observing the animal in the above position, on which leg it is lame it must be walked or trotted up and down on a piece of hard, level ground. When the animal is moving away from the person examining it, the hind legs should be observed and when coming towards the person the fore legs should be noted.

The person should stand immediately in front of or behind the animal while it is being moved and must decide on which leg it is attempting to throw an unequal amount of weight. Having decided this one can be certain that the opposite leg is the lame one. For example, if extra weight be put on the near hind the animal is lame in the off-hind, and similarly with the fore legs. When the fore legs are being examined much help can be obtained by watching the head which will drop with the sound leg each time.

If an animal is lame on both fore or both hind legs at the same time it will place an equal amount of weight on each of them but it will move stiffly and take unnaturally short steps with the affected limbs. Having detected the lame limb it is necessary to examine that limb from top to bottom for the cause of the lameness.

The conditions most likely to cause lameness will now be considered separately :—

(*a*) *The foot.*—As the foot is the most common seat of lameness in working animals that should be examined first.

The cleft of the hoof in cattle should be searched for a stone or other hard substance. On removal the lameness will probably cease.

If nothing is found the hoof should next be tapped gently all over with a hammer or nipped slightly with a pair of pincers to see if the animal evinces pain, which it will do by trying to snatch the foot away.

If there is any pain the shoe, if any is worn, should be removed and the hoof placed in a poultice made of bran and warm water applied in a gunny bag once a day, until the lameness disappears.

If an animal goes lame a day or two after shœing it will usually be due to the farrier having cut away too much of the hard outside horn or driven the nails too close to the sensitive parts of the foot.

When an animal shows pain in a hoof to which no shœ has been applied it will usually be found to be caused by hard work on metalled roads having worn away the horn of the hoof. In these cases of wearing of the horn the animal should be rested until the horn has become hard again and should be shod before it is put to work again.

(*b*) *Sprains.*—Each joint in an animal's limb is formed by two or more bones held together by fibrous bands, which may become unduly stretched or even broken owing to the animal slipping, taking a false step, being driven at an excessive speed or being made to move too heavy a load. When this happens the joint is said to be sprained.

In cattle the joints most commonly sprained are the fetlock, hip and shoulder, and the condition may be recognized by the joint being swollen, hot and painful when manipulated. The affected joint should be fomented with very hot water for half an hour morning and evening after which it should be dried and some camphorated oil applied. Camphorated oil can be made by dissolving about one tola of camphor in an ollack of coconut or gingelly oil, and if it can be obtained one-eighth of an ollack of turpentine may be added. The affected joint may be fomented with a hot decoction of tamarind leaves. In cases of swollen joints, country aloes (கரிய பவளம்) made into a paste by triturating with water and slightly heating, may be applied. Also the following preparation may be used with advantage. Juice of green tamarind leaves is extracted, added to sour and decanted. To the resultant fluid a little of country benzoin (சாம்பிராணி) powder is added and made into a paste and applied. If after two weeks the lameness still persists a blister made by mixing three parts of mustard powder and one part of chilli powder into a paste with water may be well rubbed into the part

for five minutes, but it would be better if possible to obtain professional advice before doing this. On no account should an animal which is suffering from a sprained joint be given any exercise.

(*c*) *Fractures.*—When any of the large bones of a limb are completely broken the part of the limb below the fracture will hang helpless and the animal will be unable to put any weight on that limb. If there is no wound of the skin in addition to the fracture the two ends of the broken bone should be brought together and maintained in that position by the application of splints and bandages.

Splints can be made from bamboos cut into strips from 1 to 2 inches wide, depending on the size of the animal's leg, and should be long enough to extend about six inches above and below the broken part.

If there is an external wound, either this must be made to heal, as described in Leaflet No. 1 of this department, before the splints are applied, or they and the bandages must be applied so as to leave the wound exposed for treatment.

Before applying the splints some soft cloth should be wound round the limb to prevent their chafing the skin and to keep the splints and the bandage in position a paste consisting of dry black gram flour, dry tamarind seed flour and eggs may with advantage be used, and when once applied they should not be removed for five or six weeks.

The above treatment will probably bring about a fairly successful cure of a fracture occurring in the limbs of a young animal below the elbow or stifle joints, but if in other parts of the body or if the animal is mature it is almost impossible to make the animal fit for work again and it would be better to sell it immediately to a butcher for what it will fetch.

(*d*) *Dislocation of the shoulder.*—This accident is fairly common amongst village cattle. It may be caused by the animal jumping from high to low ground, making a false step or by slipping down. The animal will be unable to place any weight on the affected leg and will progress by means of three legs.

On examination of the limb the hard end of the displaced bone will be felt sticking out from the ordinary position of the shoulder joint.

The earlier the condition is recognized and an attempt is made to reduce the dislocation the greater will be the chances of recovery.

If there is a deep tank or canal nearby the animal should be made to swim in it and this will probably have the effect of reducing the dislocation. Otherwise the animal must

be cast on the sound side, a rope placed above the fetlock of the affected limb, and while an assistant pulls the limb forward gently but forcibly the operator will endeavour with the palm of his hand to force the protruding end of the dislocated bone back into its proper position. It will go back with a distinct " Click. "

After-treatment consists when the dislocation has been completely reduced in a blister made by mixing 3 parts of mustard powder and one part of chilli powder into a paste with water rubbed round the joint for five minutes, otherwise in keeping the animal quiet until all signs of lameness disappear.

(*e*) *Other causes.*—The above by no means exhaust the conditions which may cause lameness in an animal but if the owner of a lame animal is unable to find out the cause of the lameness from the above he should obtain the help of a Veterinarian as early as possible.

9. *Mammitis.*—The word means inflammation of the udder, a condition often seen in cows in milk, usually soon after calving.

It may be caused by an excessive secretion of milk or by a careless milkman leaving some old milk in one or more quarters of the udder to coagulate and decompose.

The affected quarter or quarters will be hot, reddish in colour, painful and tense, and the animal may show the pain in the udder by continually lifting a hind leg towards it. She will be disinclined to allow one to milk the affected quarter and only curdled milk, sometimes tinged with blood, or a clear yellow fluid will be obtainable from it.

The animal usually shows signs of fever, with loss of appetite and rumination.

Treatment consists first in giving the animal a purgative consisting of 1 to 1½ lb. of common salt and 2 to 2½ tolas of powdered ginger in a quart of warm water.

After this she may be given one tola weight of nitre twice daily in the food, which should consist of bran mashes and conji only.

The affected quarters should be fomented morning and evening with hot water, in which some leaves of the Datura Stramonium or Thornapple have been boiled and after this some camphorated oil, prepared by dissolving one tola of camphor in an ollack of coconut or gingelly oil, should be rubbed into the part. The udder may be supported by means of a suspensary bandage and with a thick pad of cotton wool applied to the affected quarter.

The most important thing however in the treatment of this complaint is to strip the affected quarters three or four times a day of as much of the decomposed material in them as possible.

This should be done by gently massaging the udder above the teat with the hand before attempting to draw anything off through the teat.

If an abcess forms in the udder professional help should be obtained as soon as possible.

10. *Poisoning.*—Cattle may be poisoned accidentally or maliciously.

Cases of accidental poisoning occur from time to time but so many agents may be the cause of this that it is not possible to deal with the subject at all thoroughly in a leaflet like this.

We shall consider therefore only the agents commonly used in cases of criminal poisoning in this province. It is probable that criminal poisoning is very rife in the Madras Presidency owing to the great demand there is for the hides of cattle and the opportunities offered to unscrupulous persons during the time that cattle are taken away from their villages for grazing, but up to the present it has not been possible to bring many cases home to the perpetrator.

Owing to the fact that when cattle are taken away for grazing their owners do not go with them, it is extremely difficult to prevent cases occurring during that time but cases undoubtedly occur quite commonly in cattle owners' own villages and if these were reported promptly and proved no doubt the practice would cease to a great extent. In addition to cattle being poisoned by chamars for the sake of their hides it may be done by one man bearing a grudge against another.

Whenever criminal poisoning is suspected word should be sent to the Police, whose duty it is to make arrangements for having the carcase of the animal examined for poisonous materials, and the help of the nearest Veterinary Assistant Surgeon should be obtained either by writing to him direct or through the Tahsildar. Cattle owners should remember that if they wish the culprit to be discovered, they must report the case immediately to the Police, must retain all the droppings of the affected animals, and be ready to give the Veterinary Assistant Surgeon or other person making the post-mortem examination as much information regarding the symptoms shown by the animal as possible.

A short description is given below of the three agents most commonly used in this province in cases of criminal poisoning in cattle:—

(*a*) *White arsenic or arsenious acid.*—This is obtainable in most Indian bazaars and is usually administered by mixing it with food such as jaggery or plantain fruits, or it may be made into a paste with other material and thrust into one of the natural openings of the body like the rectum by means of a bamboo. If the poison has been given by the mouth the animal will show inflammation of the gums, mouth and tongue, and there will be a profuse flow of

saliva with retching and attempts at vomiting. The animal will soon show signs of abdominal pain by lying down and getting up continually, there will be flatulence and later a foul smelling diarrhœa sometimes tinged with blood. If the poison has been introduced into the rectum there will be much straining and the rectum will be red and inflamed. In the last stages the animal will have an anxious look, the pupils will be dilated, the breathing will be much accelerated and difficult, the gait will become unsteady and eventually paralysis will occur and the animal will fall to the ground and die.

If the case is not seen until its later stages no treatment will be of any avail. If recognized early one tola weight of sulphate of iron dissolved in a pint of water should be given at once or a large quantity of rusty iron washed in warm water and mixed with sodium carbonate (சோடா உப்பு) may be administered every 3 hours at least for ten or twelve times and this may be followed by the white of 15 to 20 raw hen's eggs mixed with a measure of milk, or conjee and given every three or four hours.

(*b*) *Yellow or Bastard Oleander* (*Latin Cerbera, thevetia, Thevetianeriifolia or nerium thebaci*).—In administering this poison the seeds of the plant are usually strung together on a card, like a rossary and thrown for cattle to eat.

Another way is to mix the bark of the plant with an animal's straw.

The animal attacked will be off its feed, may attempt to vomit, will show signs of abdominal pain, have marked diarrhœa and pass large quantities of urine.

At first the animal may show signs of excitement but this will soon turn to stupor, a staggering gait, shivering, spasms, paralysis and death. Arrack may be given as a stimulant but no treatment is likely to be of any use.

(*c*) *Jequirity or "Sui" poisoning* (*Latin Abrus Precatorius*).—The usual way of administering this poisonous plants to powder its seeds, known in the bazaar as Rati, into a paste with water, make from this paste a small sharp spike about an inch long, and after drying and hardening it in the sun, fix it into a wooden handle and stab in into some convenient part, often the neck, of the animal to be attacked. The part into which the poison has been introduced swells considerably and the animal invariably dies within two days.

No treatment is of any use except to remove the piece of paste if this can be done very soon after it has been introduced.

MADRAS,
8th January 1936.

P. T. SAUNDERS,
Director of Veterinary Services.

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CIVIL VETERINARY DEPARTMENT, MADRAS.

RINDERPEST.

Rinderpest or cattle plague is the most serious contagious disease of cattle in this Presidency. It causes enormous losses in infected herds and unless special precautions which will be described later in this leaflet are taken a very large percentage of the animals die from it. It affects buffaloes also in addition to cattle and sometimes other ruminants.

The condition is probably well-known to most stock-owners so much so, that it seems unnecessary to mention the large pecuniary losses, dislocation of work and the many hardships which follow its appearance among village cattle. It therefore behoves all stock-owners both from a personal as well as a national point of view to become acquainted with this condition and help the authorities to reduce the heavy mortality which occurs annually among the animals in this Presidency.

The cause of rinderpest is an ultra-visible virus which is present in the blood, the discharges from the mouth, nose and eyes and in the fæces and urine of an affected animal. Infection with such substances is readily accomplished in susceptible animals by subcutaneous injection or by feeding. (A common method of setting up the disease is to take a small quantity of blood from a diseased animal and inject it subcutaneously into a susceptible animal and the first symptoms of the disease usually appear in about three days.) Cattle-owners must therefore remember in connexion with rinderpest that it cannot begin in a village of its own accord. That is to say the virus which is the cause of the disease must be introduced from some other village where the disease exists or has recently existed. Fortunately the virus does not live for a long time outside the body when exposed to air and sunlight. If kept in the shade, the virus will live in these discharges for not more than three days and if exposed to sunlight it will become dead, that is, incapable of spreading infection, after some hours.

The disease usually begins in a village by one or more of the cattle or buffaloes showing at first symptoms of high fever, such as, dullness, a staring coat, shivering, a dry muzzle and loss of appetite, and if in the open they stand apart from the other animals with the head and ears drooping and the back arched, having all the appearances of a very sick animal. Rumination ceases and the fæces are dry and passed in small quantities. The urine is diminished and of a darker colour than normal. If the animal attacked is a female in milk, there is diminution in the quantity of milk secreted. The temperature is raised from 103° F. to 106° F. or more. These symptoms last for a day or two and then the characteristic symptoms of rinderpest appear. There is

increased salivation which oozes out from the mouth mixed with air bubbles and sometimes blood. On examining the mucous membrane of the mouth it is found to be inflamed and spotted or diffusely reddened and later shows the well-known eruptions which have been described as looking like bran. These bran-like eruptions which make the mucous membrane appear as if it were sprinkled with flour or bran are found on the inside of the lips, on the gums especially of the incisor teeth, on the sides of and under the tongue, on the dental pad and even on the roof of the mouth. If this bran-like eruptions be removed with the finger the surface underneath looks red and can be easily made to bleed. About the same time as the eruptions appear in the mouth lachrymation also appears. The conjunctivæ (mucous membrane of the eye) are bright red, the lids are swollen and tears run profusely from the narrow openings of the eyes. There is also a nasal discharge which is at first transparent and watery, later becoming thicker and more purulent and finally a dirty grey or brown fetid discharge which may be blood-stained. As the result of the affection of the intestinal tract which appears at the same time as the affection of the mouth, there is at first constipation which lasts for a day or two and later a profuse diarrhœa. The diarrhœa gradually gets worse, being blood-stained, with an offensive odour and finally of the consistency of rice-water and passed without any effort.

The fever reaches its height in a couple of days and rapidly drops with the onset of the diarrhœa, in severe cases to below normal, when death usually occurs, whereas if there is an indication of improvement the fever subsides gradually. Pregnant animals usually abort at the height of the disease.

The animals have no appetite during the course of the disease and rapidly lose condition.

Towards the termination of the disease the staring look of the sunken eyes, purulent secretion from the eyes, dirty nasal discharge, foamy saliva in the corners of the mouth, difficult and groaning respiration, frequent thin fluid fæcal discharges and the repulsive odour emanating from the body furnish a characteristic picture of the diseased animal. The completely exhausted animal usually dies after a long death agony.

In some cases warty-like eruptions develop on the skin particularly of the neck, back and hind legs and it is usually thought that animals having these symptoms will recover.

The symptoms begin to appear from three to nine days after infection and fever which is the first symptom reaches its height in two or three days. The other symptoms are noticed then and from that time the temperature drops.

Death usually occurs from four to seven days after the first-symptom, otherwise, the symptoms gradually subside and convalescence lasts from two to three weeks.

Rinderpest does not spread rapidly. It is a slow spreading disease as a rule and may take months before it affects all the animals in a village. There may be one or two cases and it may be a week or more before another animal becomes affected and so it goes on, but the point to remember is that it spreads slowly but surely and unless the disease is reported and help obtained from the Veterinary Department, a large number of animals will succumb.

How is rinderpest spread from one animal to another? It has been mentioned at the beginning of this leaflet that the virus, the cause of the disease, is present in the blood, the discharges from the mouth, nose and eyes and the dung and urine of an affected animal and as infection usually occurs through the digestive tract, i.e., the virus is taken in through the mouth, it will be readily understood that there are many ways by which the disease may be transmitted from one animal to another.

The disease in the majority of cases is spread by a healthy susceptible animal coming into contact with a diseased one. The diseased one contaminates the ground, foodstuff or water-supply by the discharges which contain the virus and this virus is taken into the system of the healthy animal through the mouth. Therefore, owners of sick animals should isolate them as far as possible and not allow them to mix with their own or their neighbours' animals. Actual contact of a diseased with a healthy animal is not necessary in all cases. The virus may be conveyed from the diseased animal to a healthy one in many ways, such as on the feet or cloths of persons, on hay, straw or other foodstuff, on buckets or other utensils used for watering or feeding animals, on the feet of small animals like the dog or by birds; but as already stated the virus under those conditions does not live long, probably not more than three days.

Therefore, to prevent the spread of rinderpest the following measures should be carried out as far as possible:—Isolation of the affected animals. The litter and droppings should be burnt and everything else such as ropes, clothes, feeding utensils, etc., which there is reason to suspect have been contaminated by the discharges should either be burnt or disinfected with some disinfectant, such as phenyle, whichever is found more suitable.

Ryots of neighbouring villages should avoid taking their animals to the affected village or going there themselves until the disease has subsided. They should try to prevent animals coming from the infected place and entering their own village. If it is necessary for a man to go to an infected village he should avoid taking his cattle or bandies into the village and should prevent his animals from coming into contact with animals of that village as this is the surest way of their getting the disease.

L. No. 4-2

They should not be allowed to graze or water at the same places where animals from the infected village are sent. The owners of healthy cattle when they have to go into an infected village should avoid going near diseased animals as they may become soiled with the discharges from them and carry the disease to the healthy ones. If anything becomes soiled with the discharges from a diseased animal it should not be allowed to go near the healthy cattle for at least three days and during that time the contamination should be removed by washing with disinfectants like phenol, and exposed to the sun.

Rinderpest is commonly introduced into a village by the return of animals which have been sent away for a season to distant parts for grazing. In these jungly parts cattle from many places will be gathered together and if rinderpest exists in one village from which these animals have come the disease will be spread by the animals of that village to the others which graze over the same country. Therefore when cattle return to a village from grazing it is advisable and very necessary to isolate them for ten days from the rest of the cattle in the village in order to see if any of them are going to develop rinderpest.

This method of isolation should also be adopted when animals return from a fair or from another village where rinderpest is known to exist or at any other time that the owner has reason to suspect that his animals may have become infected with rinderpest.

Another way by which rinderpest may be introduced into a village is by a travelling herd of sheep and goats. These animals may suffer from the disease, although it usually attacks them in a mild form, but it is possible for them to pass the disease on to cattle and buffaloes and so care should be taken not to allow the cattle to come into contact with a herd of sheep and goats about which nothing is known.

If the disease breaks out in a village, the diseased animals should be isolated at once and all precautions taken to prevent the disease spreading. The matter should be reported to the munsif or village headman. He will report to the Tahsildar who will forward the information to the nearest Government Veterinary Assistant Surgeon, who will then visit the affected village at the earliest opportunity. Nobody should be allowed to visit the sick animal except the attendant and he should not be allowed to come into contact with healthy animals. Plenty of water should be allowed and gruels made of well-boiled rice or linseed meal with milk if obtainable and some salt should be offered to the sick animal every three or four hours. In the early stages of the disease an oily aperient as half a bottle or two ollocks of linseed or castor-oil may be given and later half to one ollock of arrack and half a tola of powdered ginger may be mixed together and given every four hours in a bottle of gruel. The animal should

be made as comfortable as circumstances permit, given a good bed of straw and protected from the heat of the sun during the day-time and clothed at night if necessary.

If the animal dies, the carcass should be burnt or buried without removal of the hide and all other precautions taken to prevent the disease spreading. Otherwise the disease may spread rapidly and many animals may die before the Veterinary Assistant Surgeon arrives as he may have many reports to attend to.

It is probably well known to owners of cattle that if an animal is attacked by rinderpest and recovers it will not suffer from that disease again, in other words, it is said to be protected for life against that disease. As rinderpest is always with us in this country animals which are protected for life against it are obviously a great asset to a ryot for they will continue to do their work even when the village is being visited by rinderpest and other men's cattle are either sick or dead from the disease.

This protection or immunity against rinderpest is the result of a reaction on the part of the tissues which elaborate certain properties or anti-bodies which are found in the blood serum. The serum of such a recovered animal containing the so-called anti-bodies can be used and is used to protect susceptible cattle by subcutaneous inoculation but the immunity only lasts for nine days and therefore it would be necessary to inject the serum every nine days while the danger of contracting the disease remains. This is the so-called serum alone method of inoculation which has been discarded now in favour of the serum simultaneous method. In this latter method serum from a recovered animal is injected subcutaneously into a healthy animal and at the same time a small dose of virulent blood is also injected, i.e., blood withdrawn from an animal at the height of an attack of rinderpest during the most febrile period of the disease. If the animal were inoculated with the virulent blood alone it would contract a severe, probably fatal form of the disease, but this is kept in check by inoculating serum at the same time which protects the animal immediately to such an extent that no outward signs of the disease are seen. As a result of this injection the tissues respond by elaborating anti-bodies in the same way as when an animal recovers from a natural attack of the disease and it gets protection or immunity against the disease for years or in some cases for life.

The inoculation is perfectly safe and all Government Veterinary Assistant Surgeons are capable of doing it. When a Veterinary Assistant Surgeon arrives at the affected village he has the serum with him but has to indent on the Madras Veterinary College for the virus. When it arrives he is ready to begin his work and it is hoped that ryots will take advantage of this method of inoculation and bring their animals forward for inoculation especially when rinderpest is prevalent in their village or in surrounding villages. When the animals are inoculated the

owners may feel perfectly safe that rinderpest will not affect the inoculated animals. Many cattle-owners from experience know the advantages of this method of inoculation. They have seen in villages where rinderpest was prevailing that the uninoculated animals have died whereas the animals that were inoculated by the serum simultaneous method have lived.

Further information on this subject of rinderpest can always be obtained by writing to the Director of Veterinary Services, Madras, or from the Veterinary Assistant Surgeon when he visits a village to inoculate animals and it is hoped that the ryots will give him all the assistance they can as by so doing he will be able to visit other villages sooner where rinderpest is prevailing and animals are waiting to be inoculated.

MADRAS,
11*th April* 1940.

T. J. HURLEY,
Director of Veterinary Services.

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[LEAFLET No. V.] 30,000—1-2-1936.

CIVIL VETERINARY DEPARTMENT, MADRAS.

HÆMORRHAGIC SEPTICÆMIA.

This is another very important contagious disease of cattle in this Presidency, for it is probably the cause of more deaths among them than any other complaint except Rinderpest.

Owing to the way in which it usually affects cattle in this country it is often called ' Malignant sore throat.' Buffaloes are more liable to this affection than cattle owing to their greater liking for water and swamps and because it appears to attack buffaloes more frequently than ordinary cattle it used to be called ' Buffalo disease ' in Europe.

In addition to buffaloes and cattle, this disease also attacks flocks of sheep, herds of wild deer, and cases have occurred in the horse and the elephant. As far as we know, it never occurs in man. There is no doubt that in the past many cases of this disease in cattle have been mistaken for other diseases, particularly Anthrax, which it is often very like, and endeavours will therefore be made in this leaflet to explain how it can be distinguished from them.

The micro-organism which causes Hæmorrhagic Septicæmia lives naturally in the soil, particularly in damp marshy places, around tanks, and in land which is not properly drained, and the disease is therefore more likely to occur after rain, when the soil is softer than usual and more easily churned up by animals walking on it.

The organism is usually taken into the animal's mouth on the grass or in the water when feeding or drinking in such places, and it gets into the blood through wounds inside the mouth, or in the gullet, stomach or gut. These wounds may be old ones which exist there or caused at the time of taking in the poison by eating a piece of hard prickly-forage or they may be the result of such things as shedding of the teeth in young animals.

As the animal's throat is the part which is usually most severely affected in cattle, it is thought that the organism generally enters by wounds in that part.

It is also believed that infection may take place through wounds in an animal's feet or legs, or be conveyed from a diseased animal to a healthy one by biting insects. Young animals seem to be more often attacked than old ones, and this may be due to the fact that young ones are more likely to have wounds in their mouth than old ones, or it may be that many of the older animals in a herd have had an attack when young, recovered from it, and so do not get another attack.

The poison appears to attack cattle in three different places, viz., the throat, the lungs, and the intestines.

In this country the throat form is the commonest in cattle, but it is often associated with the intestinal form, and again some animals may suffer from the combined lung and intestinal forms of the disease. This difference in the symptoms shown often makes diagnosis difficult, but an attempt will be made to describe a typical case as seen in this Presidency.

An animal is found obviously ill, disinclined to move with the herd, off-feed, shivering with a staring coat, dry hot muzzle, hurried breathing, and if a cow, will give no milk. If the temperature is taken it may be found to be as high as 108° F. A little later dribbling of saliva from the corners of the mouth may be noticed and if the animal's throat is examined it will be found to be painful.

In a few hours more alarming symptoms will be observed. The animal's throat, space between the jaws, dewlap, and sometimes even the neck and fore-limbs become considerably swollen. This swelling is hot, tense, and painful, and so is quite different to a Black-quarter swelling, which is usually confined to one of the limbs, becomes cold in the later stages and crackles when pressed with the fingers.

When the swelling of the head appears the lining membranes of the eyes, nostrils and mouth becomes dark-red in colour and may have blood spots on it, the tongue also becomes very red and swollen and may hang out of the mouth, a sticky saliva constantly runs away from it, the animal is unable to swallow and may have a suffocating cough, breathing is difficult and may become so noisy as to be heard at a distance; eventually the animal dies from suffocation. Before death it may suffer from colicky pains showing that the poison has invaded the intestines also. It will stand up and lie down alternately, move the hind feet uneasily, groan and strain when passing fæces, which will be hard and glazed at first, but later they will become watery and may contain blood and pieces of the lining membranes of the bowels. Cases of the kind described are nearly always dead within two days, but the attack is often much shorter even than this.

It is said that some cases do not last for more than six hours and so an animal, which was healthy the previous evening, may be found dead from this disease in its stall in the morning. It is these very acute cases which are so difficult to distinguish from Anthrax, for in both diseases we may find a swelling of the throat, and a bloody discharge from the mouth and anus, after death. As it is not possible to make sure which disease it is without examining the blood under a microscope, it is best to treat the carcasses of cattle which are found dead or die very suddenly as cases of Anthrax, and bury them whole, if no professional aid is at hand. As will be described later in a leaflet on Anthrax, this is very necessary because human beings can contract Anthrax and die from it.

If the carcass of an animal, which has died of Hæmorrhagic Septicæmia after showing the symptoms described above, be opened it will be found that the swelling of the head and neck is due to thickening of the skin and the collection of a large amount of a yellowish fluid, in which will be found numerous 'hæmorrhagic' or blood spots, in the tissue immediately under the skin.

In the carcass of an animal which has passed through all the symptoms described, these blood spots will also be found on the lining membrane of the throat, lungs and heart, and on the outside of the intestines as they lie in the abdomen, but when the attack has been a very sudden one they are often absent altogether. Nearly all cattle which have died suddenly of Hæmorrhagic Septicæmia show a collection of the yellow fluid under the skin of the head and neck, but, as stated above, this is also sometimes found in cases of Anthrax. If the case is one of Anthrax, however, the blood will be found to be like tar and the spleen will be very enlarged, so that if these things are noticed no further cutting should be done but the carcass should be closed up as well as possible and buried or burnt immediately.

When the poison of this disease attacks the lungs, the animal, in addition to showing the usual signs of fever, will stand with its legs apart, back hunched, head extended, and nostrils dilated; it will have a painful cough and in fact show all the signs of a severe inflammation of the lungs. At the same time it may also show the same signs of intestinal trouble as were described before.

Young animals may die from the lung form of the disease in a few hours, but usually it takes longer to kill an animal than the throat form does, and may last as long as eight days. If the lungs are examined after death a large quantity of the same yellowish fluid will be found both in the lung vessels and in the lung cavity, and if the attack has lasted for several days patches of the lungs may be found thickened and perhaps containing a material like cheese.

When sheep are attacked by Hæmorrhagic Septicæmia they usually suffer from the combined lung and intestinal forms, but the disease does not kill old sheep as quickly as it does cattle as a rule. It affects lambs, however, more than older sheep, and may cause many deaths among them when they are weak and in poor condition, as for example during the lambing season and when they are being weaned.

The lung form of Hæmorrhagic Septicæmia is not likely to be mistaken for any other contagious disease of cattle and sheep in this country, but very often it is thought to be ordinary pneumonia and its contagious character not realized at all. Several such cases occurring in a herd or flock, however, should make an owner suspicious.

The mortality from this disease is very high; sometimes as many as 90 per cent of the animals affected die from it, so that this, together with the fact that it usually runs a very rapid course

in cattle, makes treatement of affected animals difficult and seldom of any use. Small doses of antiseptics like Carbolic acid ($\frac{1}{2}$ to 1 dram) and Phenyle ($\frac{1}{2}$ to 1 oz.) well diluted with water have been tried, but it is usually impossible to drench the animal.

Our attention therefore should be directed towards preventing its spread among the other animals in the herd, and it is fortunate that we can do this if we remember where the poison is to be found. When an animal is suffering from this disease it is passing out the poison in its saliva, fæces, and urine, so that it should be isolated at once and all its droppings carefully collected and burnt. When the animal dies it should not be opened, for its blood contains the causal organism in large numbers, but it should either be burnt or buried in lime at a depth of six feet. After putting the carcass into the hole its hide should be slashed with a knife to prevent chumars digging it up again and removing the hide. If the carcass is opened before burial the ground on which it was lying should be removed and burnt or buried with it. The walls and pillars of the stall it was in should be scraped, and if the floor is an earthen one about two inches of it should be removed, and all this refuse should be burnt with the carcass, together with any ropes, feeding baskets, etc., used by the dead animal. The walls and pillars of the stall, and the floor if a stone one, should then be well washed down with a solution of Phenyle and afterwards given a coating of limewash. If the roof is a thatched one it would be a good thing to remove this and so let sunlight into the stall, which should not be used again by a healthy animal for a month. If affected animals are not isolated they are a source of danger to other animals, as the disease may be conveyed directly from one to the other by means of insects, and if the carcasses of dead animals are not disposed of in the way described, but are skinned and the blood split, the piece of land on which this happens will be infective to other cattle, and if any of the carcass is removed by men, dogs, or jackals the disease will be carried wherever the flesh is taken. It is necessary to burn carefully all the droppings of an affected animal, for if thrown on the land other animals may pick up the poison in their food or water, and if it happens to be raining at the time the poison may be spread over a large area of country through the water. If it is found that in spite of these precautions being taken cases of this disease continue to occur in a village, it is probable that the animals are grazing over a piece of heavily infected land, for which a search should be made. At the same time the village munsif should report the outbreak to the Tahsildar, who will send a Veterinary Assistant Surgeon to help the ryots to stamp it out.

Enquiries should be made to see if the animals which have recently died of the disease were taken for grazing to any piece of low-lying marshy land, or over a place where animals, which died of the disease in a previous year, were opened or buried, or to a field on which manure has been spread, or to drink at a tank into which a drain from a cattle stall runs.

If so, a change in the grazing and watering places should be made at once if possible.

In many villages, however, this is not possible, and also it may be impossible to point to any particular piece of land or water as being the source of infection, but the Veterinary Assistant has the means of preventing further attacks of this disease by inoculating the animals with a serum, like the serum used against Rinderpest. This serum does not prevent bullocks being worked nor does it put cows off their milk, but it prevents all those inoculated from contracting Hæmorrhagic Septicæmia for about four weeks, even though they are sent at once to graze over a contaminated area, or come in contact with animals actually suffering from the disease.

Some ryots, being wiser than others, may know of a piece of land which always gives Hæmorrhagic Septicæmia to the animals which graze over it, or they may live in a village which is often attacked by Hæmorrhagic Septicæmia at certain seasons of the year, and they might like to have their cattle protected against such attacks before they send them to graze over the infected area, or before the bad season actually begins. The Veterinary Assistant Surgeon can inoculate cattle in such cases with a vaccine, which will protect them against Hæmorrhagic Septicæmia for at least four to six weeks, and this form of protection is recommended to all large cattle-owners who are troubled every year by this disease. The vaccine is made from a dead culture of the serum and is therefore perfectly safe for vaccination.

MADRAS,
8th January 1936.

P. T. SAUNDERS,
Director of Veterinary Services.

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CIVIL VETERINARY DEPARTMENT, MADRAS.

Anthrax.

Anthrax is a rapidly fatal disease of all animals and it is brought about by the particular micro-organism which causes the disease getting into and multiplying very quickly in the blood of an animal.

Owing to the fact that the Anthrax micro-organism is most commonly found on the ground the animals which are most often attacked with this disease are those which graze, viz., cattle, buffaloes, sheep, goats and horses, and wild animals like deer and bison. Cases have also occurred in camels and elephants. If dogs, cats or pigs get the disease it is usually through eating the flesh of another animal which has already died of Anthrax.

A man might contract the disease in the same way by eating the uncooked flesh of an Anthrax carcass, but it affects man more commonly in the form known as "Malignant Pustule."

In this form of the disease the micro-organisms gain access into the human body through a cut or abrasion, as they might for example when a man who is skinning an Anthrax carcass has a small wound on his arm. The result is a very sore place or pustule on the man's arm and if this is not treated at once by a doctor, the micro-organisms will get into the blood and the man will die.

Another common form of the disease in human beings in England and other countries dealing in wool is known as "Wool-sorter's disease." It is supposed that these cases occur because the wool being dealt with was removal from an animal which died of Anthrax and when the wool is shaken the dust containing the dried micro-organisms is inhaled by the persons at work. From the above it will be understood that Anthrax is a disease about which great care should be taken, for it is very liable to attack human beings, and it is for this reason that it is a criminal offence under sections 269 and 270 of the Indian Penal Code for anyone to open the carcass of an animal which he knows to have died of Anthrax.

In cattle and buffaloes, sheep and goats the disease usually runs such a rapid course that the affected animals are not seen to be ill but are found dead. It is not uncommon to hear that a healthy animal went out for grazing in the morning and was found dead in the fields in the evening, or that one came back from grazing in the evening looking quite well and was found dead in the morning.

All such cases should be suspected for Anthrax, more particularly if the carcass is very bloated, with the rectum protruding and blood-stained discharges escaping both from the rectum and the mouth and nostrils.

If one happened to be present when one of these animals is first attacked with acute Anthrax, the first thing noticed is a shivering fit, the temperature then soon jumps up to 106° and above, the horns and other extremities become cold, rumination stops, the eyes are red, and breathing is difficult. Usually some abdominal pain is shown, and dung stained with blood may be passed.

The abdomen now begins to swell, the breathing becomes worse, and blood may be seen at the nostrils. Very soon the animal staggers, and may die in convulsions in 2 hours from the first onset of symptoms.

Occasionally in cattle we have less acute cases of Anthrax, and in these cases the animal will show the same symptoms as those described above spread over a longer period, i.e., the animal may live for more than 24 hours, but in addition it will probably have a swelling of the throat very like that seen in Hæmorrhagic septicæmia. As stated in leaflet No. 5 on Hæmorrhagic septicæmia in these cases the only certain method of finding out with which of the two diseases we are dealing is by examining some blood with a microscope after the animal has died, so when this is not possible all doubtful cases should be treated as Anthrax and the carcass buried whole.

When Anthrax attacks horses it does not kill them so quickly as it usually does cattle, sheep and goats.

The symptoms of Anthrax in the horse are very high fever, red eyes, pain in the abdomen and the same kind of swelling in the throat and neck as is sometimes seen in cattle.

It is fortunate for stock-owners that Anthrax is not easily caught by one animal from another as Rinderpest is. As stated above the micro-organism of Anthrax is most commonly found in the soil and is taken in with the grass, so that usually only one animal in a herd at a time picks it up when grazing and dies, although if the grazing land is heavily infected several animals may die in the course of a few days.

Another source of infection is from contaminated fodder, such as straw, oil-cake, etc., and if several animals are being fed from such food, they may all be attacked with the disease within a short time. Sometimes it happens that a case of the disease occurs amongst a herd of animals in a confined space as for example in a railway truck or boat and then many deaths may be expected owing to the other animals in the herd coming in contact with the discharges from the **first** case.

It is now necessary to explain why it is so important that the carcass of an animal which has died of Anthrax should not be opened, apart from the danger to human beings referred to above. It has been said that the micro-organisms of Anthrax are found

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in the blood of the affected animal, and if a carcass containing them is burnt whole, the micro-organisms in the blood will be destroyed completely.

If however the carcass is opened and the micro-organisms are exposed to the air they change their form and are then able to resist ordinary disinfectants and are not killed by heat and cold, unless it is extreme. They are now called " Spores " and it is in this form that they are found in the soil, food-stuffs, etc., but when they get into an animal's body again they return to their old active form and begin to multiply.

It will now be understood how it is that the soil in this country so commonly contains Anthrax spores. When an animal dies in a village it is the custom to hand the carcass over to a chamar for disposal, whether the animal died of a contagious disease or not. **The chamar** skins it in the most convenient spot, and while doing this spills its blood and discharges on the ground around. If the animal died of Anthrax this means that that piece of ground will harbour Anthrax spores for many years to come and will therefore be a continual source of danger to animals grazing over it. Not only this but pariah dogs, jackals, vultures, etc., may remove portions of the carcass for some distance and infect other pieces of land.

In the case of birds they will not be attacked by Anthrax themselves, but Anthrax spores will pass through their body uninjured and infect the land on which they happen to drop their fæces.

The correct way, therefore, to dispose of an Anthrax carcass is, if possible, to burn it in the exact place where it is found. If this is not possible, its natural openings should be plugged with tow, wool or pieces of cloth soaked in some disinfectant like phenyle, to prevent any discharges from being spilt while it is **moved, and** it should then, together with all litter, dung, contaminated soil, etc., be taken to a suitable place and burnt just as it is.

If sufficient **wood** for burning is not available, it should be buried whole 6 feet deep and covered with lime before returning the soil.

If an animal dies of Anthrax in a shed, truck or other covered structure, 6 inches of the floor should be removed and burnt, if it is removable, and thorough disinfection with strong phenyle of the other parts should be carried out several times before another animal is put in the same place.

If the carcass had been opened it would be best to burn a fire on the floor of the shed, truck, etc., so as to try to destroy the spores by great heat.

It sometimes happens that the carcass of an animal which has died of Anthrax is opened by mistake, but this should be early

recognized by the appearance of the blood and spleen. The blood is like tar, i.e., it is very dark in colour and does not clot, and the spleen is very much enlarged.

If these conditions are found the carcass should be immediately closed up again and disposed of as far as possible in the manner described above.

In a case of Anthrax occurring in a byre, the temperature of all the cattle should be taken before each milking for a week or 10 to 14 days after the occurrence of the last case. Milk from any animal with high temperature should be discarded, and must not be mixed with other milk but must be sterilized and the utensils must be sterilized also.

As regards the treatment of Anthrax it will be readily understood that this is of little avail. Usually there is no time for it, and even in the less acute cases the mortality is very high and we know of nothing which will act as a cure.

All we can do is to try to prevent further cases occurring, not only at the time but at all future times, and this we can do by disposing of the carcasses without opening them, for the reason given above.

A serum, similar to those used against Rinderpest and Hæmorrhagic septicæmia, is available for use against Anthrax and may be obtained through the nearest Veterinary Assistant Surgeon, and its use is recommended when, owing to several cases of the disease occurring in a herd, the food-supply is suspected, or when animals in a confined space are exposed to infection.

MADRAS,
11*th April* 1940.

T. J. HURLEY,
Director of Veterinary Services.

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LEAFLET No. 7.

CIVIL VETERINARY DEPARTMENT, MADRAS.

Black-quarter.

Black-quarter or quarter-ill is an infectious disease of cattle characterized by the appearance of a rapidly increasing swelling containing dark decomposed blood and gases in the region of the quarter, shoulder, neck, breast or side. The disease occurs in almost all parts of the Presidency but is comparatively more prevalent in dry arid tracts than in wet deltact areas. It does not appear in any particular season though outbreaks are more common in some parts of the year than in others.

ANIMALS LIKELY TO BE AFFECTED.

It is most frequent in young and rapidly growing cattle ranging from six months to three years of age and only a few cases are met with among cattle below six months and above three years of age. Occasionally buffaloes and sheep are attacked; the deer, pig, cat and camel do not suffer from the disease as a rule; no case of the disease in the horse or pig has been reported in this Presidency.

HOW THE ANIMALS GET THE DISEASE.

The common method of infection in naturally occurring cases is by ingestion, but, it is possible that infection through wounds is, perhaps, as common as infection by ingestion. The disease is not contagious and is not communicated by actual contact from animal to animal; the infection is from the soil.

CAUSE.

The cause of the disease is a small rod-shaped micro-organism which lives and multiplies in the soil. In an infected animal, the organism is confined to the diseased parts and is seldom present in the blood circulation. The germ does not easily die; but remains

alive for an indefinite period in deep stiff dry soil where the sun's rays cannot penetrate to destroy it. It can be killed by certain chemical agents of definite strength, but neither putrefaction nor severe cold has any appreciable injurious effect on it.

Period of incubation.

By this is meant the time that elapses between the introduction of the organism into the body and the appearance of the symptoms of the disease. It varies from one to three days. In exceptionally severe cases it may be a few hours.

Symptoms.

In a rapidly fatal case the symptoms escape notice during life, as the disease sets in suddenly and runs its course so quickly that the animal is found dead in the grazing field. In such a case, evidence of the disease is furnished by the appearance of a swelling of the character described above, in some part or parts of the body of the animal. In some cases, however, the disease is not so rapidly fatal. The symptoms usually observed are dullness, loss of appetite, disinclination to move, with lameness if forced to do so, high temperature, from 104° to 107° F, anxious expression, pulse and respiration are accelerated and there is arching of the back, and tremors. On handling the region, a swelling, varying in size according to the extent of the lesion, may be felt under the skin. The swelling is hot and painful, increases rapidly in size and crepitates on pressure, and later the skin over the swelling becomes cold and painless, crackling like thick parchment. As the disease progresses, breathing becomes markedly laboured, body-temperature falls below normal, pulse slow and weak and the animal is unable to move or raise and dies in a comatose condition. The disease is very fatal.

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When the swelling is opened, a dark-red frothy fluid escapes giving off the smell of rancid butter. The affected muscular tissue which is dark-red in colour presents rather a dry-looking and porous appearance.

Course.

This ranges from twelve to forty-eight hours and occasionally may be three to four days.

Treatment.

As in most other deadly forms of cattle disease met with in this Presidency there is no specific medicine or curative treatment for this disease. Some cases, however, do respond to treatment by the administration of internal antiseptic such as carbolic acid, iodine, etc. A tea-spoonful of acid carbolic may be given mixed with a pint of linseed oil. Subcutaneous or intravenous injection of iodine may be tried but this requires the help of a professional man. The swelling may be cut or scarified and saturated solution of potassium permanganate may be applied. After recovery, nourishing food should be given to enable the animal to pick up strength, as well as tonics, and the diseased parts should be treated.

Prevention.

This is of considerable importance because outbreaks will assume serious proportions if not checked in time. A great deal can be done to prevent outbreaks of the disease in infected areas by deep ploughing, drainage, etc., but these measures are not easily applicable to the extensive rural areas of this country. The sick animals should be isolated and carcasses should be either burnt or buried without skinning, at a depth of not less than six feet with plenty of quick lime, in an unfrequented spot. These precautions

alone will not ensure freedom from loss of susceptible young stock in a Black-quarter area. It is necessary to protect the young stock against the disease by means of protective vaccination (seroaggressin vaccination) against this disease which has recently come into vogue in this Presidency. This method of protecting susceptible cattle in Black-quarter areas has become popular on account of its proved efficacy. Further particulars regarding protective inoculation may be obtained on application from the Touring Veterinary Assistant Surgeon or District Veterinary Officer concerned. As soon as an outbreak occurs, the matter should be immediately reported to the Tahsildar or to the local Touring Veterinary Assistant Surgeon so that prompt action may be taken to combat the outbreak, and also for conferring protection beforehand.

Public Health.

A carcass of an animal dead from this disease should not be passed for slaughter. Though the disease is not communicable to man the meat obtained from an animal suffering from the disease is unwholesome and unfit for human consumption.

P. T. SAUNDERS,
Director of Veterinary Services,
Madras.

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Leaflet No. 8.

CIVIL VETERINARY DEPARTMENT, MADRAS.

FOOT-AND-MOUTH DISEASE.

This is an acute and highly contagious and infectious disease affecting chiefly cattle, buffaloes, sheep, goats and pigs though all other domestic animals, human beings, hedgehogs and guinea pigs and rats and elephants are also susceptible. It is characterized by the presence of blisters or vesicles on the lining membranes of the mouth and tongue, and on the skin of the space between and above the hoofs and also on the udder and teats in milch cows. It is a rapidly spreading disease.

Cause.

The casual virus of the disease is found in the blood during the early stages of the disease and in the lesions of the affected animals. The disease passes from one affected animal to the other and the virus or poison of the disease from one species is capable of producing the disease in animals of a different species. When the vesicles or blisters of the mouth rupture the contents of them escape with the saliva rendering it highly infective. During the first few days it is also present in the milk, urine, internal organs and bone marrow but it disappears from them subsequently as from the blood.

Period of incubation.

This means the time that is taken between the introduction of the virus into the system and the appearance of symptoms. It varies from 36 hours to 6 days.

Period of immunity.

This indicates the period to which an animal that has recovered from the disease is protected from a second attack. One attack of foot-and-mouth diease generally protects an animal against further attacks for at least one or two years. But occasionally, in some places cattle may have two or more attacks of the disease within a few months. This is due to the fact that there are at least three distinct types of virus and that each of them is capable of producing a fresh attack of foot-and-mouth disease even though the animal had already suffered from the disease on account of another type of the virus. But, however, it is observed that the subsequent attacks are generally milder in character.

Source of infection.

A knowledge of this is important for the stock owner. Though the living affected animal is mainly responsible for the spread of this disease in an outbreak, the infection may be carried through several sources such as contaminated fodder, litter, feeding utensils, water troughs and infected milk. Attendants, milkmen, dogs, cats, hedgehogs, guinea pigs, fowls, rats, birds, mice and flies are also other possible carriers. Common grazing areas, cattle-sheds, railway carriages when they are infected by animals suffering from the disease, are fruitful sources of infection for healthy cattle getting in. Flocks of sheep and droves of cattle, and cattle dealers

going along the cattle routes of this Presidency from one cattle fair to the other when the routes have been traversed by sick cattle are yet other sources of infection and transmission of the disease from one end of the Presidency to the other. The carcasses of animals that have been killed during the infective period may contain deposits of active virus for long periods after they have been subjected to various pickling processes or when they have been kept at low temperature. Pigs can become infected by feeding on parts of such carcasses, especially on crushed bones. Thus, the transportation of infected meat or offals in the chilled or frozen state also forms another means of carrying the infection from place to place.

Symptoms.

The first noticeable symptoms are those of fever, viz., rise of temperature, dry muzzle, dullness, depression, shivering, hairs of coat standing on end, loss of appetite, and rumination (i.e., chewing of the cud) is wholly or partially suspended. There is also slight constipation. In about two days after the appearance of the above symptoms, a peculiar smacking of the lips and dribbling of saliva from the mouth will be observed when, on examination of the mouth, a general redness of the lining membrane of the mouth and small blisters on the point, surface and sides of the tongue and sometimes on the gums and inside of the cheek will be revealed. There may be constant shaking and kicking of the hind limbs as if something is stuck there and tenderness of the feet and stiffness of the limbs and lameness. There is heat and pain above the hoofs and also the space between them before and behind and vesicles may be seen in these places also. The blisters in the mouth are at first of the size of a pea or even smaller. These become larger and burst and leave eroded or raw surfaces which become ulcers. Sometimes these erosions join together and become larger ulcerated sores. When the vesicles in the mouth and feet rupture, the fever disappears. In some cases, the mouth lesions alone are seen, the feet being free. In some, the ulcers at the feet become infected with maggots and in very severe cases, the hoofs separate from the living structures within and above and the ulcers then become very serious. The base of the horns and the horn core are affected in some cases and the outer sheaths of the horn are shed. In cows the vesicles are seen sometimes over the udder and teats and in milch cows the milk-yield becomes either greatly decreased or completely arrested; the milk becomes thin, somewhat slimy, throws down sediment if kept in a vessel and coagulates on boiling. The vesicles over the udder and teats rupture and ulcerate. Young and weak animals succumb to the disease if they are not carefully nursed. Neglected cases become fly-blown at the angles of the mouth and nostrils and on top of the space between the hoofs. Though the disease is not fatal to strong adult plains-cattle in this Presidency it causes great inconvenience and loss to the farmer by rendering his animals unfit for work and decreasing his milk-supply for some time and weakening their constitution. In sheep and goats the symptoms are more or less similar. In these, the

foot lesions are more common and it will be observed that affected animals will be crawling on their knees on account of ulcers and pain in their feet.

Course of the disease.

Mild cases that are not attended with any complications run a course of 8 to 15 days. When even mild cases are subject to unfavourable conditions such as dirty, insanitary cattle-sheds, wet weather, long tiresome walks during illness without rest, as is occasioned when cattle are driven from one cattle-fair to the other, improper treatment by quacks and want of careful nursing, the disease becomes aggravated and serious and takes a longer time to cure, depending upon the nature of complications such as fly-blown conditions, hoof or horn sheddings, undue loss of condition and tendency to mammitis (swelling of the udder).

Treatment.

Perfect cleanliness of the sick and its surroundings and absolute rest for the patient are essential. The floor of the cattle-shed should be kept dry and clean. As most of the cattle-sheds in this Presidency are not provided with pukkah flooring, the soiled portion of the mudflooring may be replaced then and there with dry sand or sawdust and the floor sprinkled with dry disinfectants such as washing soda, quick-lime or bleaching powder. Pakka floorings, other fittings in the byre and utensils may be washed clean with any disinfectant solution, preferably a four per cent solution of washing soda in hot water at 140° F. One dram of alum (patikaram in Tamil) which is available even in village bazaars may be dissolved in a measure of clean drinking water and the solution used for washing the sores in the mouth, udder and teats. The wounds in the feet may also be washed with the same fluid and dressed with equal parts of country tar and coconut oil adding to it a little powdered copper sulphate (mayilthutham in Tamil) or with margosa oil or the tender margosa leaves ground into a fine paste. In case alum is not available, decoction of babul bark may be used for gargling the mouth and washing the ulcers elsewhere and when maggots are present in ulcers a fine paste of custard apple leaves may profitably be applied over the affected part. This has the effect of killing the maggots. Attacks from flies should be prevented by keeping the sores clean and dry and free from shreds of dead tissue as otherwise the sores would get fly-blown. In an outbreak of the disease where a large number of animals have to be attended to any disinfectant solution such as phenyle or cresol (1 in 100) may be made and either sprayed or poured on the feet of the affected or a foot-bath of this solution can be made by devising to stagnate the solution on a masonry floor for a depth of about six inches and allowing all the animals to pass through twice or thrice daily for some time. Individual attention will be necessary to all milch cows, sucking calves and old debilitated animals. These should be carefully nursed. The sucking calves shoud be removed from the mother and hand-fed. Milk of a diseased animal should not be used. Rice conjee with a little

common salt may be given to all those that are unable to feed on account of sores in the mouth. Very bad cases may, according to their age and size receive 5 to 30 drops of carbolic acid in one measure of rice conjee daily for the first two or three days. The local plains-cattle do not as a rule get severe attacks of the disease, but hill animals and foreign cattle are very severely affected and it will be necessary to treat these carefully paying individual attention. Isolation of the sick, separate sick sheds and other precautionary and preventive measures will be highly necessary in the case of these. Sores on the udder and teats of milch cows should be kept clean and dressed with boric ointment and any tendency to mammitis should be warded off.

In mild outbreaks it has been found better to mix both the sick and healthy in a herd and make all of them get the disease either by trying them all together in the same shed without segregation or by smearing the saliva of an affected animal on the lips of all the healthy ones and thereby making the whole herd get the disease at one and the same time so that the outbreak might be over as soon as possible and the farmers' work might not be dislocated for a long time.

General remarks.

Although this disease is so well-known to the ryots, it does not as a rule receive the consideration it deserves at their hands. Because it is not a fatal disease, no particular care is taken by them to get proper treatment for the animals affected with it. This disease causes economic loss in diverse ways, viz., cows in milk become dry, pregnant animals abort, working animals become weak and unfit for work for long periods, and in some bad cases permanent deformity to the feet may result. It is therefore necessary for cattle owners to pay prompt and particular attention when an outbreak occurs and this is best accomplished by asking for the services of the nearest Veterinary Assistant Surgeon.

Public health.

Man is liable to infection through scratches or wounds coming in contact with sores in the mouth, udder or teats or with the virus of the saliva, or through ingestion of milk from an affected animal. It is said that ingestion of infected milk produces headache, nausea, vomitation, diarrhœa and vesicles on the lips, mouth, nose, etc. Milk from an affected animal should not at all be used for infant's consumption, as children are highly susceptible to this disease and in them the disease is said to bring in fatal results. Milkmen and attendants should be careful to wash their hands in some disinfectants or to cauterize scratches of wound in their hands immediately after milking or attending to a sick animal.

The carcass of an animal that has died of this disease is unfit for human consumption.

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T. J. HURLEY,
Director of Veterinary Services.

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CIVIL VETERINARY DEPARTMENT, MADRAS.

Surra.

The word 'Surra' is derived from a Hindi word meaning 'dried up' or 'rotten,' and is the name given to a disease of animals in India which is characterized by intermittent fever, anæmia, emaciation and in many cases death.

The cause of the disease is a minute whip-like animalcule known as a Trypanosome, which lives in the blood of the affected animal and it is transmitted mechanically from animal to animal by various blood sucking flies, chiefly those belonging to the genus Tabanus (Horse flies). The disease is therefore likely to spread rapidly during the fly season, i.e., from June to September, but cases may be found any time of the year. The parasite causing Surra resembles very much the Trypanosome causing Human Sleeping Sickness in East Africa, but Surra does not affect man.

Surra may affect any of the domesticated animals, but it is most commonly met with in the horse, in which animal it is very fatal. In northern India it is met with in camels, while in the south it is met with in cattle and buffaloes, and occasionally found in the dog and the elephant. The period of incubation or the time which elapses between the bite of an infected fly and the date on which the first symptoms appear, in a susceptible animal is from four to ten days, but in camels and cattle which are more resistant to the disease, the period of incubation may be considerably longer. A short account of the symptoms and course of the disease in each animal is appended.

HORSE.

The disease in horses was nearly always fatal, but treatment can now be given and the animal cured. In a period varying from a week to six months, the infected animals show intermittent fever. It will be dull, off-feed and will have a staring coat during the course of the fever. If the blood is examined by an expert while the temperature is high, it will be found to contain Trypanosomes, the parasites which cause the disease. A constant symptom in horses in the early stages is the presence of small red spots on the membrane of the eye which will probably also look rather yellow. After several attacks of fever the animal will lose condition and later dropsical swellings will appear in the legs, sheath, etc., and eventually the animals will die. Natural recovery in horses is rare and while it remains alive it is a source of danger to other animals in the vicinity. For this reason Surra in the horse is scheduled under the Glanders and Farcy Act, XIII of 1899, under paragraph 10 of which it is incumbent upon the owner or any person in

charge of a diseased horse to give immediate information to an Inspector under the Act, i.e., any member of the Civil Veterinary Department, or if not available, to the nearest police station. On proper confirmation of the disease, the animal will either be treated or humanely destroyed and the owner paid half the value of the animal subject to a maximum of Rs. 100.

Cattle.

Speaking generally, cattle appear to be rather resistant to attacks of Surra, and Trypanosomes may be found in the blood of cattle which are apparently normal. It is therefore important to remember that such cattle are a danger to the community, because the disease may at any time be mechanically transferred by biting flies from such cattle to horses and start an epidemic amongst the latter animals. Though cattle are resistant, outbreaks affecting cattle seriously have occurred from time to time.

Sometimes, however, for reasons that cannot be explained at present, both cattle and buffaloes die suddenly from Surra showing symptoms simulating those of Anthrax. Such animals show a very high temperature, salivation hurried and laboured breathing, later they fall down, and die after kicking and struggling for a short time, as if suffering from a brain affection. In such cases the carcass should not be skinned, but arrangements must be made for blood smears to be taken and sent to the nearest Veterinary Hospital or a touring Veterinary Assistant Surgeon for examination with a microscope. When this has been done, the carcass should be either burnt or buried deep after covering it with quicklime. In some cattle the disease resembles Surra in horses. There is intermittent high fever, dullness, staring coat, loss of appetite, wasting, dropsy between the jaws, in the dewlap and under the belly. These cases are not so fatal and nearly 50 per cent of them may recover. Affected animals can be successfully treated and all Veterinary Assistant Surgeons are capable of carrying it out.

Camels.

The disease usually takes a very chronic course in camels and in the early stages is often difficult to detect. The symptoms are those of fever, anæmia and emaciation and during the attacks of fever which may occur only three or four times in a month, the animal will not graze, but will stand about listless or sit by itself. As the disease progresses, the animal gradually falls off in condition and if it lives as long as three years after contracting the disease it may lose its hump. A few cases may recover naturally,

but most die within two years, a very few only may live as long as four years. As in cattle, the disease can be cured by proper treatment.

Dogs.

Surra does not often occur in the dog, but if it does it is very fatal to it. It usually runs an acute course the animal showing one or two severe paroxysms and then dying. In the less acute cases the temperature will not be high, and to begin with the animal will continue to feed well, but the appetite is soon lost and the animal becomes very depressed, loath to move, and when made to do so, drops his stern and seems to have no control over his hind quarters. A common symptom in dogs is a clouding of the eye. Rarely some dogs may become furious as if suffering from Rabies. Most of the affected dogs become comatose before death.

Dogs may be infected with the disease by biting flies like other animals, but it is thought that they may also contract it through eating the meat of a horse or bullock which has died of Surra.

Elephants.

This disease is uncommon in elephants in South India. The course of the disease in these animals is very much like that in other animals, except that the intermissions between paroxysms of fever which lasts for two or three days, are longer. The animal shows usual symptoms of dullness, is sleepy looking eye membranes are yellow, gradually loses condition and shows dropsical swellings under the jaw, chest and abdomen. The disease runs a long course in elephants and it is believed that a few cases recover naturally. The disease in elephants is called Laharbad in Hindustani in South India.

Treatment.

This naturally falls under two heads, preventive and curative, and as in most other diseases prevention is better than cure. The first essential in preventive treatment is to keep one's herd free from carriers, i.e., animals harbouring Trypanosomes of Surra in their blood. As has already been explained it is incumbent on anyone owning a horse suffering from Surra to report this to the recognized authority, when arrangements will be made for its destruction, and in the case of cattle and other animals affected with this disease they should be segregated or disposed of in some other manner. It is important to keep the latter away from the healthy animals and do all that is possible to keep down the number of stable flies by burning the manure or other refuse daily. The soft bodied ticks which are often found in the crevices or sand

on the floor of stables, are also suspected of conveying this disease and these should also be destroyed. The best way to do this is to wash the floor with a solution of " Sheep dip " or by renewing the top dressing of the floor and making it hard and free from crevices. A blow lamp can be used over crevices in walls and then white-washed to fill them in.

As regards curative treatment, it has been found that Naganol gives satisfactory results.

In amending Rule VIII under Section 14 of the Glanders and Farcy Act of 1899, the Local Government in G.O. Ms. No. 503, Development, dated 1st April 1931, permit the treatment of a horse suffering from Surra. It should be remembered that destruction of such a horse possesses the additional advantage of eliminating a source of infection to other animals unless the value of the horse is such as to compensate the cost of treatment.

Animals that have died of Surra must be burnt or buried, for dogs and jackals may contract a disease by eating the meat of these and thus act as foci of infection to other animals. Any person having reasons to suspect that he has Surra amongst his animals and requiring further advice on the subject should apply to the nearest Veterinary hospital or Veterinary Assistant Surgeon who will take blood smears from the suspected animals for microscopical examination and this is the only sure way of arriving at a diagnosis.

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P. T. SAUNDERS,
Director of Veterinary Services.

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CIVIL VETERINARY DEPARTMENT, MADRAS.

CASTRATION.

The operation of castration is performed on male animals in order to render them useless for breeding purposes and unable to beget their own kind. This is a very important consideration for a breeder who wishes to improve his livestock, as it is only by the use of selected sires and the judicious mating of male and female that he can hope to obtain good results. Castration is also important in the case of those animals used for work, such as cattle and horses, for it renders them more tractable and makes it possible for them to be placed in company with females and other males of the same species both at work and at rest. Another reason for castrating the males of cattle, sheep and goats, in those countries where these animals are used for human food, is that they develop better and fatten more quickly, and their flesh is less coarse and less likely to have an objectionable odour than that of uncastrated animals.

In the case of sheep the wool produced by the castrated male is considered to be of a finer quality and thus commands a better price.

Castration consists in the removal of the animal's testicles or operating on the spermatic cord in such a way as to make the testicles sterile. There are several methods of performing this operation, and one which is still in vogue in many parts of this country is popularly known as " Mulling." This consists in the destruction without removal of either the testicles or the spermatic cord or both by hammering them between two stones or other hard objects until they are reduced to a pulp. The operation usually takes about half an hour, the animal the whole time suffering the most excruciating pain. In former years there was some excuse for 'mulling " animals, but now that Government have supplied each district in this Presidency with Veterinary Assistant Surgeons who, in addition to their other capabilities have been trained to perform the scientific operation of castration, it is time that enlightened inhabitants refused to allow their animals to be " mulled."

Veterinary Assistant Surgeons have been trained to perform the operation of castration by several methods, one of which consists in removing the testicles by a surgical operation, and this is the method usually adopted in the case of horses. In the case of cattle, however, the operation can now be performed in a bloodless manner, the testicles not being removed. The operator uses a large instrument known as Burdizzo's Emasculator, and with this he crushes the spermatic cord. This instrument, which resembles a large pair of pincers, is made in such a way that

great pressure is exerted at the jaws by the application of a comparatively small force at the handles. The edges of the jaws come together so intimately when the instrument is closed that any tissue interposed between them is completely crushed. Each cord is crushed for a minute, which is sufficient to cause atrophy of the testicles and sterility of the animal. No after-treatment is necessary. The testicles and scrotum are swollen for a day or two after the operation, but the animal exhibits no systemic disturbance or any inconvenience whatever and may be sent back to the herd immediately or worked after a few days.

The chief advantages of the Burdizzo method of castration over mulling may be briefly enumerated as follows:—

(*a*) Mulling takes half an hour to perform while the Burdizzo method of castration takes a couple of minutes.

(*b*) The after-effects are practically nil with the exception of a little swelling which disappears in a day or two, whereas the after-effects of mulling will often last for weeks and an abscess frequently forms at the seat of operation which may take a long time to heal.

(*c*) The amount of pain caused to the animal by mulling must be extreme, and those who have seen this barbarous operation performed will realize this, whereas the amount of pain caused by Burdizzo's Emasculator is very small.

(*d*) As the operation takes such a very short time, it is not usual to give an anæsthetic to an animal about to undergo castration, but should the owner so desire, this can be done by the Veterinary Assistant Surgeon, and the animal will then be rendered absolutely insensible to pain.

(*e*) The operation can be done at any age.

It is hoped that this new method will appeal to all owners wishing to have their animals castrated and in order to obtain the services of a Veterinary Assistant Surgeon for the purpose, intimation should be sent to his headquarters or to the nearest Veterinary Hospital or to the Tahsildar of the taluk concerned.

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CIVIL VETERINARY DEPARTMENT, MADRAS.

NASAL GRANULOMA IN CATTLE.

TAMIL—KORATTAI, MUKKADAIPPAN.

TELUGU—MUKABANDU, BHOOSA.

This disease of the nose of cattle is very prevalent in certain areas of the Madras Presidency and also other parts of India. The vernacular names of the disease suggest the noise in breathing of these diseased animals. The disease in itself may not be rapidly fatal, but causes the animal to loose condition and renders it less capable for work due to the difficulty in breathing and in milch cattle, the quantity of milk gets reduced all of which mean economic loss to the ryot.

It is an infectious parasitic disease of the nasal passages and is characterized by the presence of growths in the nostrils which bleed easily and interfere with free respiration.

Animals affected.—This disease is commonly seen in bullocks, cows and less commonly in buffaloes. Young animals are not immune to this disease. There is reason to believe that sheep also get this disease.

Etiology.—The disease is produced by worms called "Schistosomes" which live in the veins under the mucus membrane of the nose. The female worm lays eggs there and these eggs in finding their way out produce such an amount of tissue reaction as to cause growths in the nose.

Symptoms.—The disease begins with constant running from the nose, generally from both nostrils, associated with noisy breathing. Sneezing is also fairly common in the early stages. The character of the nasal discharge varies with the development of the disease. At first, it is thin, later becomes thick and is mixed with pus or even blood. The lesions of the disease first appear as small shot-like nodules on raised patches of mucus membrane in the anterior regions of the nasal chamber and gradually these patches grow in thickness as to appear like growths. The small nodules contain pus and when this is examined under a microscope ova of parasites are seen. The lesions of the disease gradually spread in the nose and within two to six months from the commencement, they may be so big as to bring about partial blocking of the nasal passages. When air rushes past these and the mucus discharge present, there is produced a snoring noise characteristic of the disease.

Mode of spread.—The disease is localised in the nasal chambers, a place extremely well-suited for the extrusion of the ova to fulfil their biological destiny for which they have to pass into fresh water. When an animal having this disease drinks water from a pond, etc., its nasal discharge containing the ova contaminates the

water. The ova contain in them larvæ which get liberated in the water and swim about till they come into contact with certain kinds of snails present in such ponds, etc. These larvæ enter the snails and develop further in the bodies of these snails. After the lapse of about six weeks, plenty of infective larvæ called "Cercariæ" come out of these snails and swim about in water. A healthy animal gets infected with these infective cercariæ by drinking the pond water containing these cercariæ. The cercariæ can infect animals that even wade through water containing them because they can penetrate through the unbroken skin. Once the cercariæ gain entrance into the bodies of cattle, they get into the blood stream and ultimately those that reach the veins of the nose develop into adult male and female schistosomes and the female lays eggs. These, in their attempts to get out of the body, cause the nasal lesions. Experimentally, it has been ascertained that it takes about three months for symptoms to become manifest from the time of entrance of the cercariæ into the body.

Prophylaxis and treatment.—The life history of the worms shows that the larvæ hatched out of the egg in the nasal discharge requires an intermediate host before it develops into infective cercariæ and this development takes place in certain kinds of fresh water snails. It has a cycle in its life history which can be represented thus :—Cattle, Snails,—Cattle,—Snails, and so on. The snail therefore is the link between diseased and healthy cattle. If this link is destroyed, then the life history of the parasite is broken and another animal cannot therefore be infected. Hence, destroy the snails in ponds, tanks, etc., to which cattle frequently visit to drink water. The easiest way of doing this is to clean the ponds, etc., of their weeds. The snails feed on the weeds and lay eggs on the weeds under water. If the weeds are removed, the snails loose their food supply and also their eggs get destroyed with the weeds. The snails can also be destroyed by throwing a handful of copper sulphate in the pond. Small quantities of copper sulphate are not poisonous to cattle. The cercariæ can also be killed by adding slaked lime to water and this has to be done frequently.

Diseased animals can be cured by giving intravenous injections of Tartar Emetic. This has to be done by a skilled person and a Veterinary Assistant Surgeon is competent to do this. Such animals must be taken to him for treatment. Though these animals can be cured, they are liable to reinfection and this can be prevented as suggested above. It is possible therefore to eradicate the disease in a village if attention is paid to prevention and treatment.

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A2

CIVIL VETERINARY DEPARTMENT, MADRAS.

Bovine lymphangitis.

Bovine lymphangitis is a specific disease commonly prevalent among cattle, the disease being epizootic in certain centres.

Though this disease does not cause heavy mortality among cattle, yet it is to be dreaded because it is infectious and animals affected very soon become unthrifty and totally incapacitated for work, causing economic losses to farmers and cattle breeders.

As the name of the disease implies, the lymphatic glands of the body, especially those that are concerned in draining the skin area are mainly involved and occasionally the lungs are also affected.

The disease in cattle is caused by a small microscopic organism which occurs in slender rods and shows a distinct bipolar staining. The organism can be easily cultivated on artificial media, and in liquid media they appear in the course of a few days as very fine filaments growing downwards from the surface of the liquid medium.

In natural lesions, the organisms are present in the wall of abscesses and in early stages in the pus.

The first observable symptom in this disease is the appearance of a nodular enlargement of one or more of the superficial lymphatic glands, especially in the region of the flap of the flank or in front of the shoulder or very occasionally in other parts of the body. The affected animals, in spite of such enlargements, evince neither pain nor inconvenience and perform their usual work. In the course of two or three weeks, the nodules considerably increase in size and in some animals become tense and indurated. In the cases which are allowed to run their course, the affected glands pit on pressure and indicate the existence of pus which has more or less disorganized them. No signs of acute inflammation

in the regions of these glands nor of marked constitutional disturbance are noticed. But, if the glands are considerably enlarged, slight lameness is discernible either in the foreleg or in the hind leg according as the prescapular or the precural gland is affected. In a certain proportion of cases, the hoofs become overgrown and laminated inducing lameness. As the disease progresses, general emaciation and debility become very marked in some animals and in others symptoms of respiratory affection indicating lesions in the lungs are often seen. With the further advancement of the disease, paroxysms of coughing and difficulty of breathing may become more insistent and the animals eventually succumb to the disease.

From the evidence that has been gathered after a careful investigation into the etiology and other factors connected with this disease, the probable cause of infection appears to be through the medium of suctorial insects, viz., cattle lice.

As regards treatment, surgical attention is needed for the abscesses which may soften and break. The pus is evacuated and the wound is cleaned with an antiseptic solution such as dilute Cresol and Phenyl followed by suitable drugs.

A vaccine prepared at the Madras Veterinary College from the broth culture of the organism has been found to be very efficacious in the treatment. The affected animals are inoculated with the vaccine and in a short time speedy cure results.

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CIVIL VETERINARY DEPARTMENT, MADRAS.

CONTAGIOUS DISEASES OF POULTRY AND THEIR TREATMENT.

(1) FOWL CHOLERA.

Fowl cholera is an acute febrile contagious disease causing heavy mortality among poultry and other birds. It is caused by a microbic germ called *Bacillus avisepticus*. The disease is spread by—

(1) fowls taken to public shows where sick birds may come;
(2) fowls purchased from infected flocks;
(3) eggs from an infected flock; and
(4) infected droppings and food materials carried by the feet of men and animals or by streams of irrigation, ditch water or by wind as dust or by wild birds.

The germ may live for months in the ground where an epidemic occurs, if it is not disinfected properly. Once the disease breaks out, it spreads very rapidly.

Birds affected.—Fowls, turkeys, ducks, geese, pigeons and many wild birds.

From 12 to 48 hours of the onset of the disease, the first symptoms are shown—fowls may die either very suddenly in which case no symptoms may be seen, or they may live for six to seven days. In the latter case, the affected fowl is dull, off its feed, has staring feathers. It mopes or sits with the tail and head down—the comb is dark. When made to move it sways, shows trembling, convulsions, thirst and severe diarrhœa, the fæces being yellowish green in colour. There is high fever and the bird becomes thin. On post-mortem, the liver is very much enlarged, dark red in colour about three times its normal weight. The other organs such as the spleen and kidneys may be also inflamed and enlarged. The intestines and lungs present inflammation on their inner surfaces and slight hæmorrhages (bleeding) on the outer surfaces. The contents of the intestines are invariably liquid and frothy and sometimes there may be some quantity of blood also. The germs are found in the blood of infected birds and produce a general septicæmia.

Prevention—

(1) New additions must be carefully observed before they are mingled with the flock;
(2) the sick birds must be at once separated or destroyed and the dead ones cremated;

(3) complete cleaning and disinfection of the cages, hen-houses, feeding troughs and trays, water troughs, etc., and all other utensils with 5 per cent carbolic acid, cresol, creolin, etc., daily. If the cages are of iron they can be burnt easily. All droppings and food remnants, etc., must be burnt; and

(4) drinking water may contain a slight astringent and an antiseptic such as alum and potassium permanganate, 5 per cent strength.

Treatment.—Antiseptics such as potassium permanganate $\frac{1}{4}$ to $\frac{1}{2}$ grain in tablets can be given thrice daily. In places where veterinary aid can be had, vaccination can be resorted to both by vaccine and by serum—the former protects the birds for a long time and the latter for a short time.

Diet.—Soft and easily digestable foodstuffs, such as wheat or rice bran, chopped cabbages, greens, soft roots, onions, etc., can be given. Care must be taken not to give grains which are not digested easily.

(2) Fowl Pest.

Fowl pest or fowl plague is a highly infectious disease of poultry causing very heavy mortality. The disease is caused by an ultra-microscopic organism which is otherwise known as a virus.

It affects all domesticated poultry, more especially fowls, turkeys and pigeons in their order of susceptibility. Wild birds are also not immune.

The disease is probably spread by contamination from the droppings and nasal secretions. The feet of men and animals, utensils and clothing coming into contact with the contagion may transmit the disease. Birds introduced into the flock from an infected flock may serve as a source of infection.

The symptoms usually present are dullness, depression, drooping of the wings, greenish white diarrhœa, discolouration of the comb and wattles and in the later stages, paralysis of the limbs and coma. The affected birds die in about four of five days after the onset of the symptoms. Chorea is also present in certain cases. In some cases, the duration may be shorter and in others longer.

Prevention.—The same as fowl cholera—prohibition of imported stock.

Pseudo-fowl pest.—In the Madras Presidency, a virus disease closely allied to fowl pest has been prevailing among poultry and also among crows, turkeys and pigeons. The disease has been described as pseudo-fowl pest. When the disease runs a very acute course, the birds are not seen to be visibly ill, death resulting in 12 to 24 hours. In other cases, the affected birds show dullness, disinclination to move even when disturbed, a stringy

mucous saliva dribbling from the beak, greenish white diarrhœa, paralysis of the wings and limbs and in some birds chorea; the bird in the last stages becomes comatose and the temperature is subnormal.

Treatment.—Unsatisfactory.

Prevention.—Destruction of the sick; thorough disinfection of the poultry yard; segregation of incontact birds and quarantining of newly purchased poultry.

(3) Spirochætosis.

Tick fever or fowl fever.

Tick fever of poultry is a very acute, febrile disease and is highly fatal. It is a septicæmic disease, caused by minute, slender organisms in the blood. Sometimes, the disease occurs in such an acute form that birds apparently healthy at night are found dead under the roost in the morning. In the less rapidly fatal form, there is dullness, ruffling of feathers, somnolence and diarrhœa. The organisms of this disease can be easily seen under a microscope when the temperature is high in the early stages of the disease and they disappear from the circulation soon after. In this type of the disease, death of the bird may occur in from four to five days. The chronic type of the disease is met with in some fowls. In this, paralytic symptoms may be noticed. The wings may droop or the head be twisted back; there may be inability to use the claws and the gait of the bird may be unsteady.

Tick fever, as the name indicates, is carried from one bird to another by fowl ticks. Even the progeny of an infected female tick is capable of transmission of the infection to fowls, either by feeding on the fowl or when the ticks are ingested by it.

Treatment.—An intra-muscular injection of $\frac{1}{2}$ to 1 grain of 'soamin' dissolved in sterile water cures the disease. The treatment should be done as early as possible after the onset of the disease. It can also be used as a preventive injection to healthy birds. Control of spirochætosis depends on the destruction of ticks. If these are destroyed, the spread of the disease is cut short.

(4) Chickenpox.

Chickenpox is an infectious disease caused by a very minute organism which cannot be seen even by the microscope (ultra-microscopic), chiefly affecting chickens, pigeons, turkeys and more rarely geese. It generally occurs in warm countries during summer season.

The disease is transmitted from one bird to another very rapidly, chiefly by the infected pus material of the sick coming into contact with the raw surface of the healthy or it may be caused by attendants looking after poultry. It takes about four to six days (or it may be a little longer in some cases) for the first symptoms to appear.

The bird appears dull and has high fever, does not feed properly, then eruptions appear on the comb and wattles around the eyelids, over the nostrils and such of those places as are devoid of hair. Pigeons generally get them around the eyelids, neck, lower surface of the body, inner side of legs and wings—these nodules are at first hard, slowly become soft and an opening forms in the centre through which at first a watery material, later a thick yellowish pus comes out. This material soils the feathers and other things coming into contact with it. After opening, the wound sometimes becomes very large and affects the surrounding parts. In a mild form, these nodules heal up quickly leaving a dry scab and the bird recovers slowly from the disease, but in severe cases, these nodules spread to the surrounding parts and places devoid of feathers, sometimes even into the mouth and nostrils, in which case death usually takes place. The nasal passage becomes blocked with the exudate and the bird breathes through the mouth. When it affects the mouth, the bird is not able to feed properly; when it affects the eyes, the exudate completely sticks the eyelids together and causes temporary blindness. In addition there may be diarrhœa present and death takes place in three or four days generally, but sometimes birds linger for weeks when they become extremely weak and die or a few may recover. When the disease is confined to the skin, it usually runs a favourable course and the bird recovers.

Prevention.—Same as fowl cholera and fowl pest.

Curative treatment consists in washing the lesions with antiseptic such as 2 per cent carbolic acid, 70 per cent alcohol and applying either sulphur or carbolized zinc ointment. The wound may also be painted with tincture iodine. The eyes should be kept clean by washing with boric lotion, 2 per cent.

(5) Bacillary White Diarrhœa.

It is an acute septicæmic disease caused by a microbic germ called *Bacillus pullorum*. Chicks in the first days of their life are principally affected; more rarely, chicks at the age of two to four weeks, but adult fowls are only exceptionally affected. Infection is carried through the ovary to the egg, from thence to the chick and from the chick to the ovary again. Chicks within the first 48 hours are very susceptible to infection; during the next 24 hours the chance is less; when they pass that period, they practically become unsusceptible.

The first symptoms are dullness, depression, ruffled feathers, loss of appetite, drooping of wings and the presence of the characteristic white diarrhœa, during the passage of which some chicks feel extreme pain. The affected bird usually dies in acute cases. In chronic cases, the bird becomes very unthrifty in condition, prefers a standing posture, one leg resting with the toe on the other. When walking, it shows lameness. In the adult cases in the acute stage almost the same symptoms are manifested. The

comb and wattles become pale. In the chronic form, no symptoms are noticed. After death, autopsy reveals the characteristic lesions as necrotic foci in liver, spleen, heart and pancreas and a shrunken condition of the ovum which on section presents either a tough cheesy appearance with a yellowish red or greenish tinge or may contain some dark fluid. Small sac-like nodules may appear in the pleural or abdominal cavities and chiefly the pericardial sac. In chicks the yolk sac is unabsorbed, the liver contains streaks of congestion and there are no other diagnostic lesions. Smears from blood, liver, yolk, spleen and kidneys reveal the causative organism.

Prevention—

(1) Affected birds must be destroyed.

(2) Chickens up to 48 hours from the time of hatching must be kept separately and not mingled with others.

(3) Hen-houses, incubator, etc., should be thoroughly cleaned and disinfected.

Treatment is of no avail and as a rule should not be undertaken for the following reasons:—

(1) The disease does not respond to treatment.

(2) Time and labour spent on young chicks are not worth the trouble.

(3) Those recovered remain infective to other birds.

Potassium permanganate of 1 in 1,000 strength may be given in drinking water as a preventive measure. This strength of the antiseptic is inhibitive to the growth of the organism.

Buttermilk, which inhibits the growth of the bacteria in the intestines with the aid of the lactic acid it contains, can be freely given.

Madras,
8th January 1936.

P. T. SAUNDERS,
Director of Veterinary Services.

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LEAFLET No. 14.

CIVIL VETERINARY DEPARTMENT, MADRAS.

NON-CONTAGIOUS DISEASES OF POULTRY AND THEIR TREATMENT.

(1) External Parasites of Poultry.

Lice.—Bird lice are wingless parasitic insects with mouth parts adapted for biting and sucking. They feed on the feathers, scales and the skin itself. Their presence causes itching (pruritis) set up by their claws and biting mouth parts. Lice, therefore, cause hindrance to normal growth and development, owing to the restlessness caused by the irritation on the body. These lice spend their whole life on one host. The eggs are attached to the feathers and the young lice that hatch out attain maturity in about three weeks' time.

Owing to the habit of the lice of remaining on the host, the best method of removing them consists of the application of an insecticide to the bird. The cheapest insecticide is dilute emulsion of kerosene oil brushed into the feathers. Derris root powder applied in the same way is also recommended. There are such powders as "Keating's powder" containing insecticides which are equally good. Birds often take a dust bath which appears to be a natural defence against lice. Advantage of this should be taken to provide them with earth in a box and a small quantity of an insecticide powder may be added to it with advantage.

2. *Ticks and fleas.*—These parasites usually remain in crevices of the floor and walls of fowl houses. They usually come out at night and bite and suck blood from fowls. Ticks convey a disease called "Tick fever" which is fatal to birds. Fleas drink and worry the birds at night.

Ticks may cause lowering of vitality in fowls and so make them susceptible to disease. They may be responsible for reducing egg production, stunting of growth in chickens and may even disturb sitting hens. Ticks deposit their eggs in crevices and these hatch in 10 to 15 days. The young tick (or seed tick as it is called) attaches itself to the skin of the breast, thigh and elsewhere and sucks blood. This period of feeding occupies 3 to 10 days when it drops off. After 4 or 9 days, it develops into a nympth which is still immature. The feeding habit of nymphs is by attaching themselves to a fowl for a short time at nights. After about three weeks, they become adults and the feeding habit is like that of the nymphs at nights. Seed ticks can remain for six months without food, the nymphs for nine months and the adults for nearly two years. Hence it is sometimes difficult to eradicate these when once introduced into a hen house. The best way to kill them is to scald the walls and floor with boiling water or to apply hot tar which will fill up crevices. It might even

be necessary to burn the pen and rebuild it. Seed ticks can be destroyed by washing the pen with kerosene oil emulsion.

3. *Mange.*—Mange affects usually, the legs of poultry, hence the disease is known as " scaly legs ". This is caused by mites. These mites burrow into the skin and set up inflammation. This thickens the skin and causes the natural scales of the legs and toes to protrude and in advanced cases, they appear as greyish white crusts on the legs and toes. This enlargement of legs interferes with the movement and the birds cannot move freely to feed and, in addition, the irritation caused by the mites causes loss of condition.

Treatment.—Wash legs with warm water and soap and apply vaseline or lard, cover it up with paper and bandage. The dressing can be changed once in three days. A small quantity of powdered sulphur may be added to the vaseline or lard with advantage.

Prophylaxis.—Isolate and treat the infected bird and disinfect the pen.

(2) The Internal Parasites of Poultry.

The internal parasites of poultry are of two kinds, viz., single celled animals such as coccidia, and multi-celled animals such as round worms and tapeworms. Most of these parasites are found in the intestines and produce disease and even death of the bird.

1. *Coccidiosis.*—This is primarily a disease of the intestines. In chickens it may also affect the liver. This disease is one of the scourges of poultry. Apparently, all birds are susceptible to the causative agent when exposed to infection. It is, however, highly destructive to young chickens though birds of all ages may be affected. The symptoms are weakness, disordered feathers, droopy wings, loss of appetite, and somnolence. The droppings are semifluid and usually whitish in colour or they may be fluid and brownish in tinge. In acute cases, the droppings are stained with blood. In adult fowls, the disease may assume a chronic type and is characterized by progressive loss of activity, anæmia and gradual emaciation. Death may occur suddenly after a short period of coma. The mortality may reach as much as 100 per cent in chickens. Adult fowls are not so severely affected. Diagnosis can be readily made if the droppings of the birds are examined under a microscope when the organism can be recognized.

Treatment.—The most convenient method of administering any drug is by means of drinking water to which crude catechu, one-third to half teaspoonful per gallon is added. Should signs of constipation develop one-fourth to one-third teaspoon of epsom salt may be given per fowl in its mash.

Prevention.—Isolate birds showing the disease. Scrub the dropping boards, perches and floor of the pens with 2 per cent

cresol or 5 per cent carbolic acid solution. Avoid overcrowding. Frequently cover the ground, or the run, with slaked lime. Fowls received from outside sources should be quarantined before placing them in the flock.

2. *Round worm.*—These are common parasites of the intestines and are capable of causing considerable damage. They are long, slender and threadlike. The female worm is generally larger than the male. The affected birds appear unthrifty and emaciated. Either diarrhœa or constipation may occur. The affection is most severe in young birds. The worms deposit their eggs in the intestines of the fowl and are expelled in the droppings. The worm eggs may remain alive for a long time, up to a year, in the crevices of the floor. These worm eggs gain access to a fowl through contaminated food or water and they do not seem to hatch until they are taken into the alimentary canal. The embryos that hatch out in the intestines require about three to four weeks to develop into adult male and female worms.

Treatment.—There are many remedies of which tobacco stems seem to be efficient in expelling these round worms. For one hundred fowls, a pound of finely chopped tobacco stems is steeped for two hours in enough water to keep the mass covered. The liquid and the stems are mixed with half the amount of ground feed, usually allowed to the birds, for one feeding. On the day previous to giving this, the birds should be fed only half a ration and they should be kept without feed until the afternoon of the following day. Then the mixture of tobacco and feed is given which is often readily eaten. Two hours later, the birds are given a quarter size ration of ground feed, mixed with water containing eleven ounces of epsom salt, for each hundred birds. This treatment may be repeated after two or three weeks if necessary.

Prophylaxis.—Thorough disinfection of the yards and quarters is necessary in order to minimize the possibility of re-infection from worm eggs that have been deposited fæces. The top soil of the infected yards to a depth of two inches may be removed and replaced. Netting under the roosts is of value in keeping birds from contact with fæces.

3. *Tapeworms.*—The disease produced by these worms is designated " Tæniasis." The individual worm is composed of a " head " and a variable number of " segments." The head is armed with a series of hooks by means of which it attaches itself to the intestinal mucosa of the host. Each segment is virtually an individual and the terminal segments contain in them large numbers of eggs. These segments are broken off and are discharged in the droppings. A tapeworm nourishes itself by absorbing nourishment directly from the intestinal contents of the host. There are a number of species of tapeworms that affect poultry.

Life history.—The ripe segments filled with eggs are voided in fæces and these or the eggs are eaten by garden slugs, house flies, cockroaches, etc. In these flies, slugs, etc., the eggs hatch and the larvæ migrate into the gut wall or other organs and develop into small "Bladder worms." When these flies, slugs, etc., are eaten by chicken, these bladder worms develop into adult tapeworms in the intestines of the chickens.

Symptoms.—In moderate infestation, the bird is always hungry and has excessive thirst. Restlessness is marked and aids loss of condition. Heavily infested birds show such symptoms as dropping wings, emaciation, ruffled feathers and isolate themselves from the flock. There is diarrhœa with mucus in it. The fæces at first may be clear and transparent or slightly whitish in colour, later the mucus is brownish yellow with or without bubbles in it. Segments of tapeworms may be found in fæces.

Treatment and prophylaxis.—Fast the fowls for 24 hours during which time they should receive a dose of epsom salt, half a teaspoon for each adult fowl, mixed in drinking water. Next morning administer 10 to 20 drops of turpentine mixed with one to two teaspoonful of olive oil or castor oil to each individual and three hours after this dose, feed them on mash. Arecanut 30 grains to each fowl may be administered in the form of a pill followed by half to a teaspoon of epsom salt as a concentrated solution in water. Prevention consists in collecting the droppings and mixing them with lime and ashes. To destroy slugs, it is necessary to sprinkle the ground with lime. Fly traps may be used during the fly season to destroy them.

MADRAS,
11*th April* 1940.

T. J. HURLEY,
Director of Veterinary Services.

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CIVIL VETERINARY DEPARTMENT, MADRAS.

COMMON AFFECTIONS OF POULTRY AND THEIR TREATMENT.

IMPACTION OF THE CROP—"CROP BOUND."

Crop is the term given to the dilated portion of the Oesophagus situated at the lower part of the neck and in front of the entrance to the thoracic cavity. It has the role of a temporary storing chamber for the ingested materials. At times it gets overloaded and distended with dry grains and other articles taken in by the bird and appears as a prominent swelling at the root of the neck. This condition is known as "impacted crop."

Cause.—The main cause of this trouble is improper feeding. After starvation or semi-starvation for a long time, if the birds get access to a plentiful supply of food they are liable to eat too much; again when they suffer from a catarrhal condition of the crop they usually have a depraved appetite and take in too much food and all kinds of indigestible substances, such as dry leaves, feathers, straw, stones, pieces of bones, etc. An insufficient supply of drinking water is also considered to be a cause. Impaction may also be facilitated as a result of obstruction consequent on the swelling of some foreign body or by the paralysed condition of the crop occurring in association with certain contagious diseases.

Symptoms.—There is loss of appetite and difficulty in swallowing. The bird is sluggish in movement, dull, sleepy and stupid in appearance. At the root of the neck the distended crop is seen as a prominent swelling which is hard, more or less firm, and not yielding on pressure. Occasionally, a fermenting or decomposing liquid escapes from the mouth and nostrils. The comb is pale and the feathers appear rough. The beak is kept open on account of pressure on the wind pipe and if this is excessive the bird shows signs of suffocation. If the condition is not relieved the animal may die in a few days, usually due to starvation and exhaustion. In longstanding cases, the crop may rupture or may become affected with gangrene.

Treatment.—Prompt attention is necessary to ward off fatal results. Open the bird's mouth and carefully pour into it a small quantity of sweet oil and allow it to swallow. Then manipulate with the finger and thumb on the region of the crop nearer to the throat and try to break up impacted material and gently squeeze up small portions of it towards the mouth and allow it to escape. This process of emptying may be better facilitated by holding up the bird with the head hanging down. The administration of oil, manipulation and squeezing as described above is

to be repeated with due care and patience till the crop is completely depleted. After this, three grains of washing soda and a little water may be given. Withhold food for the day, but a dilute solute of potassium permanganate may be left near the bird. Later on liquid and soft food in small quantities may be given till complete recovery takes place. Allow it to have the usual grains and other feed only gradually.

If impacted crop contains any hard pointed materials or if the contents cannot be depleted by the method described above it is necessary to open up the crop for removing the materials for which the services of a veterinary doctor should be sought for.

Egg Bound.

This term is given to the condition in hens when the egg is retained in the posterior part of the egg duct or canal as a result of some difficulty in laying or obstruction in the passage. It is a common ailment of laying hens.

Cause.—Difficulty in laying may be due to inflammation and irritation of the lower part of the egg duct (oviduct) arresting secretion of mucus therein and thereby leading to a dry state devoid of proper lubrication; or it may be due to the egg being too large or the bird being too fat. Cross-breeding between a breed of large egg type and one of a smaller egg type is said to produce larger eggs in the latter which may suffer from this condition. Sometimes constipation, a weakened and paralysed condition of the muscular walls of the egg duct and vagina, twist or stricture of the egg duct and general weakness are contributing causes.

Symptoms.—When birds are "egg bound" they have a tendency to go often to their nests and attempt to lay without any results. They are restless and show signs of discomfort and pain. Later dullness supervenes with unwillingness to move. The feathers will be rough. By palpation the arrested egg may be felt as a hard body at the posterior part of the abdominal cavity. If the condition has been in existence for some time there will be signs of inflammation at the obstructed part, and not infrequently there may be prolapse of the egg duct due to constant straining.

Treatment.—If the condition is observed early, allow the hen to remain quiet and alone for a couple of hours. In case the hen has not then laid an egg, inject into the passage a little olive oil or carbolized vaseline and manipulate the part. Mild cases are cured by this method. Give cooling food and in the case of fat birds, reduce the ration.. In protracted cases when the methods mentioned above fail, dip the posterior part of the hen in warm water for about half an hour and then introduce some more oil into the passage and manipulate externally. When this also fails, it may be necessary to use the finger well smeared with vaseline after washing with water and soap. The finger is introduced into the egg canal and the egg, if small, is removed. If it is too large, break the shell and remove all parts of it; after this give the hen

a tablespoonful of olive oil or castor oil and keep it on liquid food for a few days. Inflammation of the canal may be reduced by frequent injections of cold or iced water into it.

Bumble Foot.

This is a term usually applied to the suppurating condition of the foot following deep bruises and abscess on the undersurface of the foot of a bird and may be considered to be an advanced stage of corn. This is more common in heavy breeds and more often in cocks than in hens.

Cause.—Prolonged pressure, irritation and bruises are considered to be the chief causes. Too small or too narrow perches lead to the application of undue pressure, consequent irritation and sometimes bruising. Walking and perching too often on hard floors, stony surfaces and thorns may also cause corns which when neglected may lead to bumble foot. Dirty and filthy surroundings is also a contributing factor.

Symptoms.—The undersurface of the affected foot in the early stages is hot and painful and enlarged. Sometimes an abscess or if that has already broken, a boil with cheesy pus is noticed. In advanced and more severe cases, the joints may also be involved showing heat, tenderness and swelling at the part. The animal is unable to bear weight on the foot and walks with difficulty. Fresh abscess may break out at other parts of the foot.

Treatment.—Dip the affected foot in warm salt or boric solution for about 15 to 20 minutes twice a day and scrape out the pus and clean the sore by swabing with moist cotton wool. If there is much dead tissue, remove the same and clean the part with hydrogen peroxide. For the first few days, the sore should be packed with lint dipped in tincture of iodine and bandaged after padding with cotton wool. Later on, after cleaning the part boric or salicylic ointment is to be applied and the foot bandaged. The bandaging should be continued till the tenderness of the part disappears and the bird is able to use its foot freely. In case there is abscess formation it should be opened with a sharp knife and the dressing to be continued on the lines indicated above. In chronic cases involving the joints, destruction is the best course.

Proper preventive measures should also be undertaken to avoid the causes that lead to this condition.

Caponising of Domestic Fowls.

The objects of the operation are to increase the size of the bird and the delicate flavour of the flesh for table purposes and secondly to prevent the young cockerels from fighting with one another, as the removal of the testicles diminishes their combativeness. The operation is best done when the cockerel is about three to four months old.

Method of operation.—It is essential that the birds should be well fasted. A period of 30 hours is desirable as by that time the intestine is more or less collapsed as well as empty and a good view of the testicle can be obtained.

The subject is stretched on its side on a table and held down by an assistant. In the absence of help one may suspend one-half of a brick or a bottle from the wings and another from the legs in order to secure the subject. A few small feathers between the last two ribs and point of the hip are then plucked and the operation site exposed between the last two ribs. With a clean incision about an inch and a half long the skin and the intercostal muscles are divided. If the incision is made high enough there will be found a 'V' shaped opening exposing the peritoneum, and this is now carefully incised along the whole length of the skin wound, giving a view of the testicle when the spreader or retractor is put into position keeping the ribs apart. It is a good plan to operate in full daylight with the sun behind, so that the interior of the bird is illuminated. An electric torch answers very well. The testicle is seen as an yellow bean shaped body in front of the kidney in the sub-lumbar region. A spoon shaped forceps is then introduced and the organ seized, twisted and removed. The bird is then turned over and the same process gone through in order to reach the other gland. It is much less trouble and safer to operate on both sides than to seek both organs from one side.

After treatment and sequelæ.—Nothing need be done to the wound as it is sealed with a clot. The only trouble experienced is emphysema of the flank in a few cases. The remedy is to prick the skin and let the air out.

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P. T. SAUNDERS,
Director of Veterinary Services.

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CIVIL VETERINARY DEPARTMENT, MADRAS.

Chronic Partial Luxation of Patella Bovines.

This condition is found in bovines in the Madras Presidency especially buffaloes and is chiefly seen in working animals. It is uncommon to find it in cows and she-buffaloes. It is noticed when the animal is forced to walk and is characterised by jerky movements of one or both the stifles. During progression after rest the affected limb is suddenly lifted from the ground and appears stiff at the stifle joint. It is then suddenly flexed with a peculiar sharp jerk and the limb is again brought down to the ground with the usual force seen while walking normally. The condition may disappear temporarily if the animal is kept walking but reappears after some rest. It would appear that the condition is due to the patella slipping out partially and after some effort on the part of the animal, it slips inwards into its place over the joint thereby causing the sharp characteristic jerk. In bad cases there is great difficulty in extending the leg and it is dragged for a few

paces until the patella slips into its normal position. Though the condition is not fatal to the animal, it is painful and prevents the animal from doing its normal share of work.

The affected animals can be cured of the complaint by injecting into the stifle joint 5 to 10 c.c. of Tincture of Iodine . This treatment causes inflammation of the joint and the animal has to be rested for a few days. No after-treatment is necessary except perhaps fomentations to the part, if the swelling is excessive. After the inflammation has subsided, walking exercise is recommended for some days before the animal is put to work. One injection is usually enough but in a small percentage of animals a second may be required. If both stifle joints are affected it is advisable to inject only one joint first and after the inflammation has subsided, to inject the other joint. Veterinary Assistant Surgeons alone are competent to do these injections. Such animals should be taken to them and thus made fit for better work.

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T. J. HURLEY,
Director of Veterinary Services.

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CIVIL VETERINARY DEPARTMENT, MADRAS.

Feeding of Cattle on Paddy Bran.

One of the common foodstuffs given to the cattle of this Presidency is paddy bran, or, as it is sometimes called, rice bran. This bran, from a nutritional point of view, has much to recommend it, provided it is given properly and in proper quantities. It mainly consists of the outer covering of the rice which, as is well-known, is rich in vitamins which play a large part in promoting growth and resisting diseases. To derive the full benefit of this vitaminous food, it must be given in fairly adequate quantities not less than 3 pounds a day for an adult cow or bullock—and in good quality. Impurities very often nullify the effects of this foodstuff and produce trouble to the animal and loss to the owner. A common impurity is an admixture of husk; and this takes place generally in the process of machine-hulling of paddy. In this process, the separation of husk and bran into two entirely different entities is not possible and, as a result, a good portion of the husk is also powdered and gets mixed with bran. This mixture of bran and husk is generally disposed of under the name "bran". A few painstaking farmers and ryots separate the husk by careful sieving before using the bran for their animals, but, unfortunately such people are few. The majority of them make no attempt at separating the husk from bran and feed their animals on the stuff as received from the mills. Animals which are gluttonous or with very weak digestion, become easily affected with a very severe impaction by this irritating husk.

Recently a considerable mortality in cattle occurred in different places and, on examination, it was found that the cause of this mortality was milled paddy bran with husk. It is, therefore, thought advisable to draw the attention of the farmers and cattle-owners to the evil effects of feeding their animals on this kind of bran, and this press note is issued with that object in view.

Animals fed on this kind of bran do not generally show symptoms of illness at once. The evil effects are noticed only after a few days, sometimes even after weeks. The first symptom to draw the attention of the owner or attendant is the bloated condition of the abdomen. The abdomen gets ballooned up and the affected animal stands with its back arched and breathes heavily. This bloated condition, or hoven, as it is called, is generally accompanied by a violent diarrhœa. Some animals show signs of colic by constantly lying down and getting up. These symptoms are not generally very acute and they subside with ordinary simple treatment. An animal or two may die in this

stage from convulsions, but such cases are very rare. After first day or two, the hoven subsides for a time, but comes on again. With this recurrent hoven, the appetite is not totally absent and the animal nibbles at grass now and then. Rumination is generally absent and the diarrhœa soon gives place to an obstinate constipation. The animal passes only a few pillets of hard dung, and that, too, with great effort. This condition continues for a week or more, and, if no adequate treatment is given, the animal dies.

Treatment must be carefully adopted as, owing to the bloated condition of the stomach and its impacted state, the tendency to regurgitate anything forcibly given is very great. In the initial stages, raw linseed oil or groundnut oil in doses of half a pint may be given every day for three or four days with an ounce of turpentine and asafœtida (½ tola). This must be accompanied by frequent enemas of soap and water and massage of the abdomen. This treatment is only palliative and it is very desirable that the help of a qualified Veterinary Assistant Surgeon is soon sought.

It need hardly be said that the first and foremost precaution to take is to stop the impure bran immediately. The diet must in the meantime consist of soft food such as green grass and rice kanji.

Preventive measures consist in carefully sieving the milled paddy bran and removing as much of the powdered husk as possible, before feeding the animal with this stuff.

MADRAS,
11*th April* 1940.

T. J. HURLEY,
Director of Veterinary Services.

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§2

CIVIL VETERINARY DEPARTMENT, MADRAS.

I. CONDITIONS TO BE FULFILLED FOR THE GRANT OF PREMIUM FOR BREEDING BULLS MAINTAINED BY PRIVATE BODIES.

1. The bull should be approved by the Director of Veterinary Services, Madras.

2. It should be fed properly and housed in a good sanitary shed and kept in good condition.

3. A service register in the following form should be maintained:—

Date of service.	Name and address of the owner of the cow.	Description of the cow.	Amount of fee collected.	Description of the calf (male or female), colour of calf, date of birth, etc.
(1)	(2)	(3)	(4) RS. A. P.	(5)

4. The minimum number of services for a bull shall be 40 during the first year and 60 during each of the subsequent years, provided that in the case of a bull which is not over three years at the time of inclusion in the scheme, the minimum for the first year shall be 30.

5. The bull may be maintained by a single individual or institution.

6. Fees may be levied for services performed, the rate being fixed by the owner according to the local conditions and the demand for the bull.

7. A bull accepted for grant of premium will remain in the scheme for a period not exceeding five years from the date of acceptance or unless it is earlier removed from the scheme for any reason, provided it continues to serve satisfactorily and provided also that the conditions laid down with regard to feeding, management and the number of services are fulfilled and the bull is retained at the same station. The bull should not be removed to another station except under the advice or with the approval of the District Veterinary Officer concerned.

8. No individual or institution will ordinarily be allowed to maintain in the premium scheme more than one bull of the same breed or class in one and the same place, except in circumstances specially recommended by the District Veterinary Officer concerned.

II. CARE AND TREATMENT OF A BULL.

1. Considering that a bull is half the herd, he should be treated well and given more attention than the ordinary animals of the farm if he is to beget strong, healthy, well-developed calves and give a good return for the money invested on him.

When a bull is taken to his new home, he generally takes time to settle down. He refuses to eat much at first and so two or three weeks should be allowed before he is permitted to serve cows, in order that he may get accustomed to his new surroundings and his feed.

2. *Housing.*—One of the first points in the successful management of a bull is to provide him with proper shelter from heat, rain and cold. A shed 10 feet by 10 feet, well lighted and ventilated and free from draught should be provided. A trough should be fitted. The best floor is concrete, Cuddapah slabs chipped (to prevent slipping); this is easily washed and kept clean. A good gravel floor is satisfactory but this cannot be washed. The shed should be thoroughly swept and cleaned every day.

3. *Feeding.*—The bull should be kept in good condition if the maximum value from the bull is to be obtained and so he should be regularly fed with a fair amount of concentrated food. Suitable rations for bulls are as follows:—

Large-sized bulls.		Medium-sized bulls.	
Cotton seed	1½ lb.	Cotton seed	1 lb.
Horsegram	1½ lb.	Horsegram	1 lb.
Oilcake	1 lb.	Oilcake	1 lb.
Rice bran	2 lb.	Rice bran	2 lb.
Salt	2 oz.	Salt	1 oz.
Mineral mixure	2 oz.	Mineral mixture	1 oz.
	15 lb. dry fodder or 40 lb. green fodder.		

Feeds should be varied a little from time to time if the bull does not relish his food.

Half the concentrated food should be given in the morning and half in the evening; a suitable time-table is as follows:—

	6-30 a.m.	Clean out stall.
7 to	7-45 ,,	Exercise bull.
	7-45 ,,	Water.
	8-00 ,,	Feed half concentrated ration.
	9-00 ,,	Groom and clean bull.
	11-00 ,,	About 5 lb. dry fodder or 15 lb. green fodder.
5 to	5-45 p.m.	Exercise.
	5-45 ,,	Water.
	6-00 ,,	Feed half concentrated ration.
	6-30 ,,	Remainder of dry fodder, 10 lb. or 25 lb. of green fodder.

Cake should be soaked in water for 12 hours before feeding and horsegram should be boiled. A little jaggery can be mixed in the food two or three times per week.

Strict regularity in feeding both as regards quantity and time is one of the great secrets in the management of cattle.

4. *Exercise.*—Exercise is essential, otherwise the bull becomes slow and sluggish and shows no inclination to serve. Pay attention to the bull's feet; if the bull does not get enough exercise, the hoofs grow long and turn in and so the animal cannot walk properly. Keep the hoofs short and the soles flat by exercising on a hard road or by paring them with a sharp knife.

5. *Grooming.*—To keep the skin in proper condition and free from ticks, etc., the bull should be regularly brushed. Washing with soap and water is also beneficial occasionally.

If vermin or ticks appear, washing the bull with MacDougall's Dip or Cresol will be found beneficial.

6. *Service of cows.*—It is not advisable to run the bull with the cows. If this is done, the bull serves the cow repeatedly until both the cow and the bull are exhausted with the result that the cow may not prove in calf and the bull becomes unfruitful at an early age.

One service is sufficient, if the cow is in proper season. Double service exhausts the bull, achieves no purpose, endangers his fruitfulness, reduces his condition and constitution, diminishes the number of cows he can service in one season and consequently the good he can do in the district.

III. Instructions for the working of the rules.

1. The bull will, in the first instance, be approved by the Livestock Development Officer or the District Veterinary Officer concerned. The bull should be available for inspection by any officer of the Civil Veterinary department. Each bull maintained in the premium scheme will be inspected by the District Veterinary Officer or one of his assistants at least once in each period of three months from the date of inclusion into the scheme. Provided that the prescribed conditions in respect of care and management and the number of services to be

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performed by the bull are fulfilled satisfactorily in each period of three months and provided further that the registers are properly maintained, premium will be sanctioned at the rates noted below:—

First year.—A sum of Rs. 70 for a minimum number of services which will be 40 for an adult bull. A sum of Rs. 2 will be deducted for each service short of the prescribed number of 40. A sum of Rs. 60 for Ongoles and buffalo bulls and Rs. 50 in respect of other bulls for proper maintenance which may be reduced, if the bull is not properly managed.

No grant for maintenance or services will be sanctioned if the number of services performed is below 20. In the case of young bulls not over three years at the time of inclusion in the scheme, the minimum number of services required to qualify for the full premium in the first year at stud will be 30. A sum of Rs. 2 will be deducted for each service short of this number and no grant will be sanctioned unless 20 services at least are recorded in the year.

Subsequent years.—A sum of Rs. 60 for the minimum number of services which should be 60; a reduction of one rupee will be made for each service short of 60. The grant for proper maintenance will be the same as in the first year but will be subject to reduction according to the condition of the bull. No grant for maintenance or services will be sanctioned if the number of services performed is below 20.

2. The grant will be made at the end of the year, after the inspection of the bull and will be renewed at discretion year by year for the same bull and on the same conditions up to the date of its removal from the scheme.

3. In recommending premium to be granted for bulls in the premium scheme, inspecting officers have to state the number of calves born to the bull, and the number inspected.

4. In order that the inspecting officers may see a greater number of calves born to the bulls, the following procedure will be followed:—

(*a*) A month before the inspecting officer visits a premium bull, the owner will be intimated of the date of his inspection. The latter should inform all those who have calves born to the bull to bring them with the cows on that date for inspection.

(*b*) The officer will then select the best heifer-calf and the best bull-calf born to the bull for award of prizes. The value of the prize will be Rs. 5 each.

(*c*) The prizes may be in cash or in kind and the nature of the latter is left to the discretion of the inspecting officer.

(*d*) In order to qualify for the award of prize, a calf should be between the age of 2–12 months at the time of inspection.

MADRAS,
4th January 1945.

T. J. HURLEY,
Director of Veterinary Services.

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4. *Exercise.*—Exercise is essential, otherwise the bull becomes slow and sluggish and shows no inclination to serve. Pay attention to the bull's feet: if the bull does not get enough exercise, the hoofs grow long and turn in and so the animal cannot walk properly. Keep the hoofs short and the soles flat by exercising on a hard road or by paring them with a sharp knife.

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If vermin or ticks appear, washing the bull with MacDougall's Dip or Cresol will be found beneficial.

6. *Service of cows.*—It is not advisable to run the bull with the cows. If this is done, the bull serves the cow repeatedly until both the cow and the bull are exhausted with the result that the cow may not prove in calf and the bull becomes unfruitful at an early age.

One service is sufficient, if the cow is in proper season. Double service exhausts the bull, achieves no purpose, endangers his fruitfulness, reduces his condition and constitution, diminishes the number of cows he can service in one season and consequently the good he can do in the district.

III. INSTRUCTIONS FOR THE WORKING OF THE RULES.

1. The bull will, in the first instance, be approved by the Livestock Development Officer or the District Veterinary Officer concerned. The bull should be available for inspection by any officer of the Civil Veterinary department. Each bull maintained in the premium scheme will be inspected by the District Veterinary Officer or one of his assistants at least once in each period of three months from the date of inclusion into the scheme. Provided that the prescribed conditions in respect of care and management and the number of services to be

LEAFLET No. 19]

CIVIL VETERINARY DEPARTMENT, MADRAS.

THE FLIES THAT CAUSE DAMAGE TO LIVE-STOCK.

Flies are insects which possess three pairs of legs and one pair of wings. They reproduce their kind by laying eggs which hatch into larvæ. The larvæ are conical in shape, the head end being more or less pointed. On the head are two small hook-like "jaws." These larvæ feed vigorously for some days till they are full-grown, then stop feeding and pupate. The full-grown larvæ usually crawl a few inches under the soil for this purpose. In some kinds of flies the females produce young larvæ instead of eggs. Inside the pupal case the larva develops into a fly and this comes out by breaking open the case. So from the pupal cases male and female flies emerge and continue their life cycle.

Flies can be conveniently divided into two groups, viz.—

(*a*) Flies that bite and suck blood. Most of such flies breed in water with a few exceptions.

(*b*) Flies that do not bite, but feed on the discharges from wounds, dried sores on the bodies of animals, or on filth. They breed in manure, putrid meat or in the flesh of living animals.

(*a*) The important flies that bite and suck blood are mosquitoes, or gnats, gad flies, stable flies, forest flies and certain midges. Mosquitoes and midges, though they suck blood and torment animals to some extent, are comparatively of little importance in Veterinary Entomology, excepting that some species of them transmit the "heart worm" in dogs and certain other tissue parasites in other animals. In man certain class of mosquitœs transmit malaria, filariasis, yellow fever, etc.

The stable fly (Stomoxys calcitrans) resembles to a great extent the house fly (Musca domestica), but it has a fairly long proboscis or snout for piercing the skin and sucking blood. It breeds in moist organic matter such as rotting grass and hay or in stable manure. Its eggs are laid in batches and they hatch into tiny whitish maggots or larvæ. They feed on organic matter in the manure, etc., for about a week and then pupate in the dry parts of the manure or in soil some little distance away from the manure. Adult male and female flies emerge from the pupæ in about a week or ten days. Under favourable conditions the least time taken between the egg stage and the adult is about twelve days.

The stable flies are pests to cattle and horses and even to other animals. They sometimes bite even man. Their bites, besides causing irritation may transmit mechanically organisms of anthrax, surra and other diseases. They also act as intermediary

hosts of the stomach worms of horses. The ordinary house flies also act as intermediary hosts of those worms. Horses get infected with those worms by inadvertently swallowing the flies in the bodies of which the larval worms parasitise.

There is another fly, but smaller than the stable fly, called the " horn fly " (Lyperosia). They seem to cluster round the base of the horns of cattle. Their bites irritate and such irritation often causes reduction of milk in milch cows. They breed in fresh cow dung. It is not known if they convey any diseases.

The gad flies which are also called horse flies or clegs (Tabanidæ) are large and robust flies. They are about four or five times bigger than a stable fly. They have a fairly large head and in most of them the eyes are finely coloured during life. The females with their formidable biting parts of the mouth are inveterate blood suckers but the males have no biting parts in the mouth and feed on vegetable juices. These flies breed in water of streams, tanks, ponds or paddy fields with a standing crop, etc. The eggs are laid in masses on twigs or leaves overhanging water. The eggs hatch in about a week or more and the larvæ fall into the water and lead an acquatic life. They feed upon life in water such as larvæ of mosquitoes and others and grow. They take about four to six months to be full-grown larvæ and then crawl into damp earth or decaying vegetation to pupate. It takes about two to six weeks for the pupæ to hatch. The least time recorded between the egg stage and the adult fly is about six months. There are three kinds of flies in this family, viz., Tabanus, Hæmatopota and Chrysops. They all inflict very painful bites which cause much irritation to animals. Blood oozes from the wounds caused by them, hence loss of blood is of some consequence if a large number of flies attack an animal. These flies are known to transmit mechanically surra, anthrax and other septic infections to cattle and horses. Swamp fever in horses is also transmitted by these flies. The wounds inflicted by the gad flies are frequented by the house flies because they get the oozing blood to feed upon. These flies in their turn may infect wounds with septic material, etc.

The forest flies (Hippobosca) or " blind flies " as they are sometimes called, have a leathery integument and their thorax looks as if it is enamelled with a dusky white colour with mottlings on it. They have wings but apparently they are too lazy to fly and when disturbed they only change their places from one part of the body to another part of the same animal. These flies give birth to full-grown larvæ which pupate immediately. The adult fly emerges from the pupa in about ten to twenty days. On sheep is found a variety of fly closely related to the forest fly called ked (Melophagus). Keds have no wings. The keds give birth to larvæ and they pupate on wool of sheep. The forest flies suck blood but ordinarily may not take part in transmission of

diseases in cattle, etc. They, however, cause much inconvenience to animals. The keds on the other hand cause damage to the fleece and transmit a non-pathogenic blood parasite of sheep.

(*b*) In the category of flies that do not bite are the species which may be called "Maggot flies." The life history of these flies is essentially alike in all kinds and any differences will be noted in the text below. The larvæ of these flies are responsible for causing damage to animals. They cause a condition popularly known as " Fly blown, " " Maggoty " or " Myiasis." Maggot flies may be divided into two groups, viz., those that have mouth parts for feeding and those that have no mouth parts. In the first group are found green bottle fly (Lusilia), blue bottle or common blow fly (Colliphora), the flesh fly (Sarcophaga) and the screw worm fly (Chrysomia). In the second group are the " bot " flies, viz., the sheep nostril fly (Oestrus), the warble fly (Hypoderma) and the bot fly (Gastrophylus).

The green bottle fly of sheep (Lucilia serricata) has its body coloured a greenish metallic hue with an extraordinary fine lustre. This fly causes considerable damage to sheep in many countries, by breeding in the soiled wool under the tail, etc. Each fly lays as many as 500 eggs arranged in clusters of 40 to 50. The eggs are creamy white in colour, and hatch into tiny whitish larvæ and each of these bears a pair of two black hook-like jaws at the pointed head end. These larvæ are very active and bore through the skin of sheep and live upon fluids and discharges provoked by their presence in the wounds they make. They gorge themselves with those fluids and grow fully in about six days and then drop of on to the grounds, crawl into crevices and pupate. Adult flies emerge out of the pupæ in about two weeks or so and proceed with the life cycle once more.

Next in portance is the blue bottle or the common blow fly. It has a metallic blue coloured body and larger in size than the green bottle. This fly is often heard buzzing about in kitchens, meat shops, etc. It also causes a maggoty condition in sheep. The female fly deposits her eggs on the wool of the hind quarters or elsewhere, soiled with fluid excreta. The flesh fly (Sarcophaga) is as big or slightly bigger than the blow fly. It is leaden grey in colour and is chequered black and grey on the abdomen and striped across the thorax. These flies produce tiny living larvæ or maggots instead of eggs. They also behave like the blue bottle in producing myiasis in sheep. The maggots of the blue bottle or the flesh fly usually prefer decomposing meat or filth to sheep. The larvæ of those two flies are surface feeders and do not burrow through the skin to any extent, but crawl about under the soiled and matted wool and feed on filth found there. A number of them may be seen pupating in the wool though normally they drop off to pupate in the soil. The time taken to complete their life history is about the same as in the green bottle.

As regards the screw worm flies, they cause a fly blown condition of wounds in general and sometimes they attack the external genitals of animals. Most of these flies are fond of breeding in dead meat but some are purely obligatory and breed in wounds, etc., of living animals only. The best example in this country of the latter is Chrysomia bezziana. This fly attacks any class of animal and causes cutaneous myiasis. Maggots in wounds or on the skin cause considerable amount of irritation, hence those animals attacked do not get sufficient rest, and do not feed properly. Some animals may go lame in one or more limbs caused by the damage in the muscular parts of the limbs. Animals may be seen rubbing the maggoted parts to a post or fence and this may cause bleeding. In sheep there is loss of wool and also loss of condition. Other animals too lose condition. Though myiasis is not immediately fatal to them, yet, the economic loss is considerable and adoption of preventive measures is necessary.

The measures to be adopted against these flies in general are as follows :—

(1) Prevent such flies breeding in offal and carrion by burying such materials.

(2) Dispose of filth and manure to prevent flies breeding in them. The manure can be spread in a thin layer, over the fields as soon as collected daily. This dries it up and flies cannot breed in it when there is no moisture in it. If the manure is collected in a pit, it must be well pressed so as to close down crevices in which the flies breed. A layer of earth may be spread over the manure to prevent flies getting at it. In well packed manure, the heat caused while it is rotting, is inimical to the development of larvæ of flies.

(3) Trap flies and destroy them. There are different kinds of traps for the purpose which can be made at a small cost.

(4) Prevent attacks of flies by applying medicaments which are repellant to them on the bodies of sheep and other animals. Neem oil, camphor in oil, tar diluted in oil, etc., can be applied repeatedly to repel fly attacks. In sheep the best method is to dip or spray them with a quarter per cent arsenical solutions. Powders for such dips are available in the market with instructions how to use them.

The flies that have no mouth parts with which to feed are the so-called " bot " flies. They are obligatory myiasis producers. They breed in the flesh, etc., of living animals. Three of these are important, viz., the sheep nostril fly—Oestrus ovis which normally attacks sheep; the warble fly—Hypoderma bovis, Hypoderma lineatum which attack cattle and Hypoderma crossi which attacks goats; the bot fly—Gastrophylus equi attacks horses.

The sheep nostril fly is widely distributed in India. It is much larger than the house fly, has a yellowish head, brownish grey thorax and an abdomen mottled with greyish white, yellow and black. The general effect of the colouration is that of a greyish yellow fly of a more or less hairy appearance. The female after mating nourishes in her body a clutch of eggs till they are hatched. She then seeks out a sheep fold or a field containing sheep and starts laying her larvæ in the nostrils of sheep. In attempting to do this, she darts frequently to the nose of a sheep and each time deposits a larva in the nostril. The peculiar buzzing of these flies in flight is recognized by sheep and they get alarmed and scared and rush about madly snorting and sneezing. They stop now and again and rub their noses against the ground or against their forelegs. They sometimes close up in a group with their heads together to hide their nostrils, from the attack of these flies.

The maggots when laid on the nostril crawl upwards along the mucous membrane until they come to rest in the air sinuses of the head. Here they remain for about eight to ten months during which time they feed and grow. Each maggot is provided with a strong pair of jaws and rows of spines on the body. They live upon serum, mucous and purulent material which are provoked by the irritation and inflammation they set up. Each sheep may harbour two or more " Head maggots " as they are called, in their head sinuses and the symptoms presented by the sheep depend on the number of maggots. When only a few maggots are present, the symptoms may be some little discharge from one or both nostrils, with an occasional violent sneezing. If there are a number of them the symptoms are tossing of the head, rubbing the nose against the fore-limbs, swelling of the face, profuse discharge, sometimes blood stained, from the nostrils. The sheep may turn in circles and when it walks it lifts its forelegs much higher than normally. Its gait becomes uncertain and it may fall when excited or frightened. These acute symptoms cause loss of condition in sheep and some may even die. Otherwise, the sheep begin to recover and the symptoms abate after the illness has lasted for some time. This is because the maggots having become mature, release their hold and are sneezed out. The full-grown maggots that fall on the ground crawl a few inches into the soil and pupate. In five to six weeks the adult flies emerge from the pupæ and again commence their life history.

The best method to prevent these flies from depositing larvæ in the nostrils is to apply a little tar outside the nostrils of each sheep. Where flocks are large, contrivances should be devised in feeding troughs so that they get their muzzles besmeared with tar while feeding.

The " warble " flies are fairly large in size, thick set and hairy. The abdomen of these flies is covered with light yellow

hairs in front and orange yellow hairs behind with a band of dark hairs in between. The thorax is pale yellow or greenish yellow. Cattle like sheep get scared when they hear these flies in flight and run away in their attempts to escape the attack of the warble fly, and may hurt themselves in their mad rush to escape the flies. The flies persistently attack cattle, etc., and sometimes, horses and attach their eggs to the hair of the fetlocks. A female may lay as many as a hundred eggs in batches of four or five on each hair. The larvæ hatch out of the eggs in about three days and crawl down the hair on to the skin and burrow through it. They then wander about in the tissues and ultimately reach the tissue under the skin of the back. Here each larva causes a small nodule or " warble " and the skin over each of such nodule gets perforated, so that the larva can thrust its hind end into this opening to get air to breathe. The larvæ feed upon serum and purulent material which they provoke by irritating the place with their jaws and the spines on their bodies. These larvæ become full grown in about eight or nine months from the time they emerge from the eggs on the fetlocks. The mature larvæ escape through the openings of the " warbles " and drop down on the ground. They then burrow a few inches in the soil and pupate. In about a month or two after pupation, the adult flies emerge to continue their depredations.

Calves, young cattle and goats are frequently attacked. Excepting for poor growth and decrease in milk yield in cows, no damage to life is caused by the larvæ, but much damage is caused to the hides owing to the perforations in them. The value of the hide is lost thus causing considerable economic loss.

There are various methods of treatment adopted in removing the larvæ from the back of the animal and destroying them to prevent flies breeding from them. Such methods are useful if all the farmers act together on a large scale, and prevent adults emerging from maggots by killing the maggots before they fall out. This concerted action will reduce the incidence of warbles to a considerable extent and thus prevent much loss. There are many remedies advocated for washing the backs of infested animals. In some parts of the world they have been very successful in killing the larvæ under the skin by aplying a mixture of soft soap and decoction of " Derris root." In South India, warble flies have not been met with so far, but in the North they are plentiful.

The bot fly—Gastrophylus equi—attacks horses, donkeys, etc. Its maggots parasitise the stomach and in some instances the intestines of the horse. Each fly is brownish yellow in colour and hairy. The female has the hind end of its abdomen—the ovipositor—bent inwards on itself. These flies resemble bees to some extent. The fecundated female fly hovers about a horse and repeatedly darts on the fetlocks, shoulders, etc., and each time

glues an egg on a hair. During this act of the fly the horses get alarmed and scared. They may slip and fall in the stall and injure themselves or if they are on a pasture, they rush about madly. The eggs hatch when the animal licks the parts or when it rubs the parts against an object in the stable. The larvæ irritate the skin and are licked up. They get swallowed or they penetrate the mucous membrane of the mouth and ultimately wander through tissue into the stomach. These larvæ or " bots " as they are called, have a pair of jaws by which they hang on to the mucous membrane of the stomach and also spines on their bodies. In the stomach they are usually found attached in clusters. They feed on the inflammatory juices which they provoke by irritation and grow for nearly seven to nine months. After that period they loosen their hold and are passed out in the fæces. As soon as they reach the earth they burrow some inches in the soil and pupate. The adult flies emerge out of the pupæ in about six to eight weeks, and the life history is repeated.

A large number of these larvæ when present in the stomach may interfere with stomach digestion and may even interfere with the passage of food from the stomach into the intestines. This may result in loss of condition in those animals. Some of the larvæ on their passage through the intestines may again attach themselves to the rectum and cause irritation.

The most effective treatment is to administer suitable doses of carbon-di-sulphide in capsules to kill the maggots. Whenever larvæ are passed in fæces they should be burnt. Grooming the horse regularly and frequently will prevent the larvæ from reaching the mouth.

In North India camels are attacked by a nostril fly called Cephalopsis titilator. The fly resembles somewhat the sheep nostril fly. Elephants in this country frequently harbour " bots " in their stomach. The fly concerned is Cobboldia elephantus, a black fly. It lays clusters of eggs at the base of tusks or tushes and the " bots " behave in the same way as those found in horses.

In conclusion, it is interesting to note that sometimes, man gets infested with the larvæ of all the bot flies which cause what is called " creeping myiasis " under the skin. The screw worm fly often causes cutaneous myiasis in man and the larvæ of certain species of the flesh fly—Sarcophaga—cause intestinal myiasis. It is therefore necessary to reduce the incidence of these flies by adopting measures inimical to their multiplication and their depredations and thus prevent economic loss.

MADRAS,
4th November 1938.

P. T. SAUNDERS,
Director of Veterinary Services.

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LEAFLET No. 20.

CIVIL VETERINARY DEPARTMENT, MADRAS.

SOME COMMON AILMENTS OF SUCKLING CALVES.

Introduction.—With a view to help those cattle owners who are not able to obtain veterinary aid in time, the following short note about some of the common ailments of suckling calves is prepared to serve as a sort of first aid. The drugs recommended are available in almost every home and bazaar.

1. *Constipation.*—This is a fairly common complaint met with in young calves. The first noticeable symptom is that the dung is not passed by the animal; or if passed, it is only with great difficulty and in very small quantities in the form of dry, hard, dark pellets. Very often this is coated with mucus. The animal becomes dull and listless and frequently grinds its teeth. It may also go off its feed and there may be a slight bloating of the abdomen.

Causes.—The commonest cause is insufficient feeding, as for instance, when the cow is milked completely leaving little or nothing for the calf to suckle. It may also be due to a heavy infection with worms. Sometimes it is due to withholding of water from the animal.

Treatment.—If possible, an enema of warm water and soap may be given as this will give immediate temporary relief. Internally according to the age and size of the calf, 2 to 4 ounces of castor oil warmed and well shaken with 1 or 2 ounces of infusion of ginger may be given; or 2 to 4 ounces of epsom salt dissolved in about 8 ounces of water with a teaspoonful of powdered ginger may also be given. These mixtures may be repeated for 2 or 3 days until the bowels act satisfactorily. Afterwards, the animal may be given a course of digestive powder containing a teaspoonful each of Bicarbonate of Soda, powdered ginger and powdered gentian. If the calf has got worms, it must be treated for them.

The feed must be looked into and the animal given sufficient quantity of fresh warm milk. This is very essential, as otherwise, there will always be a recurrence of the complaint. Green grass and sloppy diet such as bran mashes are useful in giving tone to the bowels. The animal must be given sufficient water to drink.

2. *Diarrhoea.*—This is a condition in which the calf passes loose or watery dung which is milky white or clayish in colour. This is generally due to bad and improper feeding or even to over-feeding. It may also be due to tying the animal in damp and insanitary places. Parasitic infections also induce Diarrhoea.

Treatment depends upon the cause. Keep the animal in a clean, warm dry place with a sufficient quantity of bedding. Attend to the feeding and see that it is properly done. If its mother is sick, put the calf on a diet of rice gruel, thinly made and give it in small quantities at frequent intervals. Generally, these hygienic and sanitary measures in themselves are enough to effect a cure.

If otherwise, start with a dose of 2 to 4 ounces of castor oil emulsion. If this is not available, a mixture of castor oil, milk and lime water in doses of 1 to 2 ounces each, well shaken for about 15 minutes, may be given. This may be repeated for a couple of days. If the diarrhoea is persistent, give catechu and powdered chalk—half to one teaspoonful each—in 4 ounces of water for 2 or 3 days. Camphorodyne or chlorodyne if available, may be given in doses of 1 to 2 teaspoonful mixed with 4 ounces of water for a couple of days. Bael fruit is a useful remedy which may be tried. If worms are suspected, treat for that condition. As a preventive and also as a curative agent, lime water may be given morning and evening in doses of 1 to 2 ounces immediately after feed.

3. *Dysentery.*—In this complaint, the calf passes blood and or mucus with the dung which is passed with great straining. The appetite is impaired, rumination is suspended, dull abdominal pains are shown and there may be a certain amount of dryness of the muzzle. It may be symptomatic of parasitic diseases and also of specific diseases like Rinderpest.

Treatment.—This consists in the administration of demulcents. Castor oil emulsion—Four ounces with 10 to 30 drops of turpentine may be given in the beginning for 2 or 3 days until the straining stops. Camphorodyne or chlorodyne, if available may be given. Copper sulphate in doses of 15 to 30 grams dissolved in 4 ounces of water once a day for 2 or 3 days is very useful when parasitic infections are suspected. The feed must consist of milk, rice or linseed gruel.

4. *Worms.*—The common worms found in calves are the round ones which are reddish white in colour and 7 to 12 inches long. When these are numerous, there is a gradual loss of condition. The animal has a depraved appetite and may be seen licking walls, eating mud filth, etc. The abdomen is pendulous and there is grinding of teeth. There may be occasional abdominal pains. Sometimes, the worms may be seen passed with dung.

Treatment.—A dose of castor oil—2 to 4 ounces with half to one teaspoonful of turpentine—is very effective in expelling the worms; or a dose of asafoetida—quarter rupee weight—in 3 or 4 ounces of milk may be given every morning for 5 or 6 days, when the worms will all be cleared out. Tender margosa leaves and common salt made into a paste and given every morning for 3 or 4 days is said to be very efficacious.

5. *Ring worm.*—This disease is specially common in calves and is frequently seen in the head, face and neck, occasionally on the body and rarely on the legs. It generally starts as a ring like patch on which the hairs stand erect. These patches are covered with greyish white crusts. There is irritation and itching and the affected animal may be seen rubbing the parts against walls, posts, etc., and when the crusts fall off a reddish raw surface is exposed.

Treatment.—Isolate the affected animals and thoroughly clean the walls, posts, etc., wherein the animals had rubbed themselves.

It is a good thing to burn the rope and bedding of the animal. Thoroughly wash the affected parts with soap and water and remove the crusts. Paint the patches repeatedly with Tincture Iodine. If this does not cure the complaint, veterinary aid should be sought. It is necessary to improve the general condition of the animal by feeding it on good and nourishing diet with plenty of vitamin content. Cod liver oil or groundnut oil in doses of half to one ounce with 2 ounces of lime water may be given with advantage every day for some time.

6. *Mechanical Bronchitis.*—This condition is frequently seen in young calves. It is generally the result of careless and forced pouring in of medicines or other fluids down the throat of the animal. A portion of this liquid gets into the wrong passage, viz., wind pipe and sets up irritation and inflammation. As a result, the calf starts coughing violently. There is difficulty in breathing and the animal is extremely distressed. There is sometimes some discharge from the nostrils. The animal goes off its feed and rumination and becomes very dull and listless. Many animals affected with this complaint succumb.

Treatment.—Is not very satisfactory and the sooner veterinary aid is obtained the better. Steam inhalations with eucalyptus oil may be tried. Take a small bucket, fill half of it with boiling water, cover it up with a small quantity of straw and add a teaspoonful of eucalyptus oil. Hold the nose of the calf over this steaming bucket and make it inhale the medicated vapour as it arises. This may be repeated 3 or 4 times a day. This will induce sneezing and coughing which is highly beneficial for the animal. Some of the offending materials may, in this way, come out.

Preventive measures consist in drenching animals carefully and slowly, whenever drenching becomes necessary.

7. *Imperforate Anus.*—This condition is seen in some young calves at the time of their birth. The calf is born without any opening for the passage of dung. The animal may be straining to pass dung and the part where the anus ought to have been, may also be seen to bulge out but with no result. An artificial anus has to be improvised as otherwise the calf will die. This is a delicate operation to be done by a qualified Veterinary Surgeon and his help should be sought for without delay.

8. *Umbilical abscess.*—This is a condition which comes on from neglect of the umbilicus after the calf is born. The part gets hot, hard and painful to start with and later on cold and fluctuating. Relief can be obtained only by surgical operation and it is therefore desirable to get veterinary aid without delay. Hot fomentations will go a long way in relieving the pain of the part.

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P. T. SAUNDERS,
Director of Veterinary Services.

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CIVIL VETERINARY DEPARTMENT, MADRAS.

Importance of milk as an article of food and the diseases communicable through milk.

Milk has been considered from very old times as the perfect food for the young from birth to weaning and for the invalid and convalescent. This is so on account of the well balanced nutritive constituents which are easily digested and assimilated by the young and weak. The composition of milk is such that all the needs for the growth and maintenance of the body are found in it and no other single natural food can successfully replace it.

The constituents of the milk are—

(1) Water 87·20 per cent.
(2) Milk fat 3·90 per cent.
(3) Milk sugar 4·75 per cent.
(4) Nitrogenous compounds 3·40 per cent.
(5) Different salts 0·75 per cent.

In addition, it has enzymes or ferments and the various vitamins that have a specific role to perform in the animal economy. Milk should therefore be as rich in these substances as possible besides being clean and wholesome for use as a good food. Milk, though a good health-giver, is equally a disease-transmitter, as many disease-producing bacteria or organisms and viruses may gain entrance into milk and thrive under conditions favourable to them. The consumption of such milk may be injurious to the health of human beings and animals.

There are in nature many chances by which the milk may get infected unless special precautions are taken from the time of its production till it is consumed. The chief sources of bacterial infection in milk are—

(1) The cow itself when it is suffering from diseases whose specific or causal organisms are excreted through milk or when the discharges or excretions of the cow containing the specific bacteria and get a chance to contaminate the milk.

(2) The cow attendant who is suffering from some contagious disease.

(3) The utensils used for milking, storing and transmitting the milk to the consumer.

(4) The unwholesome water used for cleaning the udder, utensils, etc.

(5) Other external sources due to improper handling and transmission of milk, keeping it exposed, etc.

The diseases that are transmitted may be those affecting animals or human beings or both. The following are the diseases that are

communicated from one animal to another and to human beings through milk :—

(1) Tuberculosis bovine.
(2) Cow-pox.
(3) Contagious abortion.
(4) Rabies.
(5) Anthrax.
(6) Foot-and-mouth.
(7) Actinomycosis.
(8) Digestive disorders as enteritis due to bacillus entericitis of Gairtner.
(9) Mastitis.

Tuberculosis.—This is a disease which affects both man and animals and is characterized by fever, chronic cough, diarrhœa and progressive emaciation. A cow suffering from tuberculosis may discharge the bacteria through the nose, mouth and through the natural excretions and through the milk. In animals affected with tuberculosis, the milk may be infected, though the udder may not show clinical symptoms and look apparently healthy. The milk of an infected cow should not be mixed with that of a healthy cow. All milk should be boiled before drinking and all cows tested periodically with tuberculin.

Cow-pox.—This is an attenuated form of small-pox. It is a contagious disease affecting other animals and human beings. It is characterized by fever and pustular eruptions. Nodules of the size of a pea first appear on the udder and teat ; these become bigger and form vesicles with clear transparent lymph. On the body and udder, these vesicles are uniformly round and on the teats oval, showing a well defined depression in the centre. These vesicles become purulent and later form scabs. The disease is found in all the animals, cow, sheep, goat and horses as well as man. The milk from the affected animals is particularly harmful to children who are not protected by vaccination. The infected milk may also produce digestive disturbances.

Rabies.—This is a fatal disease affecting all animals and man, and is generally transmitted through bites, as saliva is the chief infecting fluid. The milk of animals suffering from this disease is supposed to contain the virus and may infect other animals, especially in cases where there are wounds or ulcers in the mouth, etc.

Anthrax.—Bacillus anthracis, the causal agent of this disease, has been found in the milk of animals just before death. Fortunately, the chance of transmission of the disease through the medium of milk is very small, as milk secretion generally stops in cases affected with the disease ; but the chances of infection should

not be lost sight of. The disease produced is generally malignant pustule in man.

Foot-and-mouth.—This is a highly infectious disease of animals, especially the ruminants, characterized by high fever and formation of vesicles in the mouth and interdigital spaces which rupture and leave a raw sore. The milk is said to contain the virus of the disease and it produces soreness of the mouth in human beings.

Actinomycosis.—The possibility of infection of human beings by organisms of this disease—ray fungus—through milk, though more remote, cannot be ignored. The organism, if present in milk, may affect human beings only when there are some raw wounds such as intestinal ulcer, a labial sore and those seen during teething.

Mastitis.—This is a common disease amongst dairy cattle and is caused by a variety of streptococcus and other organisms. Though the true cause of mammitis, i.e., streptococcus mastitis, may not be pathogenic to man, the other organisms that are usually found as streptococcus hæmolyticus can infect human beings and produce septic sore-throat.

Cases of food poisoning have been reported and traced to consumption of milk from cows suffering from intestinal disorders, the causative organism being Bacillus enteriditis of Gairtner which may contaminate the milk supply by means of infected fæces.

The importance of cuts and abrasions on the udder or teats should not be overlooked as these may prove a suitable medium for pathogenic organisms. There have been reports of diphtheria in human beings by consumption of milk from cows which had wounds in the teats which were infected through the hands of milkers who had diphtheria.

There are other diseases such as typhoid, dysentery, diphtheria, scarlet fever, cholera, septic sore-throat, human tuberculosis, etc., which, though primarily of human origin, are sometimes communicated through milk which has become contaminated through persons who are either suffering from the disease or are carriers of the disease. Sometimes too, milk gets contaminated by flies and other insects transmitting the germs of the disease from infected fæces and discharges to the milk direct. A brief account of the more important ones is given below :—

(1) *Typhoid fever.*—This disease is due to Bacillus Typhoisis. The fæces or urine of patients or of the carriers are the chief sources of infection. Infection may take place through the hands, body, clothes and other belongings of the milker or through contaminated water or by flies. Contamination through human agency can be avoided if the milker, a convalescent from typhoid fever or an attendant on persons suffering from typhoid fever, is kept away

from dairy cattle till declared free. Milk from such sources should be well boiled before use.

(2) *Diphtheria.*—In man, the disease is commonly seen in children. It is caused by Bacillus diphtheria. An acute diphtheritic inflammation of the mucous membrane of pharynx and upper air passages with high fever and other constitutional symptoms is observed during the course of the disease. Bacillus diphtheriæ grows well in milk and produces changes which are not ordinarily noticeable. They gain access to milk chiefly from carriers who emit bacilli through coughing, sneezing or through hands contaminated with saliva. Milk from infected cows should be discarded.

(3) *Septic sore-throat.*—This is caused by pathogenic streptococci. The mode of infection is similar to that described in the foregoing item. Boiling milk well renders the milk potable.

(4) *Human tuberculosis.*—A tubercular employer might spread the infection and contaminate the milk by coughing and sneezing, etc.

There are thus, many ways by which milk may be contaminated and become the medium of transmitting the disease from animals to animals, animals to man and man to man.

As milk from cows is a product indispensable to the well-being of every human being, besides its own kind, a thorough inspection of the cow as to its health is absolutely necessary. Again, the cattle shed, milking yard, utensils, etc., used should be hygienically clean and sanitary. The attendants employed should be healthy and trained to observe only clean habits. Proper care must be taken to eliminate other sources of external contamination. Using of unboiled milk should be avoided. A strict observance of the above principles and continued veterinary supervision and consultation would minimize considerably the dangers that are likely to arise otherwise.

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T. J. HURLEY,
Director of Veterinary Services.

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CIVIL VETERINARY DEPARTMENT, MADRAS.

VETERINARY HYGIENE IN THE CONTROL OF DISEASES IN ANIMALS.

Introduction.—It is proposed to give a few hints indicating how animals have to be cared for so that they may not fall ill. Many of the ailments of animals are due to carelessness on the part of the owner or attendant. It must be said here that such carelessness very often not only endangers the life of the individual animal concerned, but enables the spread of diseases to other animals and at times, to human beings when the same happen to be of infectious nature. By careful adoption of the following measures, animals can be kept in good health and the best obtained out of them.

Accommodation.—Animals require a house or shed to protect them from inclement weather. This house should be as simple as possible with impervious and non-slippery flooring. The solid excreta and soiled food, bedding, etc., should be removed to a pit far away from the place as frequently as possible—at least three times a day. There should be a proper drain to lead away the urine and washings. The fittings in the house should not be of wood into which dirt may soak. This house should always be clean. It should be well scrubbed and thoroughly washed at least once a day and some disinfectant used when necessary.

Air.—Animals just the same as man, require a large and continuous supply of pure air. Whenever possible they should be allowed in the open. Their houses should be provided with suitable windows or other means for the outlet of foul air and inrush of fresh air. It is essential that this should be of an uninterrupted nature. Want of attention to this important factor may lead to various respiratory diseases, unthriftiness, etc.

Water.—Animals need an unstinted supply of clean water for drinking. If possible, a supply of it in a clean tub or bucket should be kept at a convenient place which they can reach. If that is not convenient, they should be watered at least three or four times during the day. There are many diseases conveyed through contaminated and foul water. Great care should be taken that animals are not allowed access to dirty ponds and marshy lands. Common water-troughs are a source of danger especially when infectious diseases prevail. Such troughs should be closed during an outbreak. At other times, they should be scrubbed and cleaned at least once a day and then filled with fresh water. It is a good plan to limewash them once a week or so.

Food.—There are a variety of foodstuffs suitable for the various kinds of animals. The most important thing to see about these foods is that they are clean and in good condition. The grains should not be too fresh, mouldy or infested with parasites. The

animals should get the necessary quantity in accordance with their work, milk yield, etc. Oilcake is another foodstuff commonly used. Many digestive troubles arise due to eating rancid oilcakes. Oilcakes should be properly stored and not allowed to get damp and mouldy. Hay and straw are liable to get mouldy and decomposed especially in wet weather. When available, green forage should be allowed; and this specially to milch cows and growing calves.

The animals should be fed from clean troughs which should be cleaned immediately after and left to dry. All animals require a small quantity of common salt to be added to their food. A very important matter to bear in mind is that all animals should be fed and watered at regular times every day. They should not be fed or watered immediately before work or soon after exhausting work. They can, however, have a small quantity of water after such work.

Exercise.—All animals should be given some exercise, milch cows should be allowed to go out grazing, if possible, calves should be allowed to run about in sunny yards or grass lands. Working animals should be given judicious work and never overworked.

Conclusion.—Careful attention to the above points will minimize the risk of many diseases in animals. However, one cannot be too careful about the prevention of contagious diseases. These diseases spread from animal to animal either by direct contact or by infection being carried from the affected animal to other susceptible healthy animals by the agency of man, dogs, birds, etc. In many cases the spread of such diseases can be prevented by strict segregation of the sick from the healthy animals and destroying all infectious materials. In addition to these measures, which are in the nature of first aid attention, immediate step should be taken to secure the services of the officers of the Veterinary Department who have the means of effectively protecting animals from many of such contagious diseases.

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CIVIL VETERINARY DEPARTMENT, MADRAS.

Tick fever in animals.

Tick fever in animals is widely prevalent in South India as in other parts of Tropical and sub-tropical countries. The disease is also known as "Red water" in cattle, "Biliary Fever" in horses and "Malignant jaundice" in dogs. The disease is caused by organisms in the blood and is transmitted from the sick to healthy animals by various kinds of Ticks which act as intermediary hosts of the organisms. Animals of all ages are susceptible more especially imported animals.

An affected animal shows dullness, has a mild diarrhœa and high fever in the early stages. The fever persists, the bowels get constipated, the coat becomes dry and harsh and the breathing becomes rapid. There is loss of appetite and rumination becomes irregular or it may be suspended. The animal gets emaciated and the eyes appear yellow owing to some amount of jaundice caused by changes in the blood brought about by the organisms multiplying in the blood. The urine is coffee coloured in many of the sick animals, owing to the presence of blood pigment in it. The milk yield in cows gets diminished from the beginning of the disease.

The disease may run a more or less rapid course terminating in death in about a week or ten days after the onset of the symptoms or some of the animals may recover after about three weeks illness. Those that recover develop some amount of resistance to fresh infection but they remain carriers of the disease organisms for a fairly long period of time. Trypanblue is a cheap specific for this disease in cattle and dogs and the animal should be injected with a solution of that drug. In horses the drug of choice is Quinine-bi-hydro-chloride which is also injected into the blood as a solution. A veterinary assistant surgeon is trained to give the treatment after diagnosing such cases and he should be consulted in such matters.

The transmitting agent of the disease organisms is the Tick. Ticks, usually the females, suck blood from animals, during which process they remain on their host for two to four days. When they have sucked blood to repletion, they fall off and crawl into crevices of the ground or in the buildings used for animals, and there lay eggs. Each female tick may lay from two to six thousand eggs and she then dies. The eggs hatch into larvæ called "Seed ticks." These tiny young ticks reach animals, suck their blood, fall off and seek crevices for protection. They then moult there and become nymphs and repeat the process of sucking blood and

moulting a second time to become adults. It is during these intermittent feeds that ticks receive and transmit the organisms of "Tick fever" from animal to animal. Hence they have to be dealt with when they are on the animal's body and also when they are moulting in the crevices of the ground. To destroy ticks, the bodies of animals, particularly cattle and sheep, should be sprayed with a quarter per cent solution of Sodium arsenite (sheep or cattle dip), or the herd or flock may be "dipped" in such solutions in suitable tanks built for the purpose. The floors and walls of the sheds where animals are housed should be scraped and burnt and the crevices filled with mortar. If pasture lands are infested with ticks it is best to starve the ticks out by closing the pastures for a year after dressing the ground with lime or common salt or by burning the pastures after cutting down all shrubs. The choice depends on the nature of the land infested. Roughly about a ton of lime or half a ton of salt per acre will be required for top dressing. It is a good policy to adopt pasture rotation which will help in starving the ticks to death. It is obvious therefore that to minimize the incidence of Tick fever among animals, it is necessary to treat the affected ones and at the same time destroy the ticks as far as practicable by adopting the methods suggested.

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CIVIL VETERINARY DEPARTMENT, MADRAS.

THE MOST PRACTICAL METHODS OF CONTROL OF ENTOZOAL PARASITES IN INDIA.

Entozoal parasites are those that live inside the body of other animals called "hosts" and obtain food and protection from them. Entozoa themselves are animals in which special development has taken place in accordance with the mode of life which they have adopted. Entozoa may be single-celled, when they are called protozoa, or they may be made of many cells, when they are named metazoa. An animal is said to be a "definitive" or final host of a parasite when the sexual stages of the latter are found in the former, and the larvae or asexual stages are found in what are called "intermediate" hosts. Parasitic infestation to healthy animals may be either direct or through an intermediate host. The pathogenic effects on the final host depend on the number of parasites, their habits, migration in the host and the degree of adaptation between the host and the parasite. It is essential to have a knowledge of the life-histories and the habits of the parasites concerned to enable one to adopt effective measures of control. In helminth parasites, the time that elapses from the egg stage to the infective larval stage is the most critical period in its life-cycle and a knowledge of the stages of development during that period gives us a clue in adopting control measures.

A. *Protozoa.*—These are unicellular animals which live in the blood and tissues of animals. Among these there are three important ones which affect the domestic animals, particularly cattle.

1. Piroplasma organisms cause the so-called "Tick fever" or "Red water". These organisms are found in the red blood cells which are destroyed. The affected animals suffer from fever, jaundice, red urine, etc., and die in seven to ten days. Trypanblue is a cheap specific for this disease in cattle and the animal is to be injected with a solution of this drug. The intermediate hosts concerned are ticks. Ticks, usually the females, suck blood from animals, during which process they remain on their hosts for two to four days. When they have sucked blood to repletion, they fall off and crawl into crevices of the ground or in the buildings and lay eggs. The eggs hatch into larvae called "seed ticks." These reach the animals, suck blood and fall off. They then moult and become nymphs and repeat the process to become adults. It is during these intermittent feeds that the ticks receive and transmit infection to other cattle. Hence they have to be dealt with when they are on the animal's body and in the crevices of the ground.

To destroy ticks the bodies of the animals should be sprayed with a quarter per cent solution of sodium arsenite (sheep or cattle dip), or the flock or herd may be dipped in such solutions in special tanks built for the purpose. The floors and walls of the sheds or pens, where the animals are housed, should be scraped and burnt and the crevices filled up with mortar. If pasture lands are infested with ticks it is best to starve the ticks out by closing the pastures for a year after dressing the ground with lime or salt, or by burning the pasture. The choice depends on the nature of the land infested. Roughly about a ton of lime or half a ton of salt per acre will be required for top-dressing. It is a good policy to adopt pasture rotation, which will help in starving the ticks to death.

2. Trypanosomes are unicellular animals found in the plasma of the blood of infected animals and cause "Surra" among domestic animals in India. The animals suffering from this disease, particularly horses, get varying periods of high fever, anaemia, swelling of the dependent parts of the body and die in about four to six weeks. Some cattle die suddenly without any premonitory symptoms of the disease. The life-history of this parasite is not yet worked out, but it is believed that the large horse fly, called *Tabanus*, is the vector and mechanically transmits the organisms from the diseased to healthy animals. These flies are usually active in the early part of the day and evening. Hence movements of animals in Surra areas, particularly of horses, should be after sunset or before sunrise. The flies breed in swamps and over water, and this can be prevented by draining the swamps and removing weeds overhanging the water. In Bayer 205 or Naganol is to be found both a prophylactic and a curative for this disease, but it needs to be given intravenously by a veterinary graduate.

3. Coccidia are unicellular animals that infest the lining membrane of the intestines of animals. In infected animals considerable damage is done to the intestine particularly in young stock, and severe diarrhoea or dysentery results. Prophylaxis consists in destroying the faeces of badly infected animals, as these contain the spores of the organism. Ploughing up the infected pastures will improve matters, and also improve the pasturage. No curative treatment is known.

B. *Metazoa.*—The endoparasitic metazoa can be divided into two groups, viz., the flat worms and the round worms. Among the flat worms are flukes and tape-worms.

1. *Flukes.*—These worms may live in the bile ducts of the liver, the small veins of the liver and intestine, the nasal mucous membrane or in the lumen of the intestines. They may be as large as the common liver-fluke (*F. gigantica*) and act as so many plugs to the bile ducts and throw the liver out of gear, or they

may be small, like the blood-fluke (*S. nasalis*) in the veins of the mucous membrane of the nose, or like *S. spindalis* in the veins of the liver. The eggs of the blood-flukes on their way out of the body cause considerable damage to the tissues through which they pass and produce disease. The affected animals may be treated with tartar emetic, antimosan, extract of male fern, or carbon tetrachloride, etc., according to requirements. The life-histories of the flukes in general are alike in that they require some kind of fresh water snail as an intermediate host. The eggs passed in faeces or with the nasal discharge get access to fresh water, hatch out and the embryos enter the kind of nail required by them and in this intermediate host they develop into a number of larvae which are discharged into the water in about six weeks after the entry of the embryo. From one embryo some thousands of larvae develop, and the infected snail can go on discharging these larvae daily for a week or two. These larvae are good swimmers and those of the liver-flukes and intestinal-flukes attach themselves to weeds in water and remain there for considerable periods till they are eaten by herbivorous animals along with the weeds; some other kinds of larvae enter another acquatic animal like fish, crab, etc., and encyst there till they are eaten by the definitive host; yet other larvae like those of the blood-flukes will enter directly through the skin of the definitive host when the latter comes in contact with such infested water or enter through the mucous membrane while the host is drinking it. Hence, we have to break a link in the chain of the life-history of these flukes in order to prevent animals getting infested, and the best way to do this is to destroy the snails in ponds or streams the water of which is used for drinking. The fresh water snails feed upon weeds, hence if ponds, etc., are cleared of these, the snails starve and die. Copper sulphate or blue stone is a poison to snails even in high dilutions whereas in small doses it is a tonic to animals. A handful or two of blue stone powdered and made into a solution can be poured into the water of the ponds along the edges to kill the snails. Another method is to kill the larvae and this can be done by throwing lime in the water or by storing the water for at least 48 hours by which time the larvae die, when the water can be used with impunity.

2. *Tape-worms.*—Tape-worms have a long tape or ribbon-like body. Each worm has a head or scolex provided with hooks and suckers usually and this is followed by a large number of segments, which together constitute the tape-like body. Generally, these parasites require an intermediate host to complete their life-history. These worms may be a few millimeters to several meters in length. Each segment is an individual, is hermaphrodite and when it is full of ova the segment is said to be ripe or gravid. The segments when ripe break off from the rest and are passed in the faeces. The segments that are passed out in faeces disintegrate,

and if they are on grass, the contained ova contaminate the grass on a pasture or even the drinking water may get contaminated with ova. When these ova are swallowed by animals, the embryos hatch out in the stomach and intestines, burrow through the intestinal wall and enter such organs as the liver, lungs, brain, etc., and form bladder-worms which may be small or large and may press upon and destroy the tissues of the organs. Such organs may be thrown out of gear and interfere with the animals' health. Even human beings may be subject to infestation with bladder-worms. Each bladder-worm contains in it one or more heads or scolices of the tape-worm and when meat containing such bladder-worms is eaten by the definitive host, the bladder is digested, the scolex or head is liberated, attaches itself to the intestinal wall of the definitive host and develops into an adult tape-worm. It is interesting to note that the dog is the definitive host of a large number of tape-worms and cattle unwittingly play the part of intermediate hosts of almost all of them. In being the intermediate hosts they suffer more than they would if they were subject to adult tape-worms peculiar to them as definitive hosts. To give an example, a tape-worm of the dog called *Multiceps* passes its bladder-worm stage in sheep and the bladder-worm may be found in the brain causing "Gid" or "Sturdy" and may even produce death if the infestation is heavy; whereas such tape-worms as those of the genus *Moniezia*, the adults of which are found in the intestines of sheep, may not produce much harm. Further, one can treat and rid the sheep or other animals of tape-worms in their intestines, but no treatment is of any use against the bladder-worms that have formed in the tissues or organs of animals. The easiest way out of this difficulty, therefore, lies in prevention, which is best attained by not allowing dogs on pasture lands, and thus preventing contamination of grass or water which is the source of all the trouble. Pet dogs on farms must be treated frequently to destroy the tape-worms they may harbour and their faeces burnt. The usual drugs employed in expelling adult tape-worms from the intestines of animals are extract of male fern, arecanut powder, pomegranate root, etc. Ploughing up infected pastures and preventing cattle from grazing in low-lying lands is indicated. Dogs get infested by eating the offal from slaughter-houses which may contain the bladder-worms. So these have to be killed by cooking the meat thoroughly before feeding it to dogs.

3. *Round-worms.*—There is a fairly large number of round-worms that parasitise animals. In some of them the infestation is conveyed direct to animals either by swallowing embryonated eggs or by the embryos hatching out on the ground and infecting the host through the skin or mucous membrane. Examples of these are the large round-worms (*Ascaris*), hook-worms and wire-worms (*Haemonchus*) of sheep and cattle. The ova of all the worms that inhabit the intestines are passed in the faeces. In

each ovum of an ascaris worm in about ten days or longer, a larva develops, but the egg does not hatch. The ova can remain in this condition for months or for several years, unless they are exposed to heat and direct sunlight when they die. When such embryonated ova are swallowed with contaminated food or water, the eggs hatch in the intestines, the larvae burrow through the wall of the intestines and migrate through the liver and lungs before reaching the intestines a second time for development into maturity. The migration causes considerable damage to the organs through which the larvae pass. In some worms such as the wire-worms, the eggs hatch in the open and the larvae become infective in about four days provided there is enough moisture in the field. These larvae crawl up the moist grass and get swallowed with it. In about a fortnight they develop into adults in the intestines, and ova may appear in the faeces of newly infected animals within three weeks after primary infestation. It would appear therefore that the larvae or the embryonated eggs require moisture to remain viable and such a condition is always present in low-lying or marshy places and along the edges of a pond. Hence, marshy places should be drained and weeds removed along the edges of ponds to prevent larvae on them infecting animals that graze there.

Some other round-worms require an intermediate host to complete their life-history. There appear to be three ways by which the intermediate host may get infected :—(*a*) The eggs may be eaten by the intermediate host, for example, a dung beetle or cockroach may eat the faeces of a dog containing ova of certain red-worms (*Spirocerca*) found in tumours in the gullet of dogs. The ova hatch and the larvae get encysted in the beetles or cock-roaches till these are eaten by another dog.

(*b*) The eggs passed in faeces will hatch and the larvae enter an intermediate host. In the horse there are certain worms (*Habronema*) that parasitise the stomach. The ova of these are passed in these faeces and these are thrown on a manure heap. The ova hatch into larvae there. In manure heaps, house flies and stable flies breed. Their maggots are parasitised by the larvae of Habronema. The maggots of the flies pupate and hatch out into flies. These flies have in their bodies or in their mouth-parts the infective larvae. When these flies are accidentally swallowed by the horse they get digested and the larvae become free to parasitise the stomach or the larvae may escape from the mouth-parts of the flies on the body of the animals and be licked up.

(*c*) Some worms (*Filaria*) lay larvae instead of ova in the animal's tissues and these larvae enter the blood stream and remain circulating in it. A blood sucking intermediate host, such as a mosquito, while feeding sucks them up along with the blood. The larvae develop further in the mosquito and ultimately reach the biting parts of the mosquito in about three weeks. When the

mosquito bites again, these infective larvae, which are attracted by the warmth of the new host, emerge from the biting parts, penetrate the skin of that host and wander to that organ in which they can develop into adults.

The ways and means to be adopted in combating infection with nematodes vary and they are enumerated below :—

(i) The adult worms should be got rid of, while within the definitive hosts, by giving suitable drugs. To this end, the kind of worm that is parasitising the host should be ascertained by examination of faeces, etc., and suitable remedies given to the animals. It is best done during the dry season for obvious reasons. The common drugs used are Olchenopodium, santonin, nema capsules, etc.

(ii) The ova or their embryos should be killed while within the final host. In such diseases as nasal or intestinal *Schistosomiasis* or in *Filariasis*, intravenous injections of tartar emetic, antimosan and the like will help in destroying them.

(iii) The entry into the body of the infective larvae or embryonated ova should be prevented. If round-worm (*Ascaris*) infection is suspected, plough up the land preferably with some quick lime in it to destroy the embryonated ova. When infective larvae are suspected to be present on grass, do not allow the animals to graze till the dew dries off the grass. It is a useful plan to keep animals off low-lying lands, and other wet places like the edges of pools of water, etc.

It is always beneficial to carry out rotation of pastures. If over-crowding of stock is avoided, then the infestation of ova on a pasture is reduced, the animals will have a larger area to graze and the amount of infestation in animals will be lowered. The intermediate hosts must be either destroyer or prevented from becoming infected. The manure must be disposed of properly. In dry climates the manure can be spread out to dry and collected, or it may be closely packed so that the heat generated during fermentation destroys the ova or larvae. A layer of earth may be thrown over fresh manure every time it is added to the heap. This will prevent flies, etc., breeding there. Steps should be taken to keep down the number of such intermediate hosts as earthworms, beetles, biting flies and such other insects. The bionomics of these creatures have to be studied and suitable methods employed to keep them under control.

It has been found that well-nourished animals are usually free from infestation with parasites. To obtain such animals a supply of minerals is necessary, and whenever a pasture is deficient in

these, they should be supplied to the animals. This is best done by supplying " licks " to the animals of the minerals deficient in the pastures. It is a well-known fact that young animals are more susceptible to worms than adults, hence they have to be provided with proper nourishment to keep them free from infestation. Stall-fed animals should be fed from raised troughs and care should be taken that the straw or hay and water is not contaminated with faeces on the floor.

MADRAS,
Dated 4th November 1938.

P. T. SAUNDERS,
Director of Veterinary Services.

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Leaflet No. 25.]

CIVIL VETERINARY DEPARTMENT, MADRAS.

Note on Ensilage.

Ensilage is the process of storing green grass or green fodder in pits or towers. The *silo* is the pit or tower in which it is stored. *Silage* is the name given to the contents of the silo or pit when preserved.

Object.—The chief object of ensilage is to preserve fodder in a plentiful season for consumption during seasons of drought. It is very valuable in India where fodder famines are frequent. In case of dairy farms, the silage can be fed in the hot season to milch cows when there is no grazing; it will be found to keep up the milk yields of the cows. After the monsoons, in most districts, there is a plentiful supply of grass; this is generally cut and made into hay and used either for fodder or for thatch. It should be cut when the grass is flowering, and made into silage.

Advantages.—Expense in making silage is less than that in hay making. There is no risk of fire or theft. There is less loss in weight by conversion. It is the only economical means of disposing of weeds by rendering them edible and thus saving the expense of removing them from the ground. The food is more palatable and more digestible.

Time for making silage.—Silage can be made at any time while the grass or fodder is green and is not interfered with by rain falling at the time of filling the pits. Almost all kinds of weeds, which in their green stage would be refused by cattle, make excellent silage. The grass and fodder should be cut just when they are beginning to flower. If cut when the grass is ripe and dry, it does not make good silage and in this case should be kept for hay. If the grass is a little dry, water can be sprinkled over each layer in the pit.

Crops to be used.—Grass, green cholam, cowpea, guinea, or elephant grass, sunflower, maize, green oats, etc. Maize makes the best silage. Mixtures of cholam, cowpea, and sunflower have done well at Hosur. Sunflower gives a big yield and should be cut when the plant is in flower.

Sites for pits.—The site should be in the corner of the field in which the crop is growing, for preference, as this saves a lot of expense in carting. It should be on rising ground if possible, or in places where the water does not lodge during heavy rains.

Keeping qualities.—There are no records to show how long silage will keep in pits, but at Hosur it has been kept for ten

months and in England for two years, and the silage has been found excellent.

Size of the pits.—The pits can either be rectangular or circular. At Hosur there are both; the rectangular is better, especially when the fodder is thrown in whole without being chopped. The silage can then be taken out in sections of a cubic yard at a time, just in the same manner that a hay stack is cut up with a hay knife. The pit should not be too deep, as this may entail a lot of extra labour in emptying, and secondly the bottom may be saturated with water.

Some people prefer the pits lined with masonry, but this is not necessary, as first of all it is costly, and secondly, such lining would prevent the excess water from the silage being absorbed by the soil.

The sides of the pits should be vertical; this ensures proper distribution of weight and proper compaction. If the soil is sandy and loose, the sides of the pits should be supported by a revetment of coaurse wire-netting or some other suitable material.

It has been found in the United Provinces that long unchopped silage made of cholam (jonna) or maize in pits weighs about 20 lb. per cubic foot, and this figure may be taken to calculate the size of the pits required to store as a silage a given area of crop. For instance, three acres of jonna yielding 300 maunds green fodder per acre will require a pit, the cubical contents of which are 1,200 cubic feet. A pit with the following dimensions is quite a useful size :—

8 feet deep, 15 feet long and 10 feet wide.

The cost of digging such a pit in this presidency will vary, but it will be about Rs. 10.

Cutting and filling.—The grass and fodder should be cut at the flowering stage and not later. Maize should be cut when the grain is just forming. Green fodder should be cut and carted to the pit at once to prevent loss by dryage. If some of the crop has become too ripe before it is cut, water can be poured into the pit or a very succulent crop can be cut and mixed with it if available. In order to press the silage down into the pits, a pair of bullocks can be used to trample it well down or coolies can be engaged; the portions near the sides and corners should be well trampled also. If this is not done, wastage occurs when the pit is opened. If the fodder or grass can be chopped by a silage cutter or chaff cutter, it is better, as it ensures better compaction, but it is not essential. The pit should be well filled and pressed, to about 2 to 3 feet above ground level.

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Grass silage.—My experience in this work shows clearly that fairly good silage can be made, if the grass is cut and carted straight-away to the pit between 6 and 9 a.m. After this hour, the sun's rays are strong and the grass soon withers and becomes dry. The pit can be covered with a layer of hay to prevent the sun drying up the grass each day. Cutting and carting should continue between these hours each day until the pit is filled. Silage made in this manner is far superior to that made by cutting and carting grass all day long, even if water is added to each layer. Silage made in the latter manner generally turns out in the form of musty hay and is not half so palatable as a fodder.

Grass which is fairly dry is not suitable for converting into silage.

Covering of pit.—As soon as the pit is filled as above, the earth around should be banked up against the sides first, so as to form a buttress against the piled-up grass; this prevents it from bulging out; this buttress must extend 2 to 3 feet outward from the edge of the pit all round, so as to make the pit air and water-tight. The earth is then spread on the top of the silage; about one foot of earth is necessary; this will give enough pressure so that the grass will sink; more earth should be thrown in the middle; the depth of earth should be about 3 feet in the middle; this will give a slope like the roof of a house, so that there is no water-logging and water will run off quickly. All cracks and depressions in the earth should be immediately filled up. If pit is in black cotton soil and earth around cracks, these cracks should be filled up at once to prevent water lodging in them.

Contents of pit will gradually subside and steps should be taken to see that it is kept properly water-tight and air-tight by filling up cracks. A channel, a foot wide and a foot deep, should be dug all around the pit to drain off the water.

Opening of pit.—This should be opened when the food is required, say about March or April, when there is no grazing or succulent fodder for the cattle. It should be cut with a hay knife right to the bottom of the pit. A width of one yard should be dug out at first and the remainder of the pit left covered with earth as usual. This prevents loss by dryage.

Feeding.—Silage can be fed to milch cattle, yound growing stock over one year, work cattle, etc. Cattle do not take to it all at once, and so it is necessary to mix it at first with hay or straw and feed in small quantities. After a week or so, the cattle become accustomed to it and relish it. 30 to 40 lb. can be fed daily to

milch cattle in full milk and also work bullocks. It stimulates milk production. It is a good feed for cattle suffering from " Foot and Mouth " disease, as it is soft and succulent.

General.—If land has been heavily manured, and the crop is rank, like grasses grown on sewage farms, it is better to leave it in small stacks for about 10 to 12 hours outside the pit before being pitted. This produces partial fermentation and dryage of excessive moisture.

The smell of silage is objectionable, and it will be found that the younger and greener the grass, the stronger the smell. Mature grass produces sweet silage, grown in colour.

It will be found that the silage around the sides will not be so good as that in the middle; however, this should not be thrown away if the cattle will eat it.

For a ryot possessing less than six head of cattle, it is not worth-while making silage. For six head of cattle, say 40 lb. silage per day per head is 7,200 lb. per month and for three months, this amounts to 21,600 lb. so that three acres of green fodder should be grown.

R. W. LITTLEWOOD,
Livestock Development Officer.

P. T. SAUNDERS,
Director of Veterinary Services.

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LEAFLET No. 26.

CIVIL VETERINARY DEPARTMENT, MADRAS.

Some advantages of poultry keeping.

Eggs and poultry for meat are the primary edible products for those who use them in the daily diet. During recent years the demand for poultry products has considerably increased, especially in places near towns. In such places people take so keen an interest that they are becoming specialized in poultry keeping.

2. Some people keep fowls for hobby, some for the sport of cock fighting and some to realize profit out of them. The object of this short note is for those who want to keep fowls for profit. Fowls can be reared for home use also, and when there is a chance to realize a little profit from this branch of work there is no reason why greater attention should not be paid to it.

3. The birds are docile and easy to manage; therefore one's wife or children can look after them whilst the men are employed in their fields.

4. Poultry keeping is within the scope of everybody and even a small farmer can keep a few fowls with advantage. People even in big cities and towns with some available space at their disposal can maintain a few birds. This system is generally termed as " backyard poultry keeping." With a little attention, good accommodation and proper feeding, this eventually becomes a source of a small income.

5. A good hen when fed and kept properly will eat about As. 5 worth of food in a month and will lay eggs worth about As. 11. So, by keeping thirty hens one can earn about a profit of Rs. 11 a month or Rs. 130 a year with a little trouble. Is not this income equal to the value of a crop?

6. It is distinct advantage to keep fowls in a small way in conjunction with general farming. The birds utilize enormous quantities of waste products, grains and vegetables that are on the farm.

7. The birds can be put on the stubbles, i.e., a newly harvested field and the fowls will eat the shed grains which would otherwise go as a waste, thus converting all the waste material into edible product.

8. The birds eat the insect pests and grubs that may not be noticed by us in the fields and so they assist to eradicate the pests which might damage the succeeding crop.

9. In the case of a young crop the birds can be let into the fields when the crop is a foot high. They will get plenty of worms,

insects, etc., which would otherwise do a lot of harm to the growing crop. By this system, the birds get an unlimited range and so the food bill for the birds can be reduced considerably. Poultry manure is very valuable.

10. Poultry keeping as a side line to Agriculture does really help a farmer in a variety of ways; so before deciding as how this should be started, consult the Livestock Development Officer, Hosur Cattle Farm P.O., who will give all necessary help and advice.

11. At the Livestock Research Station, Hasur, there is a poultry section which maintains birds of imported and indigenous breeds. It is managed by trained men who are in a position to give advice to the visitors. The natural and artificial methods of incubation, artificial feeding and rearing of chickens, breeding and feeding of breeding hens, different systems of housing the birds, etc., are all practised. Visitors are always welcome.

12. There is a great demand for birds and setting eggs and the farm supplies the needs of the public at a very low rate, as they become available. The breeds maintained are :—

(1) White Leghorns.
(2) Rhode Island Reds.
(3) Light Sussex.
(4) Black Minorcas.
(5) Chittagongs.
(6) Country birds.

The results for last year give the number of eggs laid in the pullet year by selected birds in each breed, as follows :—

Breed.	Number of hens.	Average egg yield in pullet year.	Highest individual yield.	Lowest individual yield.
White Leghorns ..	12	184	236	158
Rhode Island Reds ..	9	157	181	135
Light Sussex	6	143	196	109
Black Minorcas ..	3	149	167	116
Chittagongs	3	134	149	116
Country (Tellicherry) ..	5	110	141	85

R. W. LITTLEWOOD,
Livestock Development Officer.

MADRAS,
11*th April* 1940.

T. J. HURLEY,
Director of Veterinary Services.

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LEAFLET No. 27.

CIVIL VETERINARY DEPARTMENT, MADRAS.

NATURAL INCUBATION OF POULTRY.

Natural incubation.—The natural method of hatching, i.e., by the employment of broody hens is right and proper for those who intend keeping fowls in a small way, say up to 100 chicks.

Signs of broodyness.—Broodyness is a maternal instinct in all female species of birds. It is an irresistible tendency to sit on the eggs until the chicks hatch out, which the nature has provided for reproducing the species. A country hen ordinarily lays 10 to 15 eggs in three or four batches and after each such lot, she goes broody. Broody hens can be recognized by—

(1) Ceasing to lay eggs;
(2) A partiality towards a dark corner where she would like to make a nest and sit undisturbed;
(3) The feathers stand out when a person approaches it and the hen clucks;
(4) A general lack of appetite;
(5) A reduction in the seize of the comb, wattles and the reproductive organs;
(6) A rise of temperature; and
(7) A general lack of lustre throughout the face.

The average time for a hen to incubate her eggs is twenty-one days although this period may either be lengthened or shortened by the influence of the temperature to which the eggs are subjected to. She can also be employed to incubate the eggs of other species of domestic fowls.

The following are the approximate periods of incubation of eggs for the different species of fowls :—

Hen	21 days.
Duck and Turkey	28 ,,
Goose	30 ,,

Sitting hen.—Care should be exercised to see that the hen is properly broody before setting. Very often it so happens that, when a hen shows the signs of broodyness, the eggs are set and the hen after a few days of sitting deserts the nest, which is a source of great disappointment; and loss.

To test that a hen is properly broody, one or two eggs or an artificial egg can be placed under her and tried for two or three days. If the hen settles to sit on the eggs properly, it can be taken for granted that the hen is properly broody.

Selection of a hen.—A medium-sized hen which is docile and in sound health should be selected; she must be perfectly clean with no lice or mites on her body; those with scaly legs should strictly be avoided for the reason that unless the hen is perfectly clean, she will pass on all the complaints to the chicks that she hatches. Some hens are clumsy, awkward and excitable and are apt to break the eggs every time they are let out and resettle. It is therefore necessary to watch the sitters carefully and if a hen proves unreliable, it will be a good thing not to use her for the purpose. Long-legged hens are generally clumsy and the breakages of eggs are more, although some of them happen to be good mothers. Short-legged variety of hens are more reliable and as such preference should be given to them.

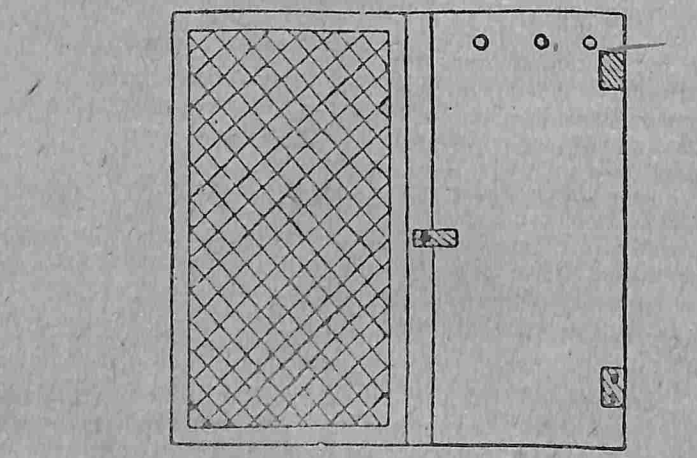
Number of eggs to a hen.—A good average size hen of imported strain can take from 10 to 12 eggs and a country hen 8 to 10 according

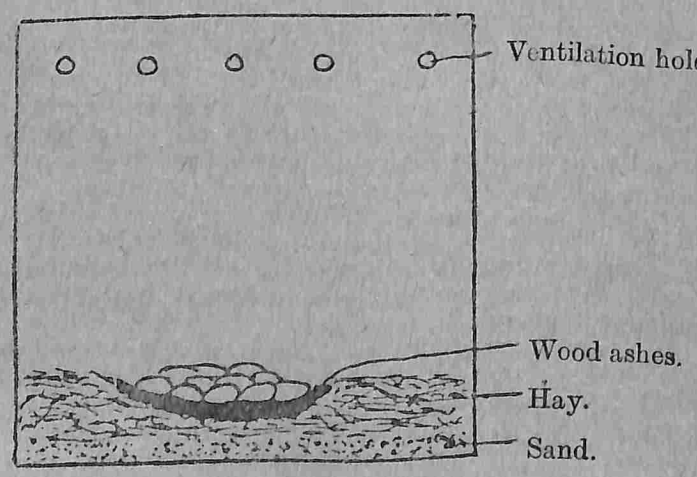
to the size of eggs. Care should be taken to see that the hen is able to cover all the eggs properly. When the hen shuffles her eggs it is quite possible that one or two eggs might be left outside and consequently chilled. So it is always safe just to give her the number of eggs which she can conveniently cover and the others removed.

The number of eggs that a hen can sit on depends on the breed and size of the bird as follows:—

	Hen of imported breeds.	Country hens.
Hens' eggs	10 to 12	8 to 10
Ducks' eggs	7 to 8	
Goose eggs	5 to 6	4 to 5
Turkeys' eggs	5 to 7	4 to 5

The nest.—It is a simple matter to make the nest, but special attention is required. A deal wood case about 18 inches square with a trapdoor in front can be taken and the nest made out of hay or straw, over a layer of moist sand. On top of the hay or straw place some wood ashes; this helps to prevent lice, etc.





Coop for Sitting Hens.

It is necessary to put some ventilation holes on the side of the box to enable free circulation of air. During the process of incubation if dry weather is experienced a little water should be sprinkled all round the nest to increase the humidity and also on the sand at the bottom of the nest. The nest proper should be made circular with a slight hollow in the centre covered with a layer of wood ashes as mentioned before. It should not be too deep as there is the possibility of the eggs rolling to the centre and consequently some breakages amongst the eggs.

The box and the nest should be dusted with some disinfectant powder to keep off vermin. Powdered sulphur mixed with wood ashes, sodium floride and tobacco dust, answer the purpose very well. A good powder can be made from a cigarette tin-full of equal quantities of petrol and carbolic, pour this over 1 lb. of plaster of paris and allow to dry.

The nest must be examined for vermin carefully once a week and action taken; if it is not attended to the hen becomes restless and does not sit properly and when the chicks are hatched out, they will be found to be covered with lice or fleas and so their growth suffers. The nest should be scrupulously clean and should never be fouled. Any broken egg or droppings should be removed and any source of contamination should strictly be avoided. If however, the nest is fouled either by a broken egg or the hen's droppings, another clean nest can be made and the remaining eggs so contaminated should be washed in warm water about 100°F. and the hen immediately returned to the nest.

Setting eggs.—Fresh eggs of uniform good oval shape and size should be selected. Too small or abnormally big-sized ones should be rejected. The shell of the egg must be of sound texture, free from ridges and encrustations. While selecting eggs preference should be given to those laid by vigorous and well-matured hens.

Storing and holding eggs.—When collecting eggs for setting they should be kept in a dry, cool, airy place. In plains they should not be kept too long. Under the best conditions, to get the best results, eggs should not be older than four to six days. In hill stations there is no harm in using eggs ten days old. As the eggs absorb odour very easily it is not good to store them near smelly substances like onions, kerosene oil, etc.

The hen and its treatment.—After having arranged the nest as described above, the nest box should be placed in a partially dark, quiet place, where there is no disturbance.

The hen should be set preferably in the evening and should not be disturbed until the following evening. She must get plenty of grain food and drink before setting. From that day onwards she must be let out once a day at a stated regular time for feeding, exercise, etc. This guarantees the cooling and turning of eggs at regular intervals.

Dust-bath.—The fowls' natural method of cleansing themselves so as to be free from vermin and parasites is to take dust-bath. So, the hen should be provided with a place for this which should contain sand mixed with wood ashes.

Feeding.—Sitting hens should be given hard grains like maize, wheat, cholam, cumbu, paddy, etc. The whole grains take a longer time for digestion and so the hen can sit comfortably on the eggs. Soft food like cooked rice and wet mash made of bran is not good for sitting hens. It is a bad practice to place either mash, grain or water in the nest itself for the hen to eat whilst sitting.

Good sitters generally do not come off the nest when required and so it will necessitate the removal of the hen by hand. While so doing it is quite possible that some eggs are concealed in her wings and

dropped and consequently broken. This fact should be borne in mind while handling the bird. Usually good sitters go back to their nests after 15 to 20 minutes when they have finished their feed, drink, dust-bath, etc.

This daily routine should continue with occasional dressing of disinfectant powder on the bird and the nest.

Testing of eggs.—The eggs are tested on the tenth day of incubation. The simple method of doing is by means of a tube made out of a stiff paper, and holding each egg between the thumb and fore-finger and middle finger exposed to the sunlight and examining it through the tube. All eggs that appear clear can be taken as infertiles and those that have spider-like structure inside with radiating lines are the blood vessels, and can be taken as " fertile " ones.

End of incubation.—The nineteenth day evening will be the final day for the hen to be allowed out of her nest. On the twenticth day the hen sits tight and the chicks start their active life. They pip on one side of the shell with their beak-horn and break open the shell and struggle. The whole hatch finishes on the twenty-first day. It is not good to help the chicks to come out as some chicks will invariably be weaklings and hand assistance will cause injuries and damage.

Conclusion.—Another clean hen coop should be kept ready for transferring the newly hatched chicks with the mother hen. The hen can be given her food but the chicks should not be fed for at least 48 hours. The chick just before hatching takes in all the yolk material in the system and this serves as reserve food for a number of days. Such being the case, they should not be over-fed, as it is likely that they may get indigestion, diarrhœa, and in fact all sorts of complications. The first food for the chicks may be some finely broken grain, e.g., wheat, maize, cholam and broken rice. Oatmeal is the best food for young chicks. The mother hen will teach them to pick up grain and drink water and all we have to do is to house them properly and keep them free from lice, mites, etc.

The essential factors for a successful hatching are moisture, heat and air. When a hen goes broody, the normal temperature of her body increases due to the accelerated flow of the blood in the system. This heat aids towards the maintenance of the eggs at a temperature of about 103° to 104° F.

An egg when placed in its normal position, the impregnated or the fertilized germ comes topmost. The yolk which contains the germ is of less specific gravity than the albumen and so it floats on it. It is the object in nature's purpose to bring the fertilized germ topmost, as near to the source of heat as possible. When a hen is let out for daily exercise (generally this occupies 10 to 15 minutes per day) she returns to her nest afterwards. Before she settles down on the eggs she shuffles the egg by which the object of turning is accomplished. If the eggs remain in the same position, there is the possibility of the developing germ sticking to one side of the egg and consequent death of the embryonic chick.

It may be mentioned here that the incubators are made so as to subject the eggs almost to the same conditions as they would be under a hen during the process of incubation.

R. W. LITTLEWOOD,
Livestock Development Officer.

MADRAS,
Dated 11th April 1940.

T. J. HURLEY,
Director of Veterinary Services.

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LEAFLET No. 28.

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CIVIL VETERINARY DEPARTMENT, MADRAS.

Brooding and Rearing of Chicks.

The brooding and rearing of chicks is an important branch of poultry keeping, inasmuch as, it is the nucleus round which the whole enterprise has to be built. This may be classified as " Natural " and " Artificial." Towards achievement of success in this line one requires eternal vigilance, patience and attention to the smallest details.

Natural Brooding and Rearing.—In the above method man has taken advantage of nature's lessons and employed hens to brood and rear chicks provided they do not extend to an unwieldy number.

On being hatched out the baby chicks require, on first opening their eyes to light, absolute rest as they have had enough exertion in their hard struggle to wriggle out of the eggs. They should not be let out till they become active enough, and show a tendency to leave the nest.

A clean coop should be prepared and kept ready to receive the newly hatched out chicks which have to be transferred with the mother hen. Whatever be the nature of these coops, the principles of cleanliness, freedom from damp and protection from extremes of weather conditions, should never be overlooked.

The mother hen should have free access to a dust bath which should have some disinfectant powder mixed in it to prevent lice, etc., getting on to the chickens which would worry them and reduce their condition resulting in their growth being stunted and consequently their turning out to be an economic failure.

The rearing capacity of a hen luckily exceeds her hatching capacity; taking advantage of this fact a good mother can be made to foster from 15 to 20 chicks including those hatched out about the same time, from other hens. She knows by instinct the principles of rearing chicks and so all that we have to do is to see to the importance of cleanliness, proper feeding and protection from enemies such as hawks, kites, rats, mongoose, snakes, etc. A small wire run will serve this purpose.

Inclemency of weather conditions affect the general health of the little chicks to a considerable extent; so the following precautions are the more important of those which should never be neglected in the selection of the place for the run :—

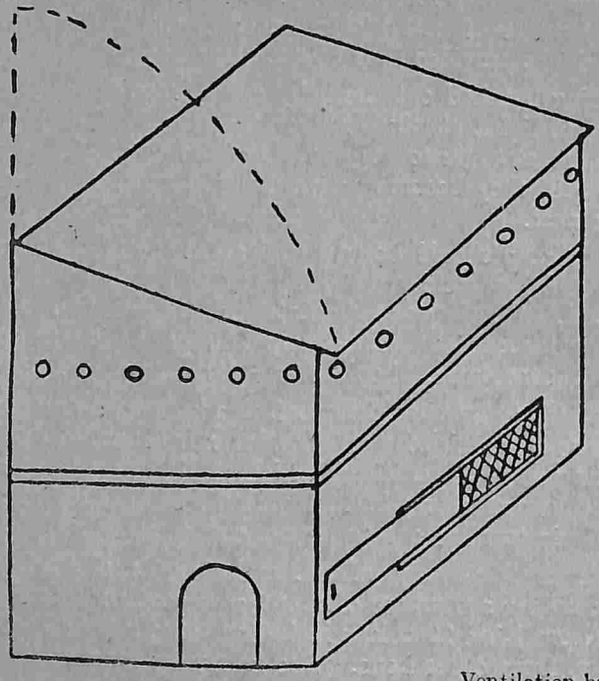
(1) adequate sunlight,

(2) prevention of humid surroundings, such as wet grass patches, floorings, etc.,

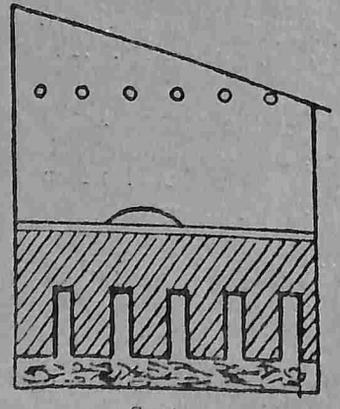
(3) cold winds and draughts.

Artificial Method of Rearing.—In intensive poultry farming, incubators have to be used to meet the large demand for chicks and recourse has to be taken to artificial brooding and rearing.

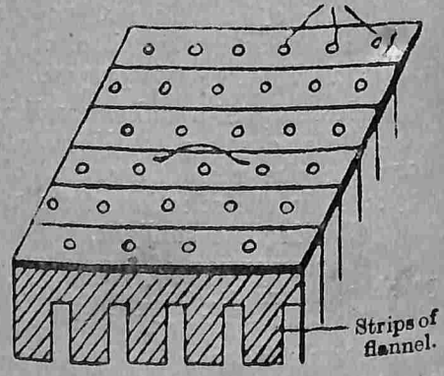
The natural way of rearing chicks has a distinct advantage, in that, it relieves us of a considerable portion of our responsibilities in attending to such details as the mother hen can do. When, however, the number becomes unwieldy, we have to necessarily depend on some mechanical contrivance that would successfully replace the mother hen providing the chicks all the comforts such as warmth, ventilation and space which she herself would have been in a position to give. "Foster Mothers," "Brooders" and "Hovers" serve the above purpose.



Ventilation holes.



Section.



Openings should alternate.

Foster Mother.

The "Foster mother" or "Brooder" is practically nothing else but a box in the chicken chamber which is heated by oil, coal or electricity, the temperature of which is adjusted by the flame in the case of oil.

The "Hover" is a cone-shaped piece of metal with a lamp in the middle, stands over the chicks like a canopy and the heat is radiated down below.

There are several types of Foster Mothers and Brooders in the market and this aspect of the question depends on the magnitude on which a farm is run.

For small farms, where 50 to 60 chicks are reared at a time "Fireless Brooders" can be easily made locally at a small cost. "Fireless Brooders" are those which have no lamp burning in them. The main principle is to conserve the heat generated by the chicks themselves.

Description of "Foster Mother."—For a unit of 35 chicks, take a packing case with the following dimensions:—3′ long × 1′ 9″ broad and 1′ 6″ deep. The lid of the box should be shaped like a leanto roof. Just below the lid, ventilation holes should be provided in a row. Chicks generally crowd in the corners and so the four corners should be rounded off with a strip of wood. About 10 inches above the floor of the box, there is a cardboard roof on a wooden frame which fits on ridges and to which are suspended a number of flannel strips as per sketches—the openings alternating. The floor of the box should have some litter in the form of chopped dry grass, etc. The side of the box should have a ventilator 9″ × 3″ with a shutter which can be kept open or closed as necessity arises.

The number of chicks should be reduced as they grow older and in size. First week 35 to 40 chicks, second week 30, third week 25, fourth week 20 and so on.

In this kind of brooder, care has to be taken regarding floor space. Too many chicks must not be put into this, as they will be overcrowded and they will not thrive well and may start cannibalism.

This kind of Foster mother is very good for the districts of this Presidency except Hill Stations.

Another kind of "Foster mother" or "After-mother" as it is called is to get a box with a dimension of 4′ × 3′ × 2′. The inside of the box is lined with wire-netting and the space between the wire-netting and the side planks should be filled in with hay, straw or dry grass. As the chicks grow older the material can be thinned gradually till at last the whole lot of it is removed. The idea is to conserve as much warmth as possible during the early

part of the chicks' life and gradually lower the inside temperature as the chicks grow older. The chicks can remain in this "Aftermother" from five to eight weeks.

Feeding.—Experience shows that mortality amongst chicks is the greatest between the first and the third weeks; so all endeavour should be made to push them through this period successfuliy. At this stage of life, apart from adequate warmth and other comforts already mentioned, the ration of the chicks must be so regulated as to give them a good start in life to develop into vigorous birds.

They must be given sufficient food but not be overfed. There is no harm in their feeling slightly hungry which would keep them busy scratching about in search of food.

There are a few principles in nutrition, which must be observed in any system of chicken rearing. Rations for chicks should have necessary nutrients to produce sufficient heat and energy and to provide all that is necessary for growth.

The first feed for chicks should be some broken grain, finely cracked wheat or ragi or broken rice. If one can afford to get oatmeal, this is the best food for the first two weeks.

This should be fed on feeding boards within the easy reach of chicks. They should, however, be taught to pick up their first food in the absence of the mother hen; this can be easily done by tapping the forefinger on the board; thus attracting the attention of the chicks to pick up the grains.

Hard-boiled eggs finely grated, mixed with bread crumbs, should be given twice daily up to two weeks. Clean water should be available before them always. Skim-milk and buttermilk are very good and can also be provided if possible.

Greenfood.—One important requirement for their growth is greenfood and as such this should be given when they are two to three weeks old. When the chicks have access for a free range on young grass, this need not be given.

Feeding Routine.

Age of chicks.	Feed.	Drink.
Up to 36 hours ..	No feed	Keep them in warm brooder.
Baby chicks up to 10 days.	Oatmeal or ground oats or finely cracked maize or wheat or broken rice depending on the availability of the grain locally. Five times a day: 6 a.m., 9 a.m., 11 a.m., 1 p.m. and 4 p.m. Feed sparingly and do not overfeed.	Clean water, skim-milk or buttermilk diluted with water.

Feeding Routine—cont.

Age of chicks.	Feed.	Drink.
10 to 20 days ..	Grainfood as noted above; at 11 a.m. boiled eggs finely grated with shell, with bread crumbs. White ants to be collected and given to them.	Clean water, skim-milk or buttermilk diluted with water.
20 days to 1 month.	Grainfood as noted above but cracked a little bigger. Leaves of vegetables can be hung before them for picking. Fine shell grit and charcoal should be available before them always.	Do.
4 to 6 weeks ..	Grainfoods as noted above—feed three times (bigger grain). Shell grit and charcoal as above.	Do.
6 weeks to 3½ months.	Mash: Stock Mash— 30 lb. wheatbran .. 30 lb. ricebran .. 30 lb. ragi flour .. 10 lb. groundnut cake. 10 lb. fishmeal .. .. 3 lb. mineral mixure .. 1 lb. salt	Do.
Do.	Mix two parts of wheatbran to the above stock mash up to two months and one part up to 3½ months and any green vegetables to be chopped and mixed with wet mash. Cooked rice and beef on alternate days for chicken after one month. Shell grit and charcoal should be available before them always.	Do.

Drinking Water.—Add permanganate of potash to drinking water to give it a light red colour and change the water as often as possible; use an earthen vessel and keep it always in shade.

Give the chicks fresh ground each day in the sun.

Vices.—Lack of sufficient space, overcrowding, underfeeding, want of mineral matter, leaving about the weaklings which are not able to hold their own, large variations in size of the inmates, etc., are the factors which are responsible for toe-picking and cannibalism. Most of the above are easily prevented with a little attention and care. Sexes must be separated as soon as recognized.

Perching.—The chicks should be perched as soon as possible. They get better ventilation, fresh air all round them, than is obtainable when they are on the floor.

Conclusion.—In conclusion, it must be stated that there is no hard-and-fast rule with regard to these little things and that common sense and experience alone play the most important part in the enterprise in turning out to be a success.

R. W. LITTLEWOOD,
Livestock Development Officer,

P. T. SAUNDERS,
Director of Veterinary Services, Madras.

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CIVIL VETERINARY DEPARTMENT, MADRAS.

Housing of poultry.

Evolution of Poultry Houses.—It is a well-known fact that the ancestors of the present-day domestic fowls slept on trees. They were exposed to elements from the very start of their life. On account of this they enjoyed a freedom from confinement, got plenty of open air and were very hardy. They consequently suffered less from the various diseases so far as is known.

After domestication, they were confined to small houses with restricted freedom and have been housed in a variety of ways. They were housed in cages, cattle-yards, outhouses, in fact any abandoned space available at their disposal. To-day, we find in the Western countries that they are housed in individual poultry houses of all shapes and sizes costing several thousands of rupees. On account of the intensive and artificial methods adopted in raising poultry, some of the best breeds have become so much domesticated that they entirely depend on man for all their requirements.

Housing is necessary.—Housing of poultry is necessary—

(1) to have control over them,
(2) for scientific breeding—to keep the breed pure,
(3) for the collection of eggs,
(4) to feed them regularly, and
(5) to have control over disease.

Essentials of a House.—For profitable results, a good poultry-house is essential. The house need not be too elaborate, but should be constructed to provide physical comfort for the fowls all the year round. The place and construction of the house will vary according to the climatic conditions; there is not still a common type of good house constructed in India which will suit all purposes and climates.

While building any form of a poultry-house, the following essential facts should be borne in mind :—

(1) dryness, free from draughts and dampness,
(2) freedom from parasites,
(3) protection from enemies,
(4) good light, ventilation and sanitation, and
(5) economy.

(1) The house should be dry and free from dampness. This can be obtained by having the floor of the house at least 6″ to 9″ above the ground level. In damp climates or wet districts, the floor of the house can be covered on the outside lower portion with tin to prevent dampness. The roof should be made water-tight and the same can extend 6″ to 12″ over on all the sides. The windows should have some protection in the way of curtains or canvas-covered shutters, so that during the storms and rainy weather, the rain water may not be blown inside the house. The windows should not be fixed in a direct line opposite to each other so as to create draught.

(2) *Freedom from Parasites.*—The houses should be so constructed as not to provide a home for the parasites to breed. The common external parasites of poultry are, mites, lice, scaley-leg

parasites, ticks, fleas, etc., these parasites are responsible for the destruction of poultry or at least render them unprofitable. They have their abode in the crevices of nooks and corners of the poultry-houses. The essential factor that should be borne in mind is not to allow space and darkness for them to breed.

(3) *Protection from Enemies.*—Instances are not uncommon for the cats, jackals, mongoose, snakes, etc., to gain entrance into the houses and destroy the birds. Therefore it is necessary to have some sort of protecting material like wire-netting at least ½″ mesh, all round the bottom of the house to prevent the enemies gaining access to the houses.

(4) *Light, Ventilation and Sanitation.*—The house should be kept clean so that it can be free from foul smell and vermin. Thorough ventilation is most important for the poultry-houses. Fresh air and sun-light are both necessary if the birds are to be kept healthy.

(5) *Economy.*—Economy should be practised in the construction of the houses. The aim should be to build one that will be adaptable for the various purposes, besides the fact that it should suit the local condition also.

Movable and Permanent Houses.—Poultry houses may be classified as portable (movable) and permanent.

Portable House.—A portable house is one which is so constructed that it can be moved from one place to another. These are usually built light and small about 7 feet by 5 feet in size or less. They are economical if made out of the planks of packing cases—dealwood. The planks should be painted or tarred to prevent rotting. They are either built on wheels or stands. They have the distinct advantage of being movable from one place to another as often as necessary. They can be moved from one field to another, and left near a crop of cholam, cotton, ragi or maize or any other growing crop. They can also be drawn under the shade of trees or left in the sun as desired. When the fowls are let out, they get plenty of free range and consume most of the destructive grubs, insects and eat plenty of green matter which is so very essential for their growth and upkeep. By so doing, the feeding charges are considerably reduced and the fowls keep up their good condition.

Permanent House.—The permanent houses are those that are built on a permanent foundation with superstructure. When the permanent houses are built, the location is of great importance. They should be erected on the highest part of the land so that all the surface water will easily drain away. They should never be put in a hollow where water stagnates.

The sun is the natural and cheapest form of disinfectant, and so, it will be a good thing to build the houses facing the morning sun or to have the windows facing the direction from which most sunlight comes.

In places where a big poultry concern is contemplated one should look ahead and make sure if there is sufficient room for further

expansion. In arranging the lay-out of this, future additions must be taken into consideration.

Floor and Air Space for Hens.—The hens should get the requisite quantity of fresh air and space for their comfortable living. The amount of floor spaces required by a hen depends on various factors. Heavy breeds require more of space than light breeds. Ordinarily a bird requires 4 square feet of floor space and 26 cubic feet of air space. This fact should be borne in mind while constructing the houses. In the plains of India if the houses are made chiefly of wire netting, not so much floor space is necessary, it can be reduced easily to 3 square feet. If the house has a wire front and ventilation at the top, the same thing applies.

The following are the approximate dimensions of houses required for a given number of birds in the plains :—

For ten birds—6 feet by 5 feet by 5 feet high.

For twenty birds—12 feet by 5 feet by 5 feet high.

There are different kinds of floors in use in poultry houses. In a fixed poultry house, the best floor and the most economical, is that made of concrete, it is dry, easily cleaned and requires no upkeep.

In the portable houses, the floors can be made of (1) wood, (2) 1″ thick wire mesh (square shape) and (3) slatted floors.

(1) *Wood floors.*—These are made of planks of wood, 1″ thick and are suitable in cold districts such as the hills. The only drawback is that vermin are likely to breed between the joints, etc., if not thoroughly cleaned out daily.

(2) *Wire Mesh.*—This is special 1″ wire (square shape), it is nailed on to wooden frames and can be removed from the house. This floor allows most of the droppings to fall on the ground and so the house is kept fairly clean and the land manured in rotation as the house is moved daily. A dropping board may be placed underneath the wire to catch the droppings if necessary.

(3) *Slatted Floor.*—These are made of wooden frame in two half sections and nailed to these frames are wooden slats of wood 1″ wide on top with bevelled edges, 1″ deep and ½″ wide at the bottom. The slats taper towards the lower surface, they are placed 1″ apart and run parallel to the door and exits. Underneath these slats are the dropping boards. If dropping boards are not required I advise wire netting ½″ mesh underneath to keep out rats, snakes, etc.

Ventilation.—This is very necessary. Provision should be made for the entry of fresh air near the floor and exits and the highest point or points of the shed. A raised ridge along the apex of the poultry house is the best form of air outlet.

Roofs.—Roofs are made of different shapes, such as the " Lean-to " and " a span roof or cabin roof " where the ridge is midway between the front and back of the house.

Roofs can be made of wood and covered with tin or water-proof felting. In hot districts, a thatched roof over this is very cooling. The best roofing is that of asbestos, it is fairly expensive but it lasts a long time and keeps the house cool and water-proof.

Interior Fittings.—The fittings inside a poultry house consist chiefly of perches (roosts), nest boxes, water vessel, feeding hoppers; in some cases a dropping board is found.

All the interior fittings should be removable to facilitate thorough cleaning each day.

Perches or Roosts.—Perches are made of wood scantlings from well seasoned wood which should not split or cause cracks. The perches 2″ × 2″ in size with bevelled upper edges make the roosts comfortable for the hens. The height should be 18″ above the floor or 6″ above the dropping board when used. The amount of roosting space required varies from 8″ to 10″ per bird, according to the breed. Heavy breeds like Light Sussex, Rhode Island Red and Australorps require 10″ per bird, whereas the light breeds like White Leghorns require 7″ of space. The perches should be 12″ from the walls and 18″ between the rows when more than one is used.

Dropping Boards.—These are wooden platforms 6″—9″ below the perches for the purpose of catching the droppings. They are made removable and should be cleaned daily. A mixture of half sand and half earth should be spread on these daily.

Nest Boxes.—Nest boxes should be deep enough for the birds to turn round and high enough for them to enter comfortably. They should ordinarily be 15″ × 12″ × 16″ (high). Allowance should be made one nest for three birds. The nesting material should be clean, either straw, hay or wood shavings. They should be removed very often, the nesting material replaced and the nest itself cleaned and disinfected: otherwise they become filthy.

Feed Hoppers.—This is a small box, the bottom of which is nothing but a trough for holding feed. There are several types of hoppers, but the main principle is that the feed comes down into the bottom trough from the top chamber as the birds consume the food.

Watering.—Hens require plenty of clean water. To ensure a continual supply, every house should be provided with adequate quantity of water. This should be changed at least two or three times a day. An earthen basin is the cheapest form of receptacle, provided it is protected from the fowls contaminating the water by stepping in.

Hoppers for Shell-grit and Charcoal.—There should be receptacle which should contain an adequate supply of shell-grit and charcoal available for the fowls always.

R. W. LITTLEWOOD,
Livestock Development Officer.

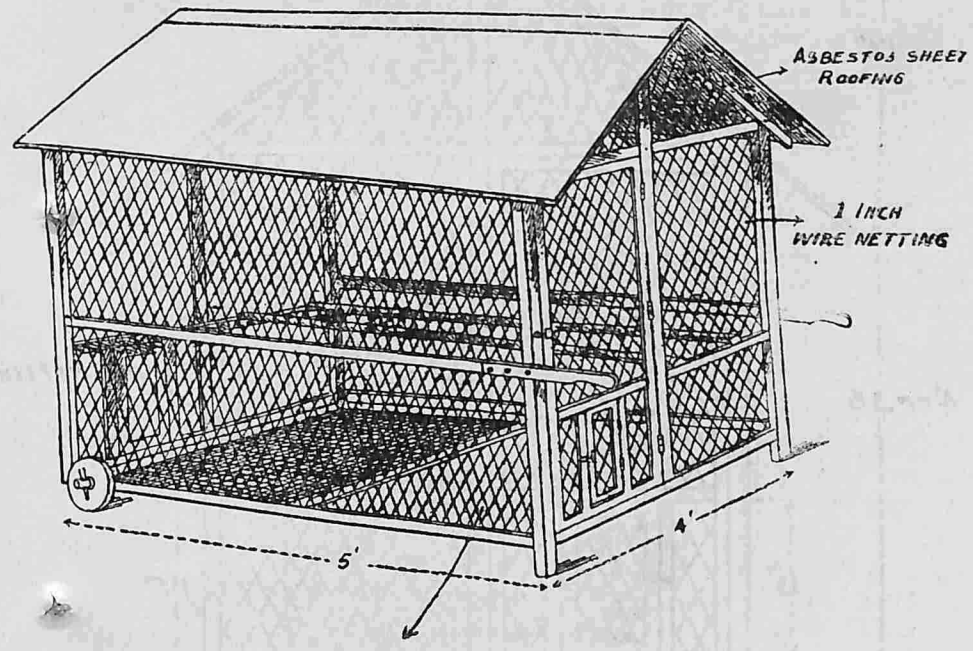
H. NARAHARI RAO,
Agricultural Demonstrator, Poultry.

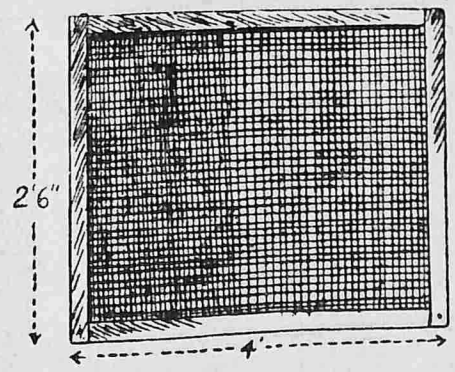
MADRAS.
11th April 1940.

T. J. HURLEY,
Director of Veterinary Services.

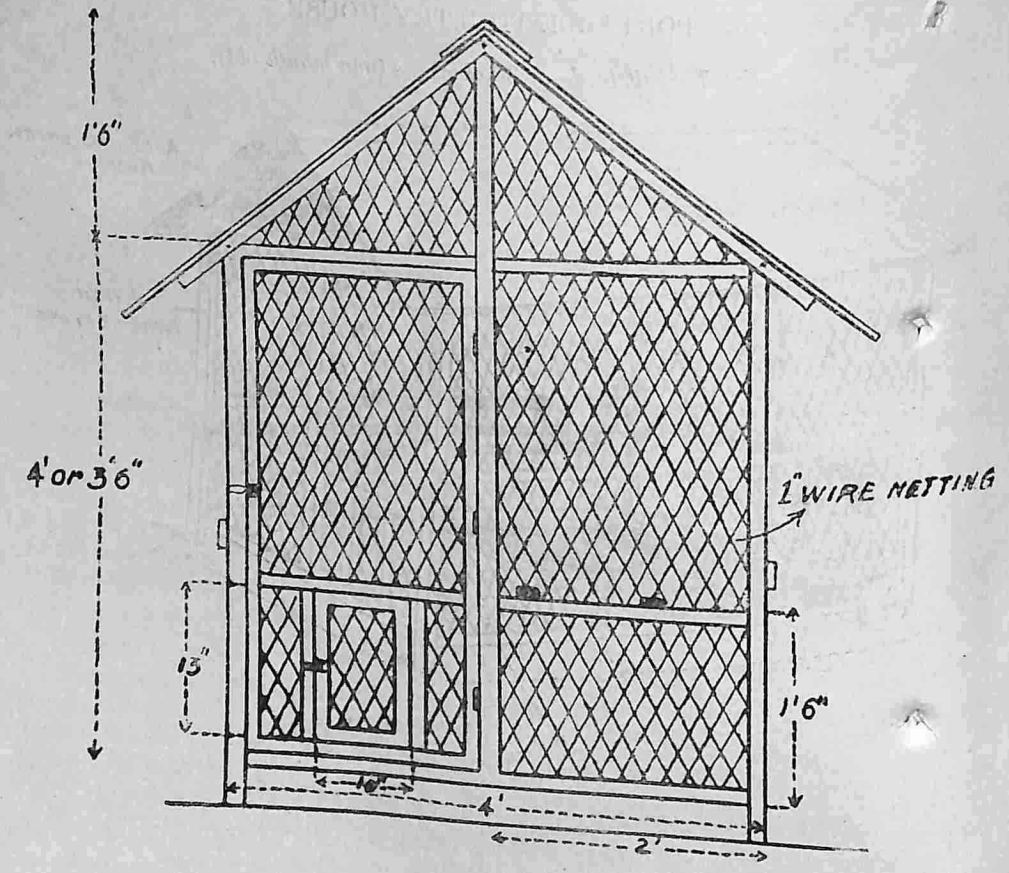
PORTABLE POULTRY HOUSE.

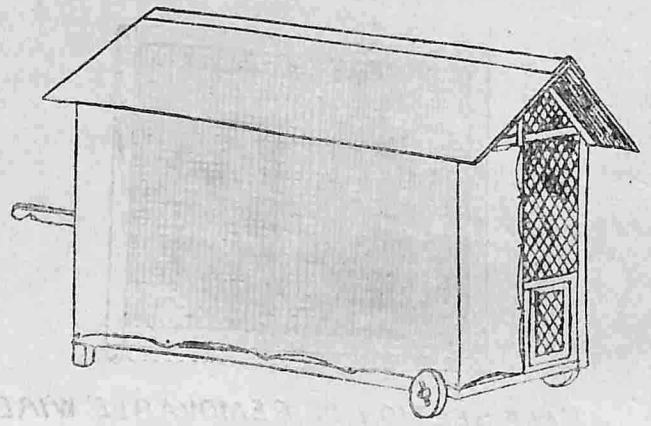
For 7 adult birds or 35 chickens (one month old).





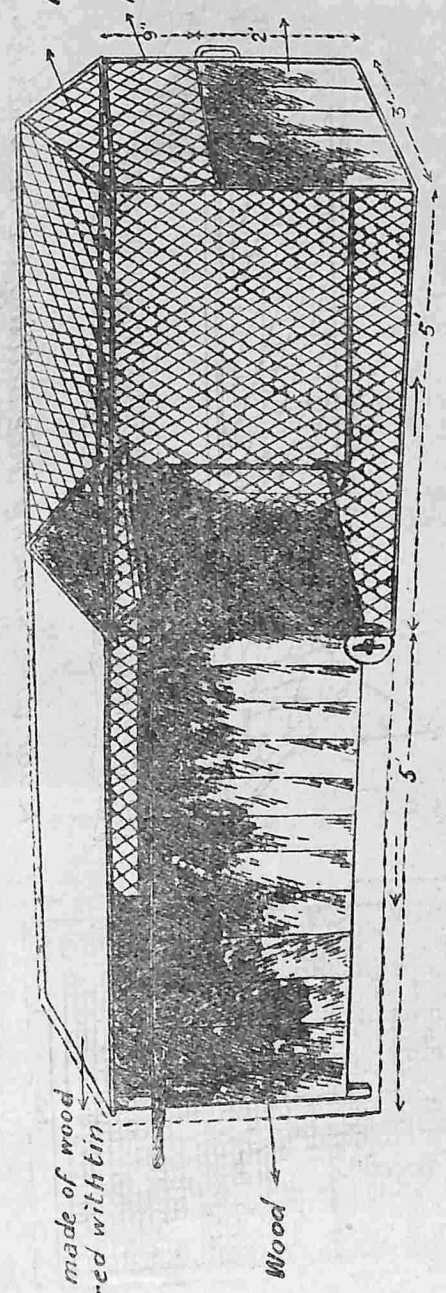
HALF SECTION OF REMOVABLE WIRE NETTING FLOOR
(This is special square floor Netting)





SCREEN OR CURTAIN MADE OF CANVAS
OR GUNNY BAGS TO BE USED IN COLD AND WET WEATHER

For 6 adult birds or 25 chickens aged one month.



HOUSE COMPLETE WITH RUN
Made from dealwood packing cases and teakwood rapers

Plus 15 lb. straw or hay and 10 lb. green grass if available and 2 oz. salt; 5 lb. straw to be fed at 11 a.m. if kept in stall and 10 lb. in the evening at 6 p.m.

Cow giving 15 to 20 lb. milk per day—

Cake	2½ lb.
Cotton seed	2 ,,
Rice bran	3 ,,
Dholl husk	1½ ,,
Salt	2 oz.
Total	9

Cow giving 20 to 25 lb. milk per day—

Cake	3 lb.
Cotton seed	2½ ,,
Rice bran	2 ,,
Dholl husk	3 ,,
Salt	2 oz.

Cow giving over 25 lb. milk per day—

Cake	3½ lb.
Cotton seed	3 ,,
Rice bran	2 ,,
Dholl husk	3½ ,,
Salt	2 oz.

Cows in calf should be fed on a little better ration than the maintenance ration for six weeks before calving, in order to produce a stronger calf and to increase the flush of milk of the cow at the time of calving. A suitable ration for the six weeks before calving is—

Cake	2 lb.
Cotton seed	1 ,,
Rice bran	1 ,,
Dholl husk	2 ,,
Straw	15 ,,
Salt	2 oz.

Heifers 1 to 2 years—

A suitable ration for these is—

Cake	1 lb.
Cotton seed	1 ,,
Rice bran	2 ,,
Salt	2 oz.
Straw	15 lb.

Calf feeding.—In the case of crossbred cows, the bull calves can be sold a week after calving as the cows milk without their calves.

If milk is sold, the following rations can be adopted: it is essential that the calf should have a good start from its birth. Gruel can be fed as a substitute for milk from one month onwards and the calf will grow into a good heifer if the following system is carried out:—

Handfed calves—

Up to one month.—Whole milk 8 lb. a day (3 lb. morning, 2 lb. noon and 3 lb. evening). No separated milk.

1 to 3 months.—Whole milk 4 lb. a day (2 lb. morning, 2 lb. evening). Gruel 3 lb. noon.

3 to 6 months.—Whole milk 2 lb. morning. Gruel 6 lb. (3 lb. noon and 3 lb. evening).

Calves older than six months.—No whole milk. Gruel according to the availability of skim milk; concentrates as stated below.

Whole milk is fed when the cows are milked (5 a.m. and 4-30 p.m.) as far as possible at the normal blood temperature. Some calves are unable to digest this 8 lb. ration; so, 1 oz. of lime water is added to the milk and if there is no change the ration should be reduced to 6 lb.—2 lb. three times.

Suckling calves—

First month.—Whole milk 6 lb. a day (3 lb. morning and 3 lb. evening).

2 to 6 months.—Whole milk 4 lb. a day (2 lb. morning and 2 lb. evening). 3 lb. gruel at noon.

After 6 months.—No whole milk. Gruel if available *plus* concentrates.

Gruel.—This is made up of skim milk, ragi and linseed meal. To every 10 or 12 lb. of skim milk, 1 lb. of ragi and ½ lb. of linseed mixed, boiled in steam, cooled and fed, sufficiently warm, after adding about an ounce of salt.

Concentrated ration for calves.

Age—months.	Cake.	Cotton seeds.	Rice bran.	Wheat bran.	Salt.	Bone meal.	Remarks.
	LB.	LB.	LB.	LB.	OZ.	OZ.	
1 to 3	½	..	..	½	1	¾	Fed half in the morning (6-30 to 7 a.m.) and half in the evening 3 p.m.
3 to 6	½	..	..	1	1	½	
6 to 9	1	½	½	½	1	½	
9 to 12	1	½	½	1	1	½	

Plus hay and a little green grass.

MADRAS,
11*th April* 1940.

T. J. HURLEY,
Director of Veterinary Services.

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LEAFLET No. 31.]

CIVIL VETERINARY DEPARTMENT, MADRAS.

Cattle Breeding.

A Dairyman or ryot who owns a herd of cows and supplies milk all the year round to his customers has to regulate the calving of his cows throughout the year to fulfil his orders and keep up a uniform supply. It is therefore important that he should know something about the " Oestrum " in cows or " the period of heat." This is the time when the cow calls for the bull.

A heifer will come on " heat " for the first time any time from the age of 2 to 4 years according to the state of her maturity, condition, environment and feeding, i.e., an early matured heifer reared under good conditions will take the bull much earlier than one which is underfed and undersized. In temperate climates, cows come on heat about 3 weeks after calving and every 3 weeks after that until they conceive; but in India, the indigenous cows vary from 3 weeks to a year or more after calving and their periods are very irregular. On the average the Indian cow in good condition will conceive about 3 to 4 months after calving. Some people are under the impression that a cow will conceive at any time if covered by the bull. This is not so, a cow must be properly " on heat " if she is to conceive. It is therefore waste of time taking her to the bull unless she shows the signs of " Oestrum."

It is very easy to see how a heat period in a cow might easily be missed. There are often no apparent preliminary symptoms of approaching heat, such as are observable in the bitch, which bleeds extensively for several days (pre-oestrum). External hœmorrhage in the cow or heifer, if it occurs at all, does so 2 or 3 days after the beginning of the heat. This is far more common in heifers than cows; in the latter it is rare, but in heifers the appearance of blood-stained mucus at the vulva is quite frequent; it forms a useful indication as to when the animal may be again on heat. On the average, heat lasts about 16 hours in heifers and 19 hours in cows. In the cold season a heat period may only last 6 hours as against 16 or more hours in hot season. It is easy to see therefore, that a period occurring in the night is overlooked. Again it is more difficult to detect the heat when the cow is tied in the stall than when she is allowed to run about.

In some cases ryots will not allow their cows to be taken to the bull whilst they are in milk and suckling their calves in the belief that if the cow is served by the bull, the cow will immediately go dry. This is not so; the cow will continue to yield milk if properly fed.

The following signs of " Oestrum " in cows will benefit cow owners in discovering the proper time to send their cows to the bull.

(i) The cow will be restless and will switch its tail frequently from side to side and will turn her head towards its hind quarters.

(ii) It will go off its feed for a day or so.

(iii) The external genital organ (vulva) will be slightly swollen and there will be a slight discharge of a white slimy mucus.

(iv) It will stand with its tail raised and ears erect and will stare at individuals.

(v) Frequent passing of urine.

(vi) Milk yield will decrease for 2 or 3 days and does not allow calf to suckle properly.

(vii) If tied in a stall, will be restless and will bellow frequently.

(viii) If allowed to graze or exercise with other cows, she will be seen to jump on them or allow others to hump her.

All cows should be taken to the bull immediately these signs appear. It is no use waiting until the next day as this may be too late.

The above symptoms become more pronounced in an adult cow than in a heifer or first calving cow.

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LEAFLET No. 32.]

CIVIL VETERINARY DEPARTMENT, MADRAS.

Breeding Bulls and their Management.

There are occasional complaints that some breeding bulls are slow servers and others refuse to serve at all. It is therefore necessary that the agriculturists should be informed of some of the reasons why this happens—

(1) Slowness of service is not necessarily an indication of infertility. It is true, however, that they are often associated and notably so in animals which are too fat or alternatively, in those which are going back in condition. The best condition for breeding in males is a hard one produced by sufficient exercise to work off a surplus of fat, but favouring the retention of nitrogenous substances and vitamins. However it cannot be sufficiently stressed that with the male, as well as with the female, a rising condition is always more conducive to the proper discharge of the reproductive functions than a falling one. A breeding bull can be worked for half a day in a single bullock cart or can be used as a work animal in agricultural operations. The bull should be well-fed and given green fodder whenever available, its muscles should be fairly hard and there should be very little fat on its body; but do not allow it to lose condition and become too lean. Groom it daily and pick off all ticks as these reduce its vitality and irritate it.

(2) Slowness in service is sometimes psychical in nature due to strange surroundings or to the nature of the control to which the animal is subjected. Hesitation in service is also sometimes the result of sores or warts on the prepuce penis or feet and males are in best condition for service a few hours after they have been fed when they are more active than directly after a meal. It is sometimes noticed that stud animals which have travelled long distances and are introduced into fresh surroundings are temporarily infertile, especially when the new conditions are less favourable than those to which the animals have been accustomed. This, however, is usually only a temporary result and full fertility can generally be restored by favourable treatment in the way of diet and surroundings. When a new bull is purchased and brought to the homestead, feed it on the same ration, if possible, as it was formerly fed on, allow it time to become accustomed to its new surroundings and do not ill-treat it. House it in a comfortable shed, give plenty of exercise as stated above and allow it to rest for two or three weeks before it begins its service.

(3) It is of great importance that a male animal should be used regularly. It should not be used too much at one time and too little at another. It should be remembered also that prolonged periods of disuse may be as injurious to the bull as over-use since

undue accumulation of semen in the generative passages may result in back pressure and deleteriously affect the spermogenetic capacity of the testes and possibly also interfere with the functional activity of the aecessory sexual glands. In India this is difficult as a large number of cows come on heat after the rains and when good grazing is available and breeders are apt to permit the bull to perform too many services in a short period. This is undesirable; the number of services in a month should be limited to 10 or 12 at the most in these heavy seasons. If possible the services should be spread out evenly throughout the year.

(4) With any young males it is inadvisable to allow service to occur too often, even though the service may be fertile, as frequent service, when performed too early, is likely to result in undergrowth of the sire and to impair its breeding capacity in later life. Young males are most liable to suffer from underfeeding and over-use, whereas old males suffer from overfeeding and under use. Many young early matured bulls are ready for work at $2\frac{1}{2}$ years old but as the bull is not fully grown until about 4 years old, its services from $2\frac{1}{2}$ to 3 years should be limited to 3 per month, from 3 to 4 years to 4 per month or 50 in the year. If a young bull is allowed to serve a great number of cows in its early life, the length of its breeding life will be considerably reduced. See that a young bull is well-fed and kept growing. In the case of matured bulls, the rations can be decreased if it is seen that they are becoming fat.

(5) In general, the males of the lighter breeds are able to serve more females successfully than those of the heavier breeds. Kangayam and Hallikar bulls are much quicker at service than the bulls of the heavier breeds such as the Ongoles and Sinds.

(6) Onanism or sexual abuse is sometimes a source of trouble, more especially in young animals that are given little service. This is often seen in India and to a void it as far as possible, give the bull some hard work to do if there are no services to perform.

A bull will refuse to serve a cow which is not properly in heat and will not stand. This is a very common complaint unnecessarily made against the bull. It must be remembered that the period of heat (Oestrum) in cows only lasts for about 16 hours and it is essential that the cow should be taken to the bull at once before the heat subsides; otherwise the cow will not stand and the bull will not serve it.

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LEAFLET No. 33.

CIVIL VETERINARY DEPARTMENT, MADRAS.

Branding of cattle and faulty flaying of hides.

It is necessary to remind owners of cattle and the public in general of the enormous economic loss caused by the practice prevailing in this Province of branding cattle and by carelessness in the removal and preservation of the skins from dead cattle for tanning. Over four million tanned hides of cattle costing not less than 20 million rupees are annually exported from the Port of Madras, but only a small proportion of them are from this Province.

The trade in hides and skins provides employment for a very large number of poor people in this Province, the minimum cost of labour employed in the various processes amounting to over 45 lakhs of rupees in a year. Any information or help which tends to avoid waste or increase the value of the articles required for the trade should be of special interest to all concerned. An appeal is now made to remedy the two evils—Branding and faulty flaying.

The average weight of a tanned hide is about 10 lb., and if damaged by brand-marks or knife-cuts, etc., its value is reduced to half or less than that of a good hide. The annual total loss resulting from the practice of branding cattle is estimated at about Rs. 7,00,000. Cattle are usually branded by ryots in the belief that it prevents or cures such diseases as Rheumatism and averts ill-luck or the ' evil eye '. The brand marks often cover the back and sides of the animal in the form of semi-circles extending to the shoulder. This extensive branding, apart from the cruelty involved, is unnecessary. If branding is resorted to, the brand should not be larger than is absolutely necessary for the purpose for which it is inflicted. Cattle are also branded with numbers or letters for purposes of identification. In such cases, the marks should be placed on such parts as the cheek, neck or lower portion of the shoulder, so that the least damage is caused. In rare cases, branding is done to prevent the ' lifting ' of cattle for the sake of their hide, but the fact that the female stock as also buffaloes in the grazing herds which are less protected against thefts are not branded, shows that the fear of thefts is exaggerated. Owners of cattle are, therefore, advised not to allow their cattle to be branded unless it is absolutely necessary.

In order to obtain the best value for a hide, it should not only be free from blemishes such as brand-marks, sores, wounds, tick-marks, etc., but it should also be removed from the carcass and preserved in a manner suited for the subsequent processes. There are many who follow the correct methods at present but there are also a great number who do not. A few instructions for flaying and preserving hides which municipalities and other bodies may usefully adopt and enforce in the slaughter-houses in their control are noted below :—

All dirt and dung should first be washed from the hide which should be removed from the carcass while it is still warm. Delay results in a stiffening of the hide. Its removal then is more difficult and the chances of damage through knife-cuts are greater. Even

a slight appearance of a knife-mark on the pelt of the hide is a serious damage and reduces its value. In warm climates, putrifaction sets in earlier than in cold climates and the hide from a putrifying carcass is of little value. In opening the carcasses, the cuts should be so placed that the hide after removal approaches as near as possible the shape of a square, thus avoiding wastage through trimming. The proper positions of cuts are described below :—

A straight cut is made extending from the chin to the root of the tail along the underside of the belly. Cross-cuts are then made along the inner side of the forelegs and thighs to a point below the knees and hocks. The hide is then carefully ripped from the carcass beginning at the central line, taking care to see that bits of flesh are not removed with the hide. The flaying knife should be used sparingly, most of the hide being removed by hand-punching with the first. On removal, the hides should not be heaped or exposed to the sun, but should be allowed to cool in the shade. If there is a tannery within easy reach they may be handed over immediately for tanning. If transport to a distant tannery is necessary, the hides should be properly preserved by one or other processes recommended for the particular purpose for which the hide is intended. In this Province, the products are received in the tanneries fresh or in the form of ' dry ', ' wet salted ' or ' dry salted hides. The dry hides are made usually by stretching the hides with the flesh side uppermost on pegs driven into the ground. The proper method for producing the most acceptable hide for the tannery is to allow the raw hide to dry in the shade on a frame placed vertically, so that both sides are equally exposed to air. If pickling or salting is resorted to, marine salt should be used in preference to the saline earth sometimes used in interior districts. On no account should attempts be made to ' load ' hides with clay, mud, etc., in the hope of obtaining a higher weight for hides. The tanner who expects to derive a certain percentage of profit on his purchases is put to a great loss if the yield is below that normally expected. He will, therefore, offer less for his subsequent purchases in order to allow for any adulteration.

The salting is done by sprinkling ground salt on the hides spread on a clean smooth floor with the flesh-side up, and rubbing in the salt by hand. After this treatment the hides should be folded and put in piles and left thus for a few days. The process is then repeated and the hides folded with the flesh side in. The hide is then ready for despatch to the tanner. During transport the hide should not come in contact with iron or other chemicals or oil and should not be exposed to heat.

Note.—The skin of animals that have died or are suspected to have died of contagious diseases should on no account be cut or removed from the carcass.

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CIVIL VETERINARY DEPARTMENT, MADRAS.

BROAD HINTS FOR EVERYDAY USE.

I.—FEED YOUR BULLOCKS.

If you wish to obtain a good crop from your land you must cultivate well. If you wish to cultivate well you must keep your working cattle well. You know that if you do not feed yourself properly you cannot work properly. Similarly if you do not feed your working cattle properly they cannot work for you properly. Your living depends on your cattle. Is it not then unwise not to look after them carefully? If you starve your cattle you will end by starving yourself.

Cattle should never be so poorly fed that they become so lean that is possible to count their ribs easily. A bullock when working uses its weight as well as its strength. If it is not fed properly it has neither the weight nor the strength that it should have and consequently it does not do as good work as it should. To keep it in good condition an average Nellore bullock needs 15 lb. of straw every day whether it is working or not. In addition to this if it is being worked regularly every day it needs 4 lb. of concentrated food (2 lb. groundnut cake, 1 lb. cotton seed and 1 lb. rice bran is a good mixture, the cake and cotton seed should be soaked for 12 hours before feeding). When there is little work the amount of concentrated food can be reduced to half of this amount but it should not be omitted altogether. A good Kangayam bullock needs similar treatment to this.

II.—KEEP GOOD BULLOCKS.

Your living depends on your bullocks. If you keep good bullocks and feed them properly you will be able to cultivate your land well and obtain good crops. With good bullocks you can use bigger implements and can cultivate your land more thoroughly and in less time. For example with a good pair of bullocks and a medium-sized iron plough one ploughing is enough whereas with a poor pair of bullocks and a wooden plough five ploughings have to be given and even then the land is not so well cultivated. A difference of a day in ploughing or sowing may very often make all the difference between a good crop and a poor one.

It is generally thought that because good bullocks cost more to purchase and a very little more to keep that therefore they are expensive and unprofitable. This is not so. It is true that they cost more to begin with but it does not cost much more to feed a good pair than a poor pair. It must also be remembered that

while a poor pair of bullocks can manage light work they cannot do heavy work whereas a good pair can do both and can do much more light work in a shorter time than can a poor pair. With poor bullocks it is necessary to have more pairs. The cost of feeding them becomes higher than when fewer good bullocks are kept. With a fewer number of good bullocks the initial cost may be the same or a little higher, but the cost of upkeep will be less and it will be possible to cultivate the land well and get good crops. With a larger number of poor bullocks the initial cost may not be so high but the cost of feeding will be greater and it will not be possible to cultivate the land well with the result that the crops will not be good.

A man who keeps poor bullocks and does not feed them properly is like a man who before he sets out to swim a wide canal ties a grinding stone round his neck.

III.—FEED YOUR COW.

Do not maintain your cow in a poor condition; it should not be neglected but should receive attention and care. A heifer poorly fed will not attain maturity quickly, she will breed irregularly, yield very little milk and will produce possibly five calves during her lifetime instead of seven or eight, she is liable to contract diseases more readily and is unable to survive them, whereas if kept in good condition, she would most probably withstand them. A well-fed heifer will attain maturity quickly and will calve down at the age of three to three-and-a-half years instead of at the age of four to five years, her dry period will be reduced and she will yield more milk and will throw a stronger and healthier calf.

Do not try to maintain too many cows and heifers if you cannot produce enough fodder to feed them properly. If you do, they are sure to be in a poor condition. Reduce the number of cows, so that you can feed them better. Cows and heifers require good fodder just as much as your work cattle, as they are the producers of your bullocks. Discard your small puny cows, keep a small number of good strong healthy cows of average size.

Cows in a very poor condition come to heat after monsoon; this is because they have been able to get green grass and have put on some flesh; if you feed them on better rations throughout the year, they would come to heat more quickly than they do at present.

Ongole cows in Madras yield on the average about 2,500 lb. milk per lactation; at the Chintaladevi Livestock Research Station, 39 Ongole cows gave on the average in their last lactations 3,378 lb. milk; twelve of these animals gave over 4,000 lb. milk in a single lactation. This is due to good feeding and breeding.

Your cow should be fed on an average maintenance ration of 1½ lb. cake and 1½ lb. rice bran per day plus 15 lb. of dry fodder; this ration helps to build up waste tissue and muscle and provides energy for the cow to walk about. About six weeks before calving increase it to 2 lb. cake and 2 lb. rice bran; this helps to increase the milk yield after calving, the cow is able to stand the strain of calving better, and a healthier calf is born. After calving increase the ration to 3 lb. cake and 3 lb. of rice bran and dhol husk mixed. After six months the ration can be reduced to 2 lb. cake and 2 lb. rice bran and gradually reduced to the maintenance ration.

Do not neglect the feeding of your heifer calf after weaning; feed her on 1½ lb. cake and 1½ lb. rice bran. You will find that a heifer fed on this ration in addition to fodder, will calve at the age of 3½ years instead of 4½ years, the extra concentrated food fed during its early life is compensated by a bigger and stronger cow and the earlier calving.

Feeding the cow on the above rations results in a better cow and calf, more milk and a larger number of calves; also it produces manure of a much higher quality and this gives a bigger yield of crops.

You say that you cannot afford to do this and yet you purchase work cattle from Rs. 250 to Rs. 450 per pair. Why do this when you can breed them and get the good manure? Don't keep cows if you cannot feed them properly and make the best use of them.

IV.—FEED AND WORK YOUR COW.

YOUR COW is the most useful animal on your farm, it produces your work animals, yields milk and will work, provided it is well fed.

You maintain too many work cattle and cows, and you are not able to maintain them in good condition. Possibly you maintain two pairs of work cattle and two or three cows; you feed your work cattle, and your cows are generally neglected and are kept in a semi-starved condition; you give them the remnants of the fodder, which your work cattle leave, and allow them to pick up whatever kind of food they can.

Reduce the number of your work cattle and TRAIN YOUR COWS TO WORK, they are quite capable of pulling carts, harrowing and light ploughing, provided they are *well fed*. Give them the food which your extra work cattle would have eaten. This will save money and your cows will breed more regularly, yield more milk, and produce strong healthy calves, besides doing the work of a pair of work cattle.

Cows may be worked up to six weeks before calving and two months after calving, provided they are kept in good condition. The cows will be healthier and stronger.

The practice of working dry cows is in vogue, with excellent results, in some parts of Coimbatore district, and they are also used as work cattle on the Hosur Livestock Research Station where they do very good work.

Do not neglect your cow; she can be made very useful on the farm.

MADRAS,
14*th May* 1940.

T. J. HURLEY,
Director of Veterinary Services.

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CIVIL VETERINARY DEPARTMENT, MADRAS.

Dedication of breeding bulls of Ongole breed.

Formerly it was the custom in selecting a bull for dedication purposes, to appoint a committee of leading ryots and cattle breeders, whose duty it was to collect several bull-calves or young bulls in the district and after paying attention to all the points which a good breeding bull should possess, they selected the best animal. Their selection was accepted and none questioned it. This custom is dying out, with the result that the best bull-calves are not always selected. In some cases, bulls of inferior quality and related to the cattle in the village are dedicated.

The Ongole tract has always been famous for its good cattle but during the last few years a deterioration in the breed is seen. Much more public attention should be shown in the selection and dedication of a breeding bull; you are all cattle owners and breeders and it is and should be your duty to improve your present stock by insisting that the Brahmini bull for your village should be an animal possessing all the good qualities of a breeding bull of your tract. To obtain this, is it not advisable for every four or five villages within a radius of three or four miles to form itself into a group and appoint a panchayat, whose duty it will be to select the best bull possible for your villages, i.e., when a person wishes to dedicate a bull? A private person should not be permitted to select a bull for dedication unless this panchayat agrees with the selection. If this is done, every village has some control in the selection and only the best bulls will be dedicated.

If a poor quality bull is dedicated, the progeny of that bull will not be so good and you will not realize as much money for your stock as you would, if its sire had been a very good bull. *A good breeding bull means more money for you.* Bulls should not be closely related to the cows and heifers of the village and they should be exchanged every four years at least, so that in-breeding does not occur. The panchayat of the different groups in the neighbourhood can arrange to exchange the breeding bulls amongst themselves with the aid of the Government Veterinary Officers. Indiscriminate in-breeding produces progeny weak in constitution and susceptible to disease and also sterility. Your panchayat should see that the dedicated bull is not ill-used and beaten and that it is properly maintained by the people especially in the breeding season when the number of services is great.

Points to remember in selecting an Ongole bull.

1. The bull must be of pure Ongole breed.
2. It should be of the size suited to the locality.

3. The colour should be white or greyish white or having "Alaka Matchalu" over the body, with black or dark grey markings on the neck and hump and black markings on the knee and just above the fetlock, black muzzle and eyelashes and black rings around the eyes with black hairs at the end of the sheath and tip of the ears.

4. The legs should be well placed on the body. The forelegs should be straight and strong and the hind legs should have a fair curve at the hock. (The hind legs of some bulls are too straight at the hock when standing straight.) The forelegs viewed from the front should be wide apart where they join the body, showing that the bull has good chest capacity. The hoofs of the forelegs should point straight forward when the bull walks. Bulls whose forelegs tend to point outwards should not be selected. The animal should not be too long in the leg.

5. The chest should be broad, deep and shoulders well developed, the ribs should be well sprung and deep.

6. The back should be broad and slightly sloping towards the hump. The hump should be broad and nearly level laterally. The slope from the croup to the tail should be gentle and not prominent.

7. The sheath should not be too pendulous. The hair at the end should be black.

8. The bull should be 2½ years old or above.

9. It should not be related to the cattle in the villages.

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T. J. HURLEY,
Director of Veterinary Services.

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LEAFLET No. 36.]

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CIVIL VETERINARY DEPARTMENT, MADRAS.

Breeding and Rearing of Cattle and Buffaloes.

It is impossible to exaggerate the importance of a pure milk-supply in any country; it is especially so in a country like India. As an agricultural country, India's demand for fine draught animals is equally great. Good cattle, both male and female stock, are therefore, a dire necessity. Yet, the present condition of livestock is nothing but deplorable. Let it not be, however, supposed that there is any shortage of cattle. In fact, India is grievously over-stocked with cattle which the country cannot properly maintain.

2. The improvement of cattle lies in the prompt disposal of all undesirable animals and in systematic breeding and rearing of the rest. Old dry cows, which yield neither milk nor calves together with young male stock, not required for work, should be got rid of. The best way of disposing of the animals is to fatten and sell them to the butchers. The people in this country with their religious susceptibility, abhor the idea of sending their animals to slaughter-houses but they little think of the disaster they bring to the country by allowing them to live on starvation rations and perish in fodder famines and epidemics which are common in India. If the people would just realize the amount of money wasted annually by maintaining all these useless animals, it must run into lakhs of rupees. The amount realized in the disposal of these animals would be useful in purchasing better animals.

3. In the improvement of livestock no factor plays so important a part as regular breeding. At present in villages most of the cattle are collected together in common grazing grounds all day long. They represent all types of animals, such as cows, heifers, immature male stock, uncastrated and some male stock imperfectly mulled. When all the cattle are grazing together, it is impossible to prevent the cows in season from being covered. Everyone knows that unless well-developed mature bulls are used for breeding purposes the calves are puny and poor. No country can hope either to improve its cattle or maintain a good strain of cattle if the young uncastrated males and the cows are sent out together to common grazing grounds and allowed to breed promiscuously. The cattle may, however, be sent to graze separately as is done in Kangayam tract by keeping the cows separate from the male stock. The practice of turning a bull loose among a herd of cows is not to be recommended, unless a person's land is fenced off and his cattle kept separately, in charge of an attendant who reports the service of an animal. This sometimes leads to a bull serving a cow repeatedly until both bull and cow are exhausted and there is a danger of the bull becoming unfruitful at an early age.

4. *The Ongole Breed.*—A noted breed of this Presidency—the Ongole breed—has deteriorated considerably in quality by breeding from indifferent and inferior breeding bulls and by the constant depletion of good breeding cows from the tract. Formerly the best young bull was purchased and dedicated as a breeding bull and this bull was selected by a committee of breeders and much stress was laid on all the points of the bull before a decision was arrived at. To-day, owing to the high price of a good young bull, a less costly bull is selected and the practice of a committee selecting the bull has discontinued with the result that in some cases inferior animals are dedicated as stud bulls. Secondly, interest has waned in cattle breeding in Guntur district due to the introduction and growing of commercial crops such as tobacco, groundnut, chillies, etc., which the ryot finds more profitable. Less fodder is grown and the quality and condition of cattle are not well maintained. It is difficult to realize a good price for a really well-bred bull of Ongole breed. The foreign breeder used to pay high prices for good animals but none of these breeders visit the tract now. **Brahmini** bulls are not well maintained and looked after; they are often driven off a holding to-day instead of being welcomed as formerly.

5. The possession of a carefully selected bull is indispensable to a breeder, if he desires either to maintain or improve the quality of his cattle. The cow-keeper who does not possess bulls of his own should see that his cows are mated only to good bulls.

6. A breeding bull should be selected with due consideration, as his influence on the progeny is extensive and he becomes the sire of many animals. For this reason a bull is said to be "half the herd." He should belong to a pedigree of good milk strain. A good dairy cow is expected to produce a fine calf, either male or female. Good yield of milk is a hereditary quality and can be increased by proper methods of breeding. Since this quality is transmitted by the male, it is incumbent that good dairy bulls should be maintained to improve the stock. A breeder intending to purchase a bull for stud purposes must satisfy himself with the history of the animal before he looks to its external points. The animals bred may be required for draught purposes. Therefore, a bull should be chosen which possesses good points as regards pulling powers, that has well-developed shoulders, big girth measurement, straight clean limbs, good hindquarters and level back. Attention should be paid to the feet of the animal. A small, compact and hard foot, free from cracks is desired. Large soft feet should be avoided.

7. In cities like Madras, a pure and sufficient milk-supply is an impossibility as things stand at present. This is not due to shortage of milch cows, but to their poor yield. The Madras Government,

in accordance with the expert opinion of the Livestock Development Officer, have formulated a scheme to improve the milk-supply of Madras, and as a first step, a number of stud bulls have been stationed at the Veterinary College, Vepery. A Veterinary Assistant Surgeon is placed in charge of the animals and he attends to them both morning and evening daily. The service fee is rupees two per cow and annas twelve per she-buffalo. The service hours are 7 to 10 a.m. and 3 to 5 p.m. A fair success has already attended this scheme in the production of a number of good calves, but it is a pity that the Madras milkmen do not bestow on the stock the sufficient care which they (calves) deserve.

8. Besides possessing a fine pedigree bull, a breeder must pay attention to proper feeding, housing, and management of his stock.

9. In feeding, regularity is the most important factor. The times of feeding should be fixed by the owner and strictly adhered to. Different classes of animals require different food in respect of both quality and quantity.

10. Cows should not be housed in dirty yards or sheds, as this affects their health. Cases of eye trouble have been noticed where cows stand in dirty sheds, due to the ammonia rising from the decomposing urine, etc.

11. A calf in this country is allowed to suckle its mother before and after milking. In Europe, the practice is to wean it at birth and hand feed. Early weaning is more advantageous than the other system, since the calf can be given a regulated and required amount of milk. Secondly, the cow can be milked irrespective of the calf being alive or dead. The latter is especially important, when the percentage of mortality due to several diseases among the calves is taken into account. It is said that calves hand fed scour. This is due to one of the following causes :—

(1) Milk fed to calves at uneven temperatures is either too cold or too hot. It should be fed at the body temperature of cow, about 100° F.

(2) Too much milk given at one feed. Calves have small delicate stomachs and they should be fed 3–4 times a day for the first month. Their stomachs will only digest a small quantity at a time and if they are overloaded it only leads to stomach trouble and a potbellied calf.

(3) Due to bacillus, which is said to enter the navel cord. This can be avoided if the navel string is tied with cotton thread near the joining to the skin and cut, leaving only about two inches, then dress it with some disinfectant such as iodine or copper sulphate ointment (blue stone).

An attempt was made at the Central Farm to hand-feed young Nellore and Kangayam calves without giving them access to their

dams. It proved a failure; the calves did not thrive well and the cows refused to give the usual quantity of milk. With the half-bred animals, the practice has been found successful. Whether the calf is separated or not, the milk yielded by the cow for the first 5 or 6 days should be fed to the calf in sufficient quantity. This milk contains some laxative principle, which helps to clear the bowels of the calf, and also a lot of albuminoids for growth and strength. A calf has to learn to drink, therefore it has to be taught to dring the milk. Put two or three pounds of milk in a bucket and let the calf suck your fingers, then lower the finger into the milk and the calf gradually sucks milk into its mouth. This has only to be done for three or four days, when the calf will drink without this aid. If the cow does not yield any milk, on the first day of calving, an ounce or two of castor oil may be given to the calf to clear the bowels out. During the first two months, a calf must get 4–8 lb. of milk according to its size. During the next two months the calf must be fed with some kanji, in addition. Linseed kanji is the best as it contains a high proportion of nitrogen which a growing calf requires. Wheat bran, or mixture of rice bran and poonac well soaked, is also good. After the first month a little grass or hay should be fed daily. Calves should be given two ounces of fish-meal daily after the second month and this should be increased gradually to 4 ounces until about 12 months old. It will be noticed that the animals grow more quickly and look better. The fish-meal should be clean and pure. The kanji or milk given to the calf should be always warm. The calves should be separated and housed in batches, according to their age. Calves require more exercise than other animals and so they must be allowed to run freely in paddocks, where they may have grazing also. They should have free access to clean fresh water. These conditions are, of course, applicable to other classes of animals also.

12. After the fifth month, the calves should get more concentrated food and fodder. Nitrogen, which is not present in all foodstuffs as other constituents, should be specially included in the concentrated food given. It is not possible to keep an animal in health by feeding it only on concentrated food, but it must also get bulky fodder. The bulky fodder, like cholam straw, contains lime, and the bulkiness of it in the stomach also makes the animal feel satisfied. There is no hard and fast rule that an animal should get only a particular food. Any food available may be given in a balanced ration. In other words, a certain proportion of nitrogenous and starchy constituents must be maintained in the food given. If the analyses of the foodstuffs are known, it is easy to make up a ration.

13. Regularity in feeding with respect to time and quantity must be strictly followed. A young calf must be fed liberally as

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the animal goes on continuously growing. Liberal feeding, however, does not mean over-feeding. A well-fed calf grows to a good bull or heifer. Bad or interrupted feeding during the early stage tells upon the system throughout life. Concrete examples of this are found in Madras. The young calves are neglected till their mothers go dry and it is then the milkmen afford their calves better treatment with the result that the calves look very unhealthy and ugly with their potbellies and well-defined bones. The ration of the animals should not be increased all on a sudden, but should be done gradually. No animal should be given more at one meal than it is able to eat up. The milk ration should be gradually reduced in proportion to the increased ration of concentrated food given, as the calf goes on growing.

A suitable ration for feeding calves is as follows :—

Hand-fed calves—

Up to one month.—Whole milk 8 lb. a day (3 lb. morning, 2 lb. noon, 3 lb. evening). No separated milk.

1 *to* 3 *months.*—Whole milk 4 lb. a day (2 lb. morning, 2 lb. evening).

3 *to* 6 *months.*—Whole milk 2 lb. (morning). Gruel 6 lb. (3 lb. noon, 3 lb. evening).

Calves older than six months.—No whole milk. Get gruel according to the availability of skim milk.

NOTE.—(*a*) Whole milk is fed when cows are milked (5 a.m. and 4–30 p.m.) as far as possible at the normal blood temparature. Some calves are unable to digest this 8 lb. ration. To them 1 oz. of lime water is added to the milk; still, if there is no change, the ration is reduced to 6 lb.—2 lb. three times a day.

(*b*) Gruel is made up of skim milk, ragi and linseed meal. To every 10 or 12 lb. of skim milk, 1 lb. of ragi and ½ lb. of linseed mixed, boiled in steam, cooled and fed, sufficiently warm, after adding about an oz. of salt.

Suckling calves—

First month.—Whole milk 6 lb. a day (3 lb. morning and 3 lb. evening).

2 *to* 6 *months.*—Whole milk 4 lb. a day (2 lb. morning and 2 lb. evening). Gruel, 3 lb. at noon.

After 6 *months.*—No whole milk. Gruel 3 lb. at noon.

Concentrated ration.

Age months.	Cake.	Cotton seed.	Rice bran.	Wheat bran.	Salt.	Bone meal.	Remarks.
	LB.	LB.	LB.	LB.	OZ.	OZ	
1 to 3 ..	½	..	..	½	1	½	Fed half in the morning (6–30 to 7 a.m.) and half in the evening 3 p.m.
3 to 6 ..	½	..	..	1	1	½	
6 to 12 ..	1	½	½	..	1	½	

Calves should have green fodder and hay throughout the year if possible.

Two ounces of mineral mixture made of steamed bonemeal and ground lime should be fed daily to calves after four months old; this promotes good growth.

14. The Indian cows generally go dry after seven months and the calves are then weaned. The weaned calves should get a liberal feeding. Their ration must be gradually increased. Weaned heifers should be separated from bulls and housed separately. A bull-calf not intended for breeding purposes should be castrated. Regular and liberal feeding hastens maturity in heifers. Generally, Indian heifers do not come on heat until they are 3½ to 4 years old. This period can be reduced to 2 years, if the heifers are well bred and reared. This is a great advantage for a breeder. Heifers should not be allowed to get too fat, as oestrum is liable to be delayed and they may even go barren. In one Montgomery herd at Pusa, the calves are weaned at birth and it has been noticed that the cows take the bulls two to four months earlier than those which suckle their calves and so this is important. Country heifers bearing their first calf, should be tried by taking away the calf at birth and hand-feeding them.

15. A heifer or cow on heat should be at once taken to a good bull. The signs of heat are—

(i) General restlessness.

(ii) Unusual bellowing and switching of the tail.

(iii) If at liberty, the cow jumps on other cows and allows herself to be jumped.

(iv) In full heat, there is a slight discharge of a slimy fluid from the vagina.

(v) The cow passes urine frequently and in small quantities.

(vi) Some cows withhold the milk either altogether or in part when in heat.

(vii) During the heat, the vulva appears fully or slightly swollen.

Since the heat does not last for more than half to one day, it is important to see that the cow is covered by a good bull before the heat subsides. In Madras, it is common to see a milkman bringing his cow for service 2 or 3 days after she has shown the symptoms; the result is that the bull would not cover the cow, or even if some young bulls do, the service will be fruitless. It is for this reason that the Government stud bulls are sometimes said to be impotent.

It is not the bull which is impotent, but the cows are brought to it too late to be served successfully. If a cow is in proper season one thorough service is all that is necessary. Double services should not be allowed; it is apt to reduce the constitution and condition of the bull. If a service is not effective, the cow will come on heat again after three weeks. A careful look-out should be kept from the 19th day until the 22nd day after covering in order to ascertain whether heat has recurred. Some cows come on heat at irregular intervals. When heat recurs, whether at regular or irregular intervals, abortion or some other condition causing failure of pregnancy should be suspected. Animals, which abort, should be at once separated from other cows, the womb should be washed out with some weak disinfectant such as permanganate of potash, about 3 per cent solution, and the abortion burnt or buried in quicklime. It should not in any case be thrown on to the manure pit.

16. When the cow comes to heat the next time, instead of serving her, wash the vagina out again with this solution and do not allow the bull. Then have her served by the bull at the next oestrum.

17. The average period of gestation in cows is 285 days and that in buffaloes 310 days. A cow in calf should get extra rations as she has to nourish the foetus in addition to maintaining herself. In the early stage, it is difficult to find out whether a cow is pregnant or not. As the period advances, the indications are that she does not come on heat again and there is improvement in her general condition. The abdomen enlarges particularly on the right side. The udder increases in size and a mucous discharge from the genital parts is seen. After the fifth month, foetal movements can be perceived by looking at the flank on the right side. A cow advanced in pregnancy requires special treatment. She should not be taken out along with other cows, but should be confined to the calving shed and stall-fed. Slight exercise, however, both morning and evening is necessary. She naturally prefers a quiet place and avoids company. When the time of parturition approaches, as indicated by extraordinary swelling of the udder and occurrence of milk in it, white discharge from the vulva and drooping of the hind quarters, she must be provided with a bed of straw. No people should crowd near the shed, but a watch may be put at a distance. An animal near calving should not be roughly handled; it should not be frightened nor allowed to run or squeeze through narrow passages, etc.

18. The parturition generally lasts for an hour. If the labour is found difficult, the assistance of a Veterinary Surgeon should be sought. In ordinary cases, no meddling is required. The placenta comes away in ½ to 4 hours, after which, if it is delayed,

veterinary aid must be procured. Always call in a qualified Veterinary Surgeon and do not wait too long.

19. A cow in milk should be fed well and regularly as milk production is an extra strain on the animal. A heavy milker must get more food than a poor one. An average cow requires about 3 or 4 lb. concentrated food daily for its body upkeep and about $3\frac{1}{2}$ to 4 lb. concentrated food for every 10 lb. of milk it gives. It is advantageous for a cow-keeper to keep a separate record of milk yield of each of his animals, so that he may have an idea as to which cow is paying or not. A cow that does not pay the owner should be disposed of at once. Only the cows that are profitable should be kept and treated kindly, otherwise they will turn mischievous and will not yield the maximum amount of milk. A cow can withhold milk at will. If possible, one and the same man should milk a cow during her lactation. Some young heifers come on heat three weeks after calving; they should not be bulled at once, but given a rest for $1\frac{1}{2}$ to 2 months before the next bulling. After that period, they may be covered by a bull at the earliest opportunity. If a cow continues to give milk in her advanced pregnancy she must be dried within two months of calving in order to give rest to the mamillary glands. The lactation period of Indian cattle is generally 6 to 7 months and they go dry for a long period. A good cow should average a calf a year. The cows that remain dry for a long period should be weeded out from the herd as they are a loss to the breeder. There are some cows which have a tendency to put on fat if fed liberally, instead of increasing their milk. Such cows may be profitably fattened for meat, if they are not paying as dairy cows. If fairly good milkers, then the ration should be reduced until it is noticed the milk yield does not go down with the lowering of the rations. The yield of milk must be such that the cow is a profit-earning machine when kept for milk alone. Unrestricted breeding of the unfit is certainly a great evil at present.

20. A breeding bull is useful between $2\frac{1}{2}$ and 8 years. To obtain strong large calves, it is necessary to maintain a bull in good condition and to allow him plenty of exercise. To leave him loose in a paddock is an ideal form of giving him exercise. He must be fed well and regularly. Four to six pounds of concentrated food and 20 lb. of hay or 50 lb. of green grass will not be too much for a bull. A bull should be fed, attended to and exercised by a careful man; he should be treated kindly and on no account should be ill-treated; otherwise he will develop vicious habits. A bull should have a ring in his nose and a strong staff for leading. The best-behaved bull can never be trusted. A bull's hoofs should be kept short and the soles flat either by exercising on a hard road or by paring them with suitable instruments. Otherwise the animal

cannot stand, walk or serve properly. A young bull should not be allowed to serve too many cows during a short period, lest he should become stunted and vigourless. One bull is sufficient for a herd of 60 to 80 cows if properly fed.

21. Bulls intended for work should be castrated when young. No recourse to mulling should be taken, as it is a very painful and inefficient method. Castration, on the other hand, is quickly done, without giving pain to the animal and the operation is always successful. A bullock should be used for work before $2\frac{1}{2}$ years old and after the twelfth year it is not fit for work.

22. Proper housing is another factor in the rearing of cattle. Animals, according to their age, should be grouped in batches and housed separately. A visit to the Livestock Research Station, Hosur, will give a very good idea as to how they are arranged. The sheds must be erected in a locality, where there is plentiful supply of fresh water. There must be a large area for grazing and the land must be capable of producing good fodder-crops. The place should not be far away from a town or city, to which it must be connected by road. Sanitation must be strictly observed, since contagious diseases are liable to break out when the animals are kept under dirty conditions. The animals should not be crowded in the stalls. Each animal must have sufficient space to make itself comfortable. Salt licks should be kept in the stalls in places, easily accessible to the animals. If the animals do not make use of them, and Indian cattle often do not, a little quantity of salt must be added to their ration. Two ounces for an adult animal and half to one ounce for a young one will suffice. A stock breeder must have a knowledge of treating his animals for common ailments and he must have simple medicines always at hand. The Veterinary Department now permanently inoculate animals against rinderpest. This makes the animals immune to the disease, and if one has some good cows, it is advisable to have them done as this disease is usually fatal.

23. *Buffaloes.*—The treatment of buffaloes is similar to that of cattle, except in a few respects. They are of a hardy nature and can live on coarse food. They like low miry places to wallow about in. The calves when young, are very delicate and difficult to rear. They often die of diarrhoea. This can be prevented by regulating the quantity of milk given to them. Buffalo milk is very rich in fat and the calves cannot digest it. It is therefore advisable to hand-feed them. The milk must be diluted with clean warm water and given or some milk substitute will do. As the mothers can be milked without the calves there is no difficulty in separating the calves. In Madras most of the she-buffaloes are without calves.

Buffaloes are profitable for dairy concerns since the milk contains a very high percentage of fat. The buffaloes also stand in need of being improved by careful selection and breeding. At present, there are not many good breeding bulls, as in the case of cattle. In order to remedy this, a breeding farm has been opened recently in Guntur, under the management of the Livestock Development Officer. As stated already, the breeding bulls stationed at Madras include bulls. The latter are very much appreciated by the Madras milkmen. A number of calves have been born to these bulls. Their services are fruitful in almost all cases.

24. A Veterinary Assistant Surgeon is stationed at the Veterinary College, Madras, in charge of these bulls, and he is always ready to advise or assist people in regard to feeding and rearing of young stock and the feeling of milch cows.

MADRAS,
14*th May* 1940.

T. J. HURLEY,
Director of Veterinary Services.

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CIVIL VETERINARY DEPARTMENT, MADRAS.

Contagious Pleuro-Pneumonia in Goats.

The existence of contagious pleuro-pneumonia in goats has recently been established in Madras. The disease affects goats exclusively, sheep and other animals appear to be immune.

This disease is called by different names such as " Erlamooti Noyi ", " Eramooti Noyi ", or " Kulaimooti Noyi " in Tamil, and in Telugu it is called " Gundu Mooku Thegulu ", or " Dhaggu Rogam ", or " Dhaggu Sankatam ". It is sometimes erroneously called " Dhomma Rogam " which actually means Anthrax.

Contagious pleuro-pneumonia in goats is an acute, infectious and rapidly spreading, fatal disease, occurring often in an epidemic form. When once it appears in a flock the infection generally spreads to all the animals in the flock claiming a very high mortality.

The infection is believed to gain access into the body through the respiratory tract (air passages) by inhalation. After a period of incubation extending from 2 to 10 days, the symptoms commence with fever and inflammation of the air passages followed by a cough and nasal discharge which is thin at first, and later on becomes thick and pus-like. After 3 to 5 days there is accelerated breathing which later becomes laboured. Examination of the chest wall reveals inflammation of the lung usually on one side. The symptoms gradually increase in severity and the temperature rises up to 105·0 degrees F. Due to the difficulty in breathing the animal stands with its legs apart and the head and neck extended. The hair is erect, the eyes become sunken, and the general appearance of the animal is miserable. During the later stages of the diseases the animal is unable to stand or cough due to exhaustion, and assumes a recumbent position and dies. The mortality in some epizootics is as high as 90 per cent.

In the acute form of the disease, pneumonia develops in a few hours and death supervenes within 12 to 46 hours. But in a mild attack the disease runs for 3 weeks, and the affected animal may continue to graze and feed throughout its course.

When a dead animal is cut open one or both lungs are found pneumonic, and a profuse straw coloured fluid which sets into a jelly on exposure to air is seen in the chest cavity. The lungs are usually found adhering to the chest wall.

Prevention.—Affected animals should at once be segregated, and if kept in a stall the place should be thoroughly disinfected.

To prevent the spread of the disease to other healthy animals in a herd, it is advisable to slaughter the sick animals. Movements of the affected flock from place to place either for grazing or for sale should be strictly prohibited.

Treatment.—Camphor in the form of electuary and inhalation of medicated fumes give only a temporary relief. Intravenous injections of 0·3 gram doses of Neosalvarsan in 20 c.c. of sterile distilled water have given encouraging results.

Experiments are being conducted to evolve a suitable vaccine against the disease.

MADRAS,
2nd August 1940.

T. J. HURLEY,
Director of Veterinary Services, Madras.

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LEAFLET No. 38.]

CIVIL VETERINARY DEPARTMENT, MADRAS.

Sale of Breeding Bulls from Livestock Research Stations.

1. All bulls issued from the Livestock Research Stations, on sale, loan or transfer to other stations or persons, are tested twice before issue. If any bull does not serve to the satisfaction of the officers of the Veterinary Department on the Station, or is considered unsuitable for any other reasons, it is not issued as a breeding bull.

2. Intending purchasers are advised to inspect the bulls before purchase and to select their animals.

3. Purchasers are advised to give the bull at least a month or six weeks' time to acclimatize itself to its new surroundings. The bull should not, therefore, be allowed to serve the cows until it settles down in its new place.

Conditions of sale of Breeding Bulls from Livestock Research Stations.

1. Bulls sold cannot be returned or replaced for any reason except for unsatisfactory service not due to mismanagement.

2. If unsatisfactory service is proved to be due to conditions over which the purchaser has no control, the bull will, at the discretion of the Director of Veterinary Services, be replaced by another bull or sent to the Veterinary Institute for treatment. The decision of the Director of Veterinary Services in this matter is final. When a bull is replaced, the person getting it will pay the freight on the bull returned by him and Government will pay the freight charges on the new bull issued to replace it. An exchange will be permitted only once. The transport charges on the bull to and from the Veterinary Institute will be paid by the custodian and the bull will be maintained in the Veterinary Institute free of charge for a period of two months from the date of admission.

MADRAS,
10*th April* 1942.

T. J. HURLEY,
Director of Veterinary Services.

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CIVIL VETERINARY DEPARTMENT, MADRAS.

Veterinarian's A B C to the Agriculturist.

Animal husbandry is the mainstay of Agriculture.
Agriculture is the mainstay of India.
Animal husbandry and Agriculture are engaging all-India attention at present.
Beware of animal pest as well as agricultural pests and
Be aware of their preventive measures.
Communal grazing is the commonest form of communication of Contagious ailments among
Cattle. Such ailments that require your care and caution are Cattle-plague, malignant sore-throat, quarter-ill, anthrax and foot-and-mouth, etc.
Death is the key-note of Deadly Diseases. Its five letters
Define the preventive measures of dealing with them, viz.—
(1) Disinfection, (2) Eradication, (3) Attention, (4) Treatment and (5) Hygiene. Failure to do these,
Denotes Danger and Death.
Eradication of cattle diseases by
Elimination of their infection is the main function of the Veterinary Department. Your
Earnest Endeavour should be not only to Ensure your safety but also to
Educate and Enlist the Effective co-operation of your co-agriculturists as well.
First hand knowledge of the common ailments of cattle is a
Favourable Factor to Fruitful Farming.
Foot-and-mouth disease is not a fatal affection among Indian cattle ; but a source of
Financial loss to the farmer.
Glanders is a serious scheduled affection governed and controlled by the
" Glanders and Farcy " Act.
Hæmorrhagic Septicæmia and Black-quarter are
Highly fatal to cattle.
Healthy animals as an important factor to
Human beings is highly spoken of in Health Week celebrations.
Improved agriculture is intimately connected with
Improved cattle.
Indifference to animals increases indebtedness.
Johne's disease just like tuberculosis is a slow wasting disease among cattle.
Kindness to animals is not craved of thee as a matter of grace, but, demanded of thee as a matter of right and necessity for the indispensable services they render to thyself.

Livestock improvement is a Laudable and Lively policy
Launched by Lord Linlithgow.
Mortality among cattle is one of the main sources of misery to Mother India.
Mulling of bulls practised in the country
Must give place to Burdizzo's method of castration.
Neglected livestock leads nowhere but to National ruin.
Never should you neglect to attend to infection in your village.
On the livestock uplift depends agricultural uplift;
On the agricultural uplift the Economic one.
On the economic uplift rests the Rural Uplift, and
On the rural uplift, the National one.
Protect your cattle by Prompt and
Preventive inoculation; because, you know that "Prevention is always
Preferable to cure"
Quack treatment in many cases proves to be
Queer and quixotic.
Rinderpest is a cattle disease Ruinous to the Ryot; while
Rabies is a disease ruinous to all.
Self-help is the best help and so is veterinary help to the ryot.
Systematic castration of Scrub bulls is a
Sure and successful method of improving cattle.
Take care of your cattle and cattle products; the crops will take care of themselves.
Trust your animals and Treat them well, they, in turn, will
Tend to your agricultural wealth.
Uplift of rural cattle is urging the attention of Government at present,
Utilize hence, the services of a veterinarian to the best of your advantage.
Veterinary aid in the Vicinity of Villages is the
Vital theme of our Viceroy's scheme
Wise agriculturists are those who realize that their village
Welfare is identical
With that of their cattle. Ways and means of improving your cattle wealth are well-worth your wholetime attention.
X-ray, Y-ray and ultra-violet-ray are the latest developments of modern medical science for the treatment of many obscure ailments.
Yours is the duty to look after your cattle and not others.
Yoke-gall, though a negligible affection among cattle, is likely to affect the agriculturist seriously during the working season.
Zealous agriculturists are those who evince their Zeal and
Zest in understanding the above alphabetical hints.

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CIVIL VETERINARY DEPARTMENT, MADRAS.

Chronic Rheumatic Arthritis
or
Endemic Fluorosis in Cattle.

This disease is locally known in the Kurnool district as "Vayu Potlu" or "Vayu Noppulu" [Vayu means Rheumatism and Potlu or Noppulu (Telugu) means pains]. It is sometimes called "Keel Vayu" (Keel = Joint, Vayu = Rheumatism of the joints).

Definition.

"Vayu Potlu" or "Vayu Noppulu" is a chronic disease which affects usually cattle, less so buffaloes and rarely sheep and goats. It is suspected to be due to fluorine poisoning and is characterised by difficulty in locomotion, a gradual and steady loss of condition, ruggedness of the coat and abnormal skeletal developments characterised by exostosis of the long bones and jaws.

The Incidence.

The disease is confined to certain areas, and is endemic in several villages of the various taluks of Kurnool, Anantapur, Cuddapah and Nellore districts of the Madras Presidency.

The affected localities in the Madras Presidency lie in the area bordered on the one side by the Kurnool district and on the other side by the Hyderabad State. Divided by the Tungabhadra and Kistna rivers, is an area of sedimentary rocks of the Kurnool-Cuddapah formation classified as the lower and upper Vindhyan series geologically.

A peculiar feature of the disease is that while its incidence is heavy in one village a neighbouring village may be free from it. In the affected villages the disease is known to have existed for many years and is considered to be more prevalent after the introduction of groundnut cultivation especially the spreading variety.

In and around the majority of the affected villages there are groundnut or mica factories.

Etiology.

The causes suspected are—

(1) Deficiency or excess of calcium.
(2) Deficiency of phosphorus.
(3) Deficiency of vitamins especially vitamin "A".
(4) Fluorine poisoning.

From the observations so far made, it is agreed that fluorine plays a major role either directly or indirectly in causing the condition; supplemented perhaps by a deficiency of phosphorus.

Animals affected.

The disease is usually seen in working animals over four years and is most prevalent among stall-fed animals. The greater the intensity of stall feeding the higher the incidence of the disease.

Five to 10 per cent of the total cattle population of a village may be affected and the percentage recorded in working bullocks may vary from 5 to 50 per cent.

The economic loss is very great. Expensive animals worth about Rs. 400 per pair may become quite unfit for hard work after remaining a year or two in an affected village and will have to be replaced.

Symptoms.

The first indication of the disease is lameness which may affect one or more limbs, more often the forelimbs, and especially in the region of the shoulders which appear to be thrown forwards. The lameness is usually a constant factor, generally obscure in nature and progressive in character; in some cases, the lameness is metastatic. Depending on the severity of the lameness the gait of the animal becomes stiff, laboured and painful in the course of about six months to a year. The animal finds it very difficult to arch its back. There is progressive emaciation and when the animal is very emaciated there is great difficulty in lying down and getting up. When this stage is reached, the animal constantly lies down and makes very little effort to rise.

When standing, the animal shivers and transfers the body weight from one leg to the other. In some instances, the animal may be seen resting on its toes, while in other cases, they move about in a stilty manner.

The forelimbs, generally, are affected first and in such cases the shoulders appear to be thrown forwards and outwards and the animal is afraid to place any weight on the heels. If the hind limbs are affected, the gait is of the laminitic type.

After a time, atrophy of the muscles of the affected limbs occurs, especially noticeable in the region of the shoulders.

The hoofs become twisted or distorted and overgrown. The digits have a tendency to separate and the points of the toes frequently curve inwards.

The shoulder, knee and coronary joints are commonly affected. The abnormal skeletal developments are manifested by swollen joints and exostosis of the long bones and jaws. Hard bony enlargements may occur on the medial and lateral aspects of the joints giving them a thickened and deformed appearance. In very severe cases, the pasterns may be affected with even anchylosis of the joint, so that the whole distal extremity may present an irregular club-shaped appearance causing marked distortion of the limb and a peculiar stiff gait. Callous formation may be seen also on the prominent bones and ribs. Slight nodular elevations may occur on the middle of the ribs in a lengthwise manner. Two or three ribs are generally affected on one or both sides. The nodules are hard bony prominences and in size, vary from a walnut to that of a big egg or even larger.

Discolouration of the teeth with brownish pigmentation and mottling may be noticed and the teeth, in some cases, are easily broken or chipped.

In the early stages, the affected animals feed normally, but gradually, they lose condition and finally the appetite becomes impaired emaciation becomes extreme and death ensues from cachexia.

Throughout the course of the disease, there is no appreciable increase in the body temperature. The disease is a chronic one, slowly progressive and may affect an animal for years.

Post-mortem Findings.

Severe inflammation of the hip and shoulder joints, enlargements with diffuse periostitis and bony exostosis of the distal extremities of the metacarpal and mettarsal bones and knee joints are commonly found. Nodular prominences may be present on the ribs which are porous in character.

Treatment.

There are selected curative villages in the midst of the affected areas wherein a regular trade goes on, in the purchase of sick animals from affected villages and placing them in the curative villages for some months and their sale for a better price, after they recover or improve.

The general description of such curative villages is that there is paddy cultivation, irrigation from tanks, canals, and also less groundnut cultivation.

Some animals when taken from an affected to a healthy area in the early stages of the disease show a decided improvement and

may gradually recover without any treatment. The development of the symptoms is arrested.

In the Madras Presidency, the results of analysis of the soil, water and fodder of the affected localities in the districts of Kurnool, Cuddapah and Nellore revealed that the disease is closely associated with deficiency of phosphorus in the fodder, etc., and an excess of fluorine in the drinking water. It was therefore considered that if the diet of sick animals is supplemented with easily digestible phosphorous compounds like bran, bonemeal or if dicalcium phosphate is given in sufficient large quantities, a cure would be possible in many of the cases in the early stages of the disease.

For this purpose, bonemeal in doses of two ounces daily per animal was tried with beneficial results. It was found that animals in the early stages of the disease and those that have not developed any chronic lesion such as enlargement of joints, etc., showed rapid improvement and became almost free from the condition in about two months from the administration of bonemeal. In the case of well advanced cases with marked anatomical abnormalities such as bony exostosis, etc., the bonemeal treatment helped in relieving them of the acute symptoms like lameness and painful joints but had very little effect in reducing the exostosis.

It has also been shown that the addition of bonemeal to the feed of healthy animals in the affected locality acts as a preventive. Owners are, therefore, strongly advised to give two ounces of sterilized bonemeal to their animals daily, both as a curative as well as a preventive measure. In the dry season, it is also advisable to give vitamin " A " in the form of one to two ounces of shark-liver oil daily.

Those who require further particulars of the disease and the source from which sterilized bonemeal can be obtained, may apply to the nearest Veterinary Assistant Surgeon.

T. J. HURLEY,
Director of Veterinary Services, Madras.

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LEAFLET No. 41.

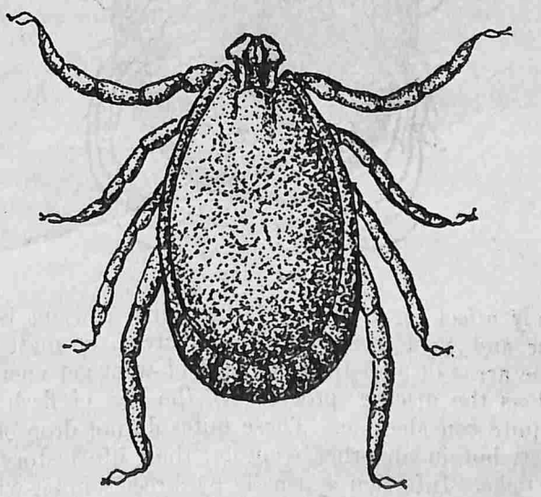
CIVIL VETERINARY DEPARTMENT, MADRAS.

Dipping and Drenching of sheep to control diseases caused by internal and external parasites.

The sheep industry is an important side line of agriculture and the mainstay of the shepherd. There are about 17 million sheep in this province and the income derived from the sale of mutton, skins and wool is very considerable. This source of national income can be increased to a large extent if more attention is paid to the better management of the sheep which is lacking at present. One of the chief obstacles to successful sheep breeding is the presence of parasites either inside the sheep or outside on their bodies. They cause loss of condition; they lower the resistance of the sheep to disease; the quality of the wool is lowered and mortality is high. Intestinal worms do greater damage in lambs than in adult sheep and adult sheep may, sometimes, harbour these parasites without showing any signs of ill-health. Such animals whose fæces contain the eggs and larvæ of these parasites, contaminate the pastures and pens and are a potential source of danger to the other members of the flock, especially the young ones. These parasites thrive well during the wet season, and in damp and low-lying places which provide a suitable environment for the growth of the worm larvæ, and for the breeding of the intermediate hosts of certain worms. In this leaflet you are told how and what these parasites look like and the damage they cause to your sheep.

There are two kinds of parasites known as ' External ' and ' Internal,' according to the parts of the animal's body they attack. The most common external parasites which attack the skin of sheep are—(1) Ticks, (2) Mites, (3) Lice, (4) Keds and (5) Blowfly larvæ.

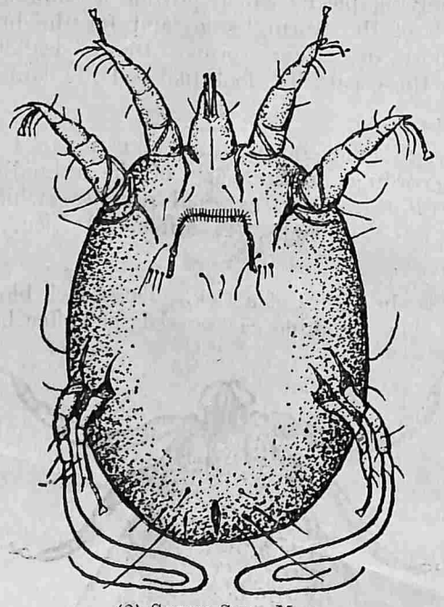
(1) This is the figure of a tick. Ticks suck blood, and when fully engorged they resemble castor seeds or coffee beans in shape



(1) SHEEP TICK.

and size. They have a tense leathery covering and very strong piercing and sucking mouthparts by which they cling on to the skin of animals and suck blood. The females after sucking blood are fertilized by the male while still on the body of the animal. The fertilized females drop off, lay their eggs in very large numbers (some hundreds) in crevices or cracks in walls or soil and other sheltered places. These eggs hatch in course of time into six-legged larval ticks or ' seed-ticks ' as they are generally called. These seed-ticks are very tenacious of life, climb up blades of grass or other vegetation and stick on to passing animals. This done, they suck blood, fall off to the ground, and moult afterwards into the next stage of nymphs. These nymphs also get attached to suitable animals, suck blood and drop off to develop into adult ticks. The adults too invade a fresh animal to feed, breed and drop down to lay eggs. Thus, ticks cause loss of blood in animals resulting in debility and anæmia and the degree depends on the number of ticks present. Secondly, the bites of ticks cause damage to the skin and consequently lower the quality and value of the skins. In some cases, tick bites cause a certain kind of sickness called ' Tick-fever.'

(2) This is the magnified figure of a mite. Mites cannot be seen by the naked eye, but can be easily seen under a magnifying

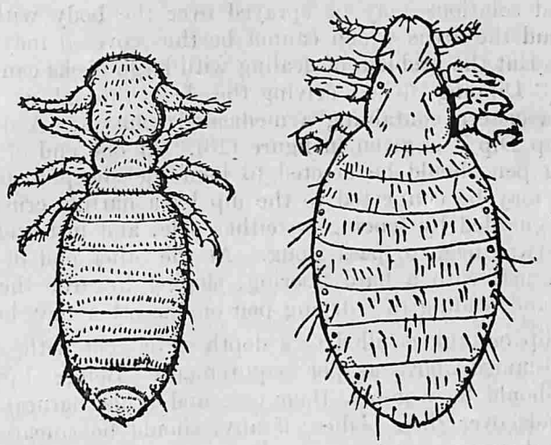


(2) Sheep Scab Mite.

lens. They affect large areas of the skins, causing itch, falling off of hair and wool from the affected areas, or matting of the wool. The areas of skin thus denuded of wool get encrusted with scabs and as the disease progresses, the loss of flesh and wool becomes quite considerable. These mites do not drop off the body of the host, but in all other respects, their life history is similar to that of ticks. Infection is usually by direct contact with affected animals.

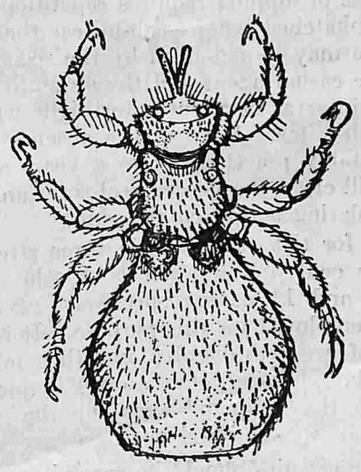
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(3) & (4) These figures give an idea of what lice and keds look like. The lice cause lousiness, itching and pruritis or inflammation of the skin. On account of the irritation caused to the skin, the affected animals constantly keep on rubbing, biting or



(3) Sheep Lice.

scratching the affected parts injuring the skin and causing abrasions. The constant itching prevents the animals from feeding and resting well and consequently there is loss of condition. Keds are wingless flies that live under the fleece, bite and suck blood.



(4) Sheep Ked.

(5) *The blow-fly larvæ.*—The blow-fly deposits its eggs under the fleece which is soiled with dung; and the larvæ from these eggs live in the debris of the skin under the wool and on the exhudate of wounds caused by the biting of the sheep at or near the infected part. The larvæ penetrate inside the broken skin and cause fly-blown wounds and ugly ulcers. The remedy for the infection of the abovenamed parasites consists in " Dipping " and " Spraying." Watery solutions of arsenical compounds, sulphur and lime

are efficacious in killing the external parasites and in curing itch or scab. But the problem is how to get the solution into direct contact with the parasites which lurk under the fleece and hide under the scab. When only a few animals have to be dealt with, medicated solutions may be sprayed over the body with a spray pump, and the areas which cannot be thus covered may be hand-dressed. But the problem of dealing with large flocks can be solved only by " Dipping ", i.e., driving the sheep through a " Dip ", a tank or a cistern containing a medicated solution. A diagram of a " Sheep Dip " is given in figure (13). At one end of the dip a collecting pen should be erected to hold the sheep to be dipped, and this may be connected to the dip by a narrow crush of hard flooring, guarded by fencing on either side, and just wide enough to allow two sheep to pass along. At the other end of the tank an exit crush with a hard flooring, sloping towards the tank on one side and leading to a drying pen on the other may be erected.

The dip or tank is filled to a depth of $3\frac{3}{4}$ feet with one of the solutions named above as per requirement. Before dipping, the animals should be watered, their ears and other natural openings and wounds over their bodies, if any, should be smeared with a protective dressing containing vaseline or any bland oil. The sheep are then driven into the tank in twos, allowed to stand in the fluid for about two minutes and then driven out through the exit crush to the drying pen. Here they are detained for some time to allow the dip to drip off. Following a dip, sheep should not be allowed to graze, but must be penned in a fresh uninfected place. The process of dipping requires repetition since those parasites and their unhatched eggs (scab-mites) that were not killed by the first course may be acted on by the second, and the intervals vary with the casual agent and the strength of the dip. Two dippings with an interval of about a fortnight will be sufficient to get rid of the scab-mites. Even in the absence of parasites, dipping can be profitably practised twice a year, a fortnight before clipping. This will clean the fleece, heal sores and wounds, if any, and exert a stimulating action on the skin.

Arsenical dips for ticks are used in three strengths (viz.), 0·1 per cent, 0·2 per cent and 0·3 per cent solutions with dipping intervals of 3, 6 and 14 days respectively. Sodium arsenite is the agent usually employed for this purpose. It is first boiled with a small quantity of water to dissolve, and then mixed in the water in the dipping tank. It is important to test frequently the strength of the solution in the tank and keep up the correct standard required. The tank should be cleaned out every six months.

Caution.—Arsenical dips should be carefully used, and handled, otherwise they prove harmful to both sheep and man.

Lime and sulphur dip is prepared by mixing 15 lb. of lime with 25 lb. of sulphur into a paste with water, and boiling in a suitable vessel with 50 to 100 litres (11 to 22 gallons) of water until a deep orange purple solution is obtained. This solution is filtered through cloth and made up to 100 gallons.

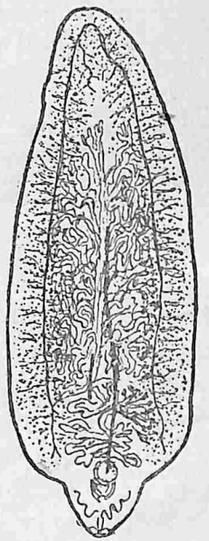
There are some useful patent ready-made sheep dips manufactured by Messrs. Coopers and obtainable from Messrs. Wilkinsons Heywood and Clark, Exchange Buildings, Sprott Road,

Nallard Estate, Bombay, or from any other leading stockists. Instructions for the use of these patent dips can be had directly from the suppliers.

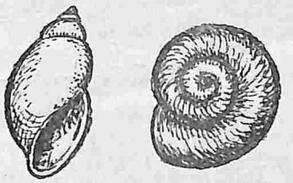
The cost of construction of a dip approximately amounts to a thousand rupees and the running expenses include the cost of the solution and the pay of an attendant. Should this expense be met on a co-operative basis in sheep-rearing areas, it will not be too hard on the individual sheep-owner, but on the other hand, it will amply repay him by improving the condition of his sheep and in fetching higher profits.

The internal parasites.

The following is a brief description of the common internal parasites which infest sheep and the damage they cause. This is the picture of a liver fluke. It is a leaf-like parasite commonly present in the bile ducts and gall bladder, causing a disease known as "Liverrot." The liver is greatly damaged, digestion is deranged and death of the animal occurs in many cases. In the chronic form the animal is found to be losing condition gradually, it looks very unthrifty with a rough coat and brittle wool in spite of any amount of care, doughy swellings under the jaw appear. Oedematous swellings and ascitis (or accumulation of fluid in the abdomen) are met with. Jaundice is seen in some cases. The animal gets rapidly debilitated and finally dies. This disease is found among sheep that graze in marshy water-logged areas abounding in fresh-water snails which are necessary for the development of the young stages of the flukes. Snails which are suitable for this development, if present in and around grazing areas, serve to keep the infection permanently in the locality. Sheep pick up infection by infesting the infective forms of the parasite present in the grass and weeds. Control measures, therefore, consist in draining the marshy water-logged areas, and destroying the snails. Copper sulphate in minute doses is a deadly poison to snails, while it does not cause any harm to animals and man. A mixture of one part of copper sulphate with four parts of sand is made and broadcast by hand. A hundred pounds of such mixture will be sufficient for an acre of water surface.



(5) Liver fluke sheep.



(6) Fresh-water snails.

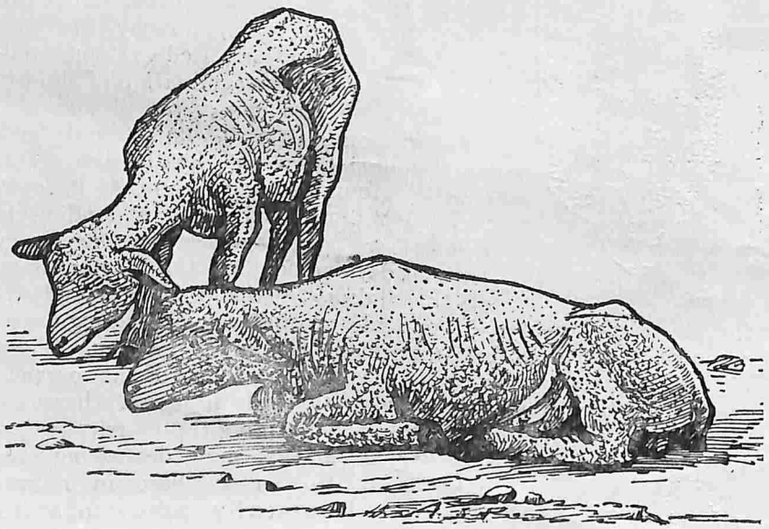
The treatment of the affected sheep can be done by administering 1 c.c. or (17 drops) of carbon tetrachloride in 4 c.c. (or 60 drops) liquid paraffin.

This illustration gives you an idea of how a cluster of " wire-worms " which infest the abomasom or the fourth stomach of



(7) Stomach worms of sheep.

sheep, particularly lambs, look like. These are very harmful parasites causing serious loss among the stock. When lambs are infected with this worm, the usual symptoms noticed are indigestion, constipation and sometimes diarrhœa, œdematous swellings particularly under the lower jaw, debility and loss of fleece in tufts. Lambs still in apparent good condition may sometimes die. The worms suck blood from the walls of the fourth stomach and live on it. The affected animals therefore look debilitated as seen in the picture below.



(8) Sheep suffering from stomach worms.

Treatment consists in administering half to two ounces of a 2 per cent solution of copper sulphate (1 lb. in 5 gallons of water) alone or combined with mustard. For lambs under 4 months, ½ oz. and for lambs aged 4 to 12 months, ¾ to 1 oz. of the solution may be given. This worm takes about 3 weeks to develop and breed. Hence the dose should be repeated after a fortnight and at intervals of 3 to 4 weeks thereafter for some time.

The following suggestions help in general control measures against wire-worm disease :—

(i) Pastures should be ploughed and mixed with lime to kill the infective larvæ present there.

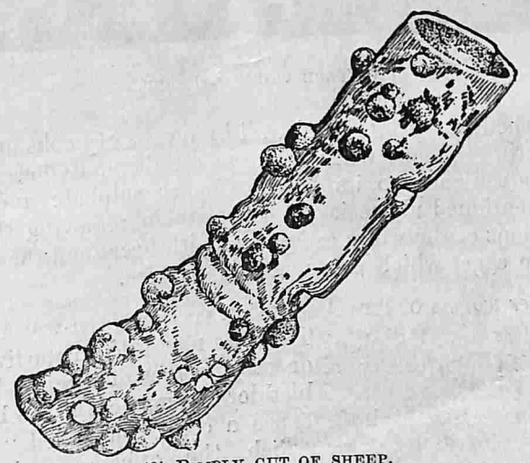
(ii) Lambs may be made to graze and pick up the larvæ and the latter killed while still developing within the lamb's stomach by drenching with copper sulphate solution as suggested above.

(iii) When a pasture is known to be a potent source of wire-worm infection it is best to burn it and allow fresh grass to grow during the following rains.

(iv) Low-lying water-logged areas should be drained and filled up lest they form infective centre for the worms.

(v) Rotational grazing can be adopted when extensive areas of pasture are available.

The nodule worms which cause pimply gut as shown in this picture, live in the large intestines and cause numerous nodules, interfering with digestion. The symptoms usually observed are catarrh of the intestines, resulting in diarrhœa. In lambs mucus is passed with the motions and when a heavy infection is present, they suffer markedly and lose condition. Oedematous swellings, loss of hair and other symptoms common to worm disease are also caused by this infection. The location of the parasite makes it difficult to adopt any successful treatment.



(9) Pimply gut of sheep.

The following may be tried with advantage :—

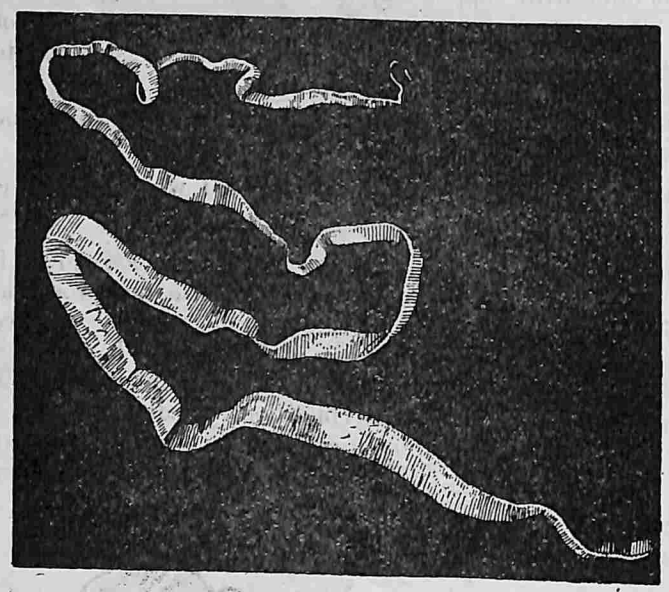
(i) Give 2·5 c.c. (42 drops) of 10 per cent solution of copper sulphate and 15 seconds later 1 gram (15½ grains) to 2.5 grams (39 grains) of the following powder should be given in capsules :— 2 parts of copper arsenate, 3 parts of calcium hydroxide, and 5 parts of copper tartarate.

Precautions.—Sheep should have a drink of water immediately before being drenched and should not have a grain ration or salt lick for a day or two before and after treatment. No water should be given for 1 to 2 hours following drenching.

(ii) Enema containing 2 grains of sodium arsenite in one litre of water.

Dose.—1 pint for lambs under 4 months.
$1\frac{1}{2}$ to 2 quarts for adult sheep.

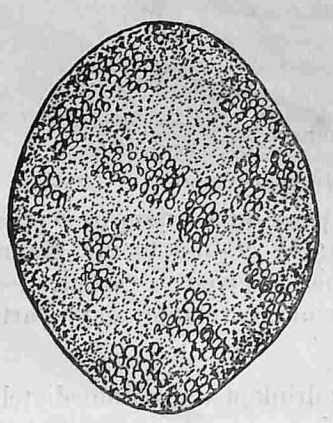
This is the figure of a tape-worm which lives in the intestines of sheep and lambs and grows to a length of 20 feet. It gets itself



(10) Tape worm of sheep.

firmly attached to the intestinal wall by means of hooks and suckers in its mouth. Except when in large numbers, it does not cause much inconvenience to its host. Copper sulphate and mustard solution mentioned above is also effective in removing this worm. Small portions of the worm are passed with fæces and these portions liberate the eggs, which propagate the species.

Bladder worms or larvel stages of certain tape-worms of dog. They are met with in the liver, brain, or other organs of sheep. When the bladder worms infest the brain they cause a condition called "Gid," in which the affected animal turns round and round in one direction spasmodically, or goes straight till an obstruction is met with. Some animals get blind in one eye, and in some others, paralysis of the hind quarters is caused. This worm is in the form of a cyst or bladder with an accumulation of fluid and small white specks known as the scolices or heads of the future tape-worms. This worm is popularly known among butchers as "Kovvu Kaya" (Telugu) meaning fatty growth.



(11) Bladder worm of sheep.

The lung worms cause a condition known as "Hoose" or bronchitis and pneumonia. They live in the air passages, blocking the bronchi and setting up irritation, leading to bronchitis and pneumonia. Treatment consists in intra-tracheal injections and administration of certain drugs which are beneficial. This should be done under the advice of a qualified Veterinary doctor. The affected animals have to be given nourishing diet.

Drenching is the process of administering medicines or any liquids by the mouth. This requires a little care and practice, otherwise it is liable to cause suffocation and even death of the animal when wrongly done. An illustration showing the correct method of drenching is given below.



(12) Drenching sheep.

The lower jaw should be firmly held with the left hand keeping the thumb on the tongue. The medicine should be poured a little at a time on the back of the tongue, occasionally stopping if the animal coughs.

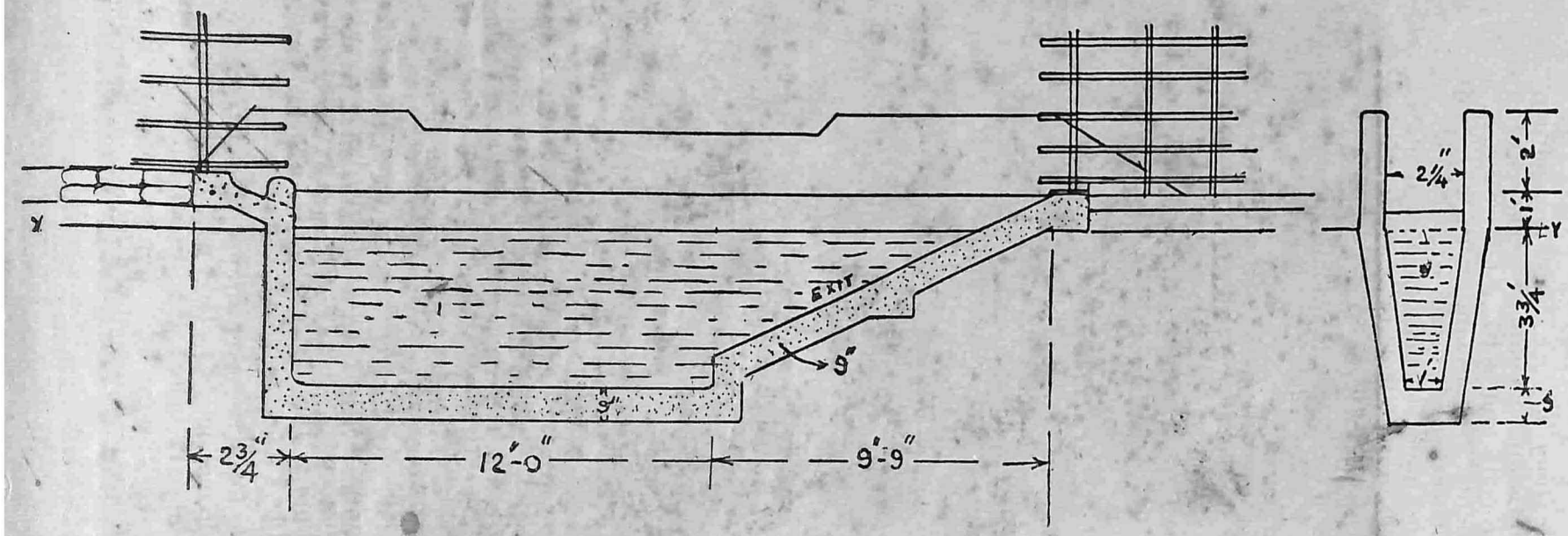
The following precautions may be observed with advantage while drenching sheep for worms. Starve the animal for 12 hours before and 12 hours after drenching. When the sheep return to the pen in the evening after grazing, water them and pen them without giving any fodder for the night. In the morning give the

animals a worm drench and pen them till about 3 p.m. They may then be allowed out to eat and drink. They should not be transferred to a new pen or pasture for a week after drenching.

Before giving any worm drench, give each animal a small quantity of 2 per cent to 4 per cent solution of copper sulphate up to half-an-ounce. This brings about a temporary closure of the œsophageal groove, enabling the worm mixture to pass directly into the fourth stomach instead of the first and thus allow the drench to exert a better and quicker action.

Further particulars on the subject can always be obtained from the nearest District Veterinary Officer.

For professional advice and treatment of the disease conditions specified in this leaflet, the assistance of the nearest Veterinary Assistant Surgeon may be sought.



(13) Longitudinal Section of a Dipping Tank for Sheep.

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CIVIL VETERINARY DEPARTMENT.

What to do when fodder is scarce.

Due to failure of the rains or other causes, there may arise occasions when cattle fodder and other common feeding stuffs become acutely scarce in villages and townships. For the benefit of cattle-owners faced with such a situation, hints regarding alternate sources of fodder and feeding stuffs are given in this leaflet. The items described are available in many areas though not commonly fed to cattle, and they will be found to form satisfactory substitutes during periods of shortage.

1. *Mango seed kernels.*—Mango seeds may be collected from waste-heaps, etc., and the kernels are then taken after breaking the shells. They are slightly crushed and offered to the animals as such or after drying in the sun. In the dry condition, the size of the seeds should be reduced to that of a pulse grain and moistened with water before offering to animals. In the beginning, it should be mixed with either a small amount of oil-seed cake or any other grain or kitchen refuse. The animals get accustomed to this food after about a fortnight.

2. *Entrails.*—The entrails of slaughtered animals (bowels, intestines, etc.) are collected, cleaned of their contents and washed thoroughly with water. It is then heated in an open pan with a sufficient quantity of water to avoid charring. It is then cut into small pieces and dried and stored after crushing. It is likely that this material may not be relished in the beginning. It should therefore be mixed with some cake or cheap grain refuse, which should gradually be replaced entirely by entrails. For storing, the material should not be kept in a damp place.

3. *Groundnut husk.*—The husk should be crushed and moistened with water before feeding to animals. It should then be sweetened with molasses mixed with water in equal proportions.

4. *Autumn-shed leaves.*—Leaves shed in the autumn by "shushem," "pakkar," "pipal" and "her" trees can replace the roughage requirement. They should be beaten with sticks to remove the adhering dust.

5. *Sugarcane bye-products.*—The dry residue from cane after the juice is crushed becomes a satisfactory feeding stuff if properly

treated. This may be fed to cattle after the addition of a suitable quantity of molasses to make it a mass or cake.

6. *Water Hyacinth.*—Water Hyacinth which is found in tanks, etc., can be used as cattle-food. This is being fed in its green form in some places, but it can be collected and compressed and used. If abundant, such prepared stuff can be transported to famine areas.

7. *Cactus.*—Cactus (both spineless and spined) after pre-treatment on fire makes a satisfactory famine fodder.

8. *Tamarind seeds.*—These are roasted and crushed into a fairly rough powder. Animals can be fed with this mixed with other items of feed, either dry or soaked.

9. *Paddy straw.*—The treatment of straw by alkalies (caustic soda lime, etc.) increases its feed value. The straw is steeped for 24 hours in 1·25 per cent sodium hypdroxide (or lime) solution and then washed and dried. Animals may not relish such treated-straw for some time, but in due course they get used to it.

10. *Coconut leaves.*—Ryots in certain parts of this Presidency are accustomed to feed their cattle with coconut leaves, during times of fodder scarcity. Coconut leaves form a fairly satisfactory source of roughage in the green stage, which the cattle seem to relish. The central ribs from these are removed, and they are then cut into small pieces before being fed to cattle.

In addition to the above, the following are also occasionally used in various parts of Madras Presidency as substitutes for fodder for cattle during periods of short supply :—

Leaves of mango, banyan, plantain, drumstick, " Arasu " (" Ravi " in Telugu), " Agatti " (" Avasi " in Telugu) and palmyra trees, and also the pods of the Acacia and the " Rain " trees, waste products (rinds, etc.) of the jack fruit, tapioca leaves, and the whole groundnut plant. These may be fed in the green state and also after drying and proper preservation.

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Leaflet No. 43.]

CIVIL VETERINARY DEPARTMENT, MADRAS.

CLEAN MILK PRODUCTION.

The term " Clean Milk " denotes raw milk from healthy cows which has been produced and handled under hygienic conditions. Clean milk should have a sweet smell and taste and should be free from extraneous dirt or dust. The keeping quality as well as the nutrient effect of milk deteriorates to the extent there is contamination from dirt or other foreign matter. Hence, every one concerned with it, the producer, the distributor and the consumer should take extreme care to see that milk is not contaminated nor made dirty at any of the stages it passes through from the cow to the drinking cup, as cleanliness at all stages reduces risk of incidence of milk-borne diseases (described in leaflet No. 21 of this series).

Milk, which is a valuable human food, provides a favourable medium for the growth of micro-organisms or bacteria. Contamination with bacteria is the chief danger against which one has to take vigilant measures. Bacteria on enternig the milk multiply at a very rapid rate more so if the temperature is favourable to them—and bring about undesirable chemical changes as a result of which the milk turns ' sour ', ' ropey ', etc., and becomes useless as human food. Hence, to prevent the entrance of these organisms into the milk, it is essential that the sources of pollution of milk from the time of production to consumption should be appreciated and understood. The production of clean milk is neither difficult nor expensive. Having known the causes and the sources of pollution, it is easy to produce highly clean milk with no elaborate equipment or labour.

Sources of milk contamination.

The primary source of infection is the cow itself. A diseased animal or one with an unhealthy udder, would give milk with innumerable bacteria in it.

2. The cow-shed and its surroundings : untidy cow-sheds and dirty surroundings can very easily contaminate milk.

3. Gross dirt, dung, etc., on the body, udder, tail and other parts of the cow are very rich sources of contamination of milk.

4. The milkmen, when they are either unclean or are unhealthy are also capable of adding to the pollution of milk with not only dirt and dust but harmful bacteria too.

5. Wrong methods of milking and handling contribute to the contamination of milk, e.g., " wet-milking ", dipping of fingers into the milk to test it, etc.

6. Unsuitable or unclean milking utensils tend to contaminate milk with foreign matter as well as micro-organisms.

7. Wrong methods of collecting and storage of milk can also be a cause of milk pollution.

Precautions essential for clean milk production.

The producer must first of all see that his animals are healthy. Any animal suspected of, or showing signs of, ill-health should at once be isolated from the herd and its milk should not be mixed with the general supply.

A good, sanitary and well-constructed cow-shed is an undoubted contribution towards the production of clean milk. It should be well lighted and ventilated. And it should have ample supplies of fresh clean water.

The dung should be removed from the cow-shed as often as is necessary. This will prevent the cow from treading and lying on the dung. The standings and gutters should be swept and washed at least once a day. Lime-washing of the cow-sheds and surroundings should be carried out as frequently as is necessary. Dirty litter and refuse should not be allowed to accumulate anywhere near the sheds, but should be removed regularly and properly disposed of.

Dusty foods like straw, bran and husk should never be given to the animals for at least an hour prior to milking, owing to the amount of dust which will circulate in the air and so gain entrance into the milk. Every particle of dust acts as a vehicle for thousands of bacteria. The dust already present in the air of the cow-shed should be allowed to settle down before the commencement of milking. This can be done by spraying water on the floor of the sheds and yards with an ordinary watering-can. It will be advantageous to add a little disinfectant to the water, as this tends to discourage flies.

Clean milk cannot be produced unless the cows are kept clean. Therefore it is essential to keep the flanks and tails of the animals scrupulously clean. Wash these parts with clean water and then dry them with a clean cloth (towel). The cleaning and washing of the cows should be completed at least five minutes before milking commences. The most important part of the cleaning is the washing of the udder and teats just prior to milking. Particular attention should be paid to the teat-orifices and the clefts between the quarters of the udder. The udder and teats of the cow after the calf has suckled require to be washed and dried before milking.

The methods indicated above may appear to entail a large amount of labour; but once the cows are clean and housed in clean surroundings, it is easy to maintain them as such. A skilled worker can easily carry out all the work necessary on each animal within five minutes. These operations should be carried out before every milking.

The personnel responsible for the handling and care of the animals play a vital part in the production of clean milk. It is therefore particularly essential that the milkmen should be healthy

and free from all infectious diseases. If any of the people handling milk are suffering from diseases like typhoid, diphtheria, etc., they act as carriers and may contaminate the milk and thus convey the disease to the consuming public through the medium of milk. There are many cases on record of such instances. Therefore, the milkers should not only be efficient and clean but healthy too. In up-to-date dairies the milkmen are provided with new white overalls and caps to be worn by them while milking. This prevents contamination of milk from the person and clothing of the milkmen.

The milkmen should thoroughly clean and scrub their hands and arms before starting to milk. It is also necessary to wash the hands after each animal is milked.

The udder and flanks of the cow should be moistened with a damp cloth and dried well before the commencement of milking. This procedure will greatly aid in the production of milk of low bacterial count. It is easy and inexpensive.

If the " fore-milk " is allowed to enter the milking vessel, it would considerably increase the bacterial content of the product. Hence, it is very important that the first two or three " draws " of milk from each teat are rejected.

" Wet-milking " or the practice of allowing the first few streams of milk to run over the hands of the milker, is very objectionable as it greatly enhances the bacterial content of milk. Therefore this should not be done. Milking with dry hands is the best way.

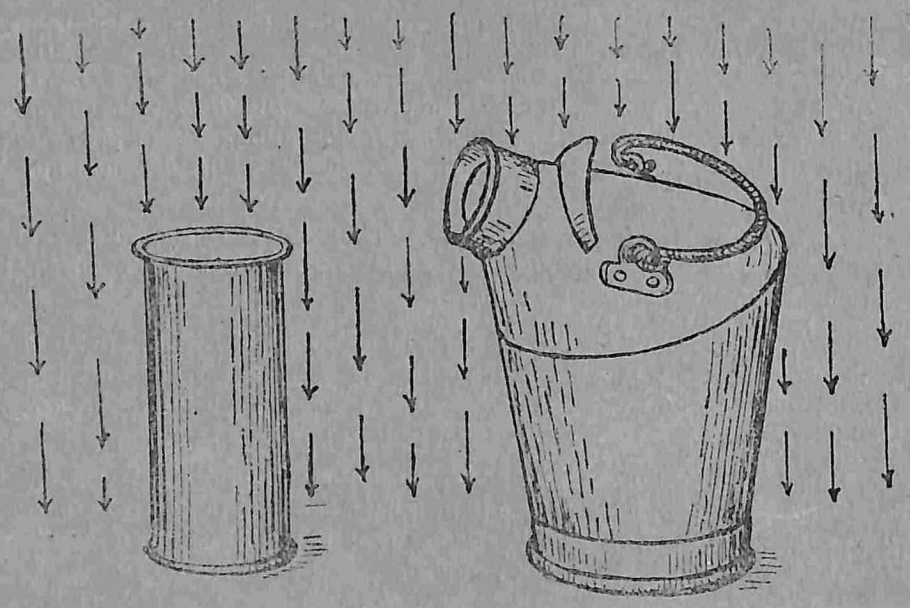
Another factor which exerts a great influence on the germ content of milk is the degree to which the udder had been emptied at the previous milking. The udder should be completely emptied at every milking.

As stated previously one of the greatest sources of mil pollution is the milking utensil. All dairy utensils should be constructed of metal with well tinned surfaces. They should be free from cracks and crevices where dirt and dried milk can collect. All seams should be well flushed with solder.

To clean the utensils properly, first wash them with cold or lukewarm water. Then wash with warm water containing washing soda (2 per cent) or other suitable cleaning agent. Finally, scale them with boiling water. It is best to steam all dairy vessels for a few minutes before use. It is very important that the utensils be dried at once and kept dry in a clean place until used. Drying is very important as bacteria grow in moisture.

The use of the wide-mouthed " deksha " and the " jodthabala " is very objectionable, as particles of dust, etc., can very easily find their way into the milk during milking. Pails with

small openings or those covered on top (as shown in the illustrations on page 4), are helpful in the production of clean milk.



Milk should be removed away from the cow-shed as quickly as possible. Milk as it leaves the udder is warm. It is of vital importance to cool it immediately after it leaves the udder and keep it cool until used. This will prevent the multiplication of bacteria and the resulting souring of the milk, since warmth helps the growth of organisms. This cooling can be done by keeping the container with milk in a tub of cold water. Milk after being drawn should be stored well protected from heat and also flies before it is distributed. A store-room with fly-proof wire-gauze fitted in, and with good light and ventilation is ideal for the storage of milk. In small dairies and establishments with an adequate supply of water, a milk-cooler will be very useful. For large dairies a milk cooling plant should be fitted up.

Thus, if these simple precautions are observed it is neither laborious nor expensive to produce milk of high cleanliness.

MADRAS,
12th December 1946.

T. J. HURLEY,
Director of Veterinary Services.

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LEAFLET No. 43

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CIVIL VETERINARY DEPARTMENT, MADRAS.

Ranikhet Disease of Poultry and its Control by Vaccination.

This disease popularly known in India as "Ranikhet Disease" derived its name from the Town of Ranikhet in North India, where the disease during 1928 was first diagnosed. The ravages caused by this very fatal disease among fowls and the consequent financial loss sustained by poultry owners are very well known throughout India. It assumes its importance not as an ailment of mere individuals but rather as a mass disease. So the preservation of the health and vigour of the flock, as a whole, is of far more concern to the poultry breeder than the well-being of a few individuals in his flock.

Occurrence and spread.—This disease has certain striking features. It appears very suddenly, runs a rapid course and wipes out a large flock in a matter of days. The disease is widespread and occurs on the hills, plains and coastal areas during all seasons of the year. It affects all breeds of fowls of all ages and sexes. Pea-fowls, Turkeys and Guinea fowls also get the infection. Geese and ducks are resistant.

The cause of the disease is a virus. It is usually enzootic (constantly present) at poultry markets in big cities and towns where fowls from various places are brought for sale. It appears even in well kept poultry farms stationed in isolated areas. The majority of the outbreaks of the disease are generally traceable to newly introduced birds from outside sources such as from street vendors, shandies or markets.

The disease spreads in the flock by contamination of the food and water through the infected droppings, buccal and nasal secretions of sick birds. Men, animals, utensils, clothing coming into contact with the contagion, crows and wild birds also help in

the dissemination of the disease. It must be borne in mind, specially in poultry farms that infection may be spread through brooms used for cleaning an infected yard. It is important that the presence of the disease in the flock should be detected quickly before it gets out of control so that at least some of the healthy birds can be saved by suitable protection against the disease.

Symptoms.—The disease can be recognized by the following symptoms: The affected bird stands in one place with the head drawn in over the back and with the eyes closed. It is not easily roused and is very dull. When disturbed and made to move, the gait is staggering and irregular. The appetite is lost and the food in the crop remains undigested; a stringy mucous saliva dribbles from the beak and as the disease progresses, the beak is kept half open *and a gurgling sound is heard during breathing*. In later stages, a bluish discolouration of the comb and wattles occurs, followed by paralysis of the legs or wings. The bird passes loose motions which are greenish white or white in colour. With the onset of diarrhœa, the bird becomes very weak and exhausted and is unable either to get up or move about and then dies. Death occurs usually in a few days. Recovery from the disease is very rare and in such of those that recover, Chorea (a nervous affection) is observed.

Treatment.—There is no specific drug which can be used as a curative for the disease and treatment is unsatisfactory.

Control and prevention.—The control efforts must, in general, be those of sanitation and hygiene. Frequent cleaning, disinfection of all utensils and equipment constitute important control measures. The sick birds should be destroyed and the poultry yard thoroughly disinfected. In-contact birds should be segregated and newly purchased poultry quarantined for a fortnight or three weeks.

Vaccination.—Owing to the very acute course this disease runs in a flock, its effective control has been a difficult problem in the

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past. A vaccine of high potency however which gives good results has now been evolved. Therefore as a preventive measure, all healthy birds can be protected against the disease by vaccination.

Preparation of the vaccine.—This vaccine is a live product, the virulence of which is reduced by laboratory methods. It is manufactured from the chicken embryos infected with a strain of Ranikhet Disease virus lowered in virulence. The vaccine is propagated on fertile eggs by passages. The fluid surrounding the chick embryo contains the protective substances elaborated by it and this constitutes the vaccine. It is highly concentrated and 1 c.c. of this is sufficient to protect 1,000 birds. As 3 to 4 c.c. can be collected from each chick embryo, vaccine from one egg can protect three to four thousand birds.

Properties of vaccine.—This vaccine has certain striking properties. It is very fragile and sensitive to exposure to atmospheric temperature and is therefore always stored in ice in hermetically sealed glass ampoules and transported in thermos flasks, the vaccine being packed in ice. Near freezing point, however, it remains quite stable for at least three to four months. This is not a curative vaccine but only a preventive one.

Use of vaccine.—For use in the field, 1 c.c. of this concentrated vaccine is diluted in 1,000 c.c. of low temperature tap water which has been previously filtered, boiled and cooled in ice or in a refrigerator and used immediately. It is kept protected from direct sunlight. When large numbers of birds are to be vaccinated, the diluted vaccine is preserved in a bucket containing ice and water. The vaccine is injected under the skin of the wing or into muscles of the thigh in doses of 1 c.c. This vaccine, not being a curative one, should not be used on sick birds or on birds in the incubative stage of the disease. Healthy birds alone are to be protected.

Vaccine reaction and after-care.—Pea-fowls, Turkeys and fowls of all breeds and chickens above two months of age can be protected

with this vaccine. After the vaccination, birds may show drowsiness from the fourth to sixth day followed by greenish loose motions for four or five days. The birds generally feed well; if appetite is impaired in a few birds, they may be nursed and fed on soft wet mash and buttermilk till they are normal. A few birds show slight weakness in gait or lameness which usually clears up in a fortnight. Birds exhibiting illness or symptoms of paralysis at a later stage, i.e., after 2–3 weeks of vaccination should be suspected for coccidiosis and necessary preventive measures taken. Birds with severe lameness, or paralysis should be segregated and if no improvement is noticed within the few following days, should be culled and used for table. This occurs only in a small percentage of vaccinated birds (say 1–3 per cent). In laying hens, egg production will decline after vaccination but will return to normal in about four weeks. So it is generally advisable to have the vaccination done before the pullets have started laying, i.e., between four and five months of age. Vaccinated birds should not be exposed to infection for a week following vaccination. They should be fed carefully and housed properly against inclement weather, chill wind, etc.

Birds in convalescence may be put on a course of shark-liver oil. Immunity is set up in two days after vaccination and a definite and lasting immunity is conferred.

Since all healthy birds can be protected with this vaccine, do not wait till the disease sets in and then think of protection. You may consult the Principal, Madras Veterinary College, the District Veterinary Officer or the Veterinary Assistant Surgeon in your locality who will arrange to get your birds protected.

Poultry owners in the City of Madras are informed that arrangements have been made to vaccinate fowls against the disease at the Madras Veterinary College. The vaccination is done free of cost on all working days between 7-30 to 10 a.m.

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LEAFLET No. 44.

CIVIL VETERINARY DEPARTMENT.

A DESCRIPTION OF THE COMMON METHODS OF MALTREATMENT OF AND MALICIOUS INJURIES INFLICTED ON ANIMALS IN THE MADRAS PRESIDENCY.

PART I—MALTREATMENT METHODS PRACTISED IN VILLAGES.

It has been observed that in the treatment of animals by villagers in various parts of the Presidency, there are some common practices which do more harm than good to the animals so treated. In this short note some of those objectionable methods are described and cattle-owners are strongly discouraged from resorting to such methods.

1. *Indiscriminate use of the branding iron.*—Branding of even healthy animals is very widely prevalent in villages. It is not proposed here to discuss this, except to point out that such a procedure causes injury to the skin and thus reduces the value of the hides considerably. Villagers resort to branding as a line of treatment for almost all diseased conditions, general or localized, viz., fevers, contagious diseases, fits, nasal granuloma, impaction of the rumen, bronchitis, etc., and lameness (old or new), sprained neck, yokegalls, eye diseases, abscesses, luxation of the patella, slow-healing wounds, etc. In veterinary practice the branding iron is used occasionally, and that too in chronic conditions like lameness due to organic changes in the bone tissues. But in the hands of the amateur and especially when used over tender areas, and in acute conditions, it is fraught with the greatest risks. The indiscriminate use of the branding iron has incapacitated and maimed many animals for life, and in some cases has sent young and useful cows and bullocks to the slaughter house.

Never adopt " firing " (branding) as a line of treatment unless specifically advised by a Veterinary Surgeon.

2. *The juice of the plant—Calotropis Indica (Tamil—erukku : Telugu—jilledi).*—An almost universal practice in villages is to apply the juice of the calotropis plant whenever there is anything wrong with the animals. It is used for lameness, swellings on the body, wounds, injuries, yokegalls, skin diseases and sometimes even for eye-diseases. The juice of this plant is quick in action and is a powerful counter-irritant. An indiscriminate and extensive use of the juice causes escoriation of the skin and the deeper structures, leading in many cases to ' myasis ' (Magotty wound) and gangrene. Many of the conditions for which this highly caustic juice is used can easily be treated by very simple remedies. Please refer to leaflets Nos. 1 to 3 of this series or consult the local Veterinary Assistant Surgeon. Don't use the juice of this plant, in the treatment of animals.

3. *Application of irritants into the eyes—" kalikkam " in Tamil and " kalikkammu " in Telugu.*—This is a very widely prevalent practice in the rural parts. Common salt, powdered pepper, powdered glass, aloes, snuff, or the highly irritant juice of plants like ' erukku ' or the ' kalli ' are the materials used generally for this purpose. Not only in eye diseases but in all cases of illness, contagious or non-contagious, the first thing done is a ' kalikkamu.' Sometimes animals that refuse to get up due to various reasons are also treated in this way. As a rule, the application of these irritants does more harm than good and as a sequel to this practice, purulent conjuctivities results leading to opacity or ulcer of the cornea, growth in the eyes, cancer of the eye-ball and ultimately loss of the eyes.

Treatment of eye diseases is quite simple and the conditions for which ' kalikkam ' is used can be cured by simple remedies. Avoid these crude methods. Take your sick animals to the nearest Veterinary Assistant Surgeon for treatment.

4. *Introduction of foreign bodies into the nostrils.*—As a curative treatment for nasal, bronchial and other such affections which go under the single name of ' purai ' or ' porai ' in rural parts, some villagers resort to highly objectionable practices, e.g., the introduction of certain foreign bodies into the nostrils of the ailing animals. For this purpose, the tender shoots of the plantain tree, thin green sticks, long feathers, etc., are used. Sometimes gingelly or other oil mixed with pepper powder, etc., is poured into the nostril. Both these are cruelties which while doing no good at all, bring about serious complicatoins like pneumonia, suffocation and sometimes even death. Hence, *never* allow these cruel ways to be practised on your animals. Go to the nearest Veterinary hospital.

5. *Sprained neck.*—Due to heavy work or faulty driving or faulty loading or yoking, the neck muscles of working animals become sprained. Some people adopt very cruel methods to treat this condition. The head and horns of the ailing animal are securely tied to a tree and then ropes are passed round the body and over the shoulder and a number of men are asked to tug violently at these ropes from behind the animal. This ' treatment ', instead of giving relief to the poor animal makes matters worse. The sprain is increased and only needless torture is inflicted on the animal to no purpose. Sometimes, instead of this method, a rope is tied round the neck which again is passed over the branch of a tree and a number of men pull or hang on to the tree and of the rope, thus lifting the animal bodily in mid-air. This is a very cruel method and has caused the death of many a valuable animal as a result of strangulation or fracture of the neck. Do not resort to these highly risky practices. Get your ailing cattle treated by a Veterinary Assistant Surgeon.

6. *Cruel treatment for digestive disorders.*—In certain parts of this Presidency, villagers adopt the following methods to " cure " animals when they refuse to feed properly, or are suffering from digestive trouble or other.

(*a*) The tongue of the animal is pulled out and a paste made of common salt and " pirandai " (' nalleru ' in Telugu) is then rubbed well over the tongue. The protruding tongue is then tied up tightly with a straw-rope besmeared with the above paste, and the animal is forced to stand in the hot sun.

(*b*) The tongue is drawn out and its tip is branded or burnt with a hot iron (generally a big knife).

(*c*) The veins on the under surface of the tongue are cut and blood allowed to flow freely.

(*d*) Quantities of salt, tamarind, onion and ' pirandai ' (nalleru) are ground into a paste, made into balls and given by mouth to the animal. The sick animal is then made to stand in the sun.

These cruel ways can never produce the desired result. They cause not only untold suffering to the animal but also create further complications like permanent injury to the tongue and mouth, and chronic digestive trouble. Scrupulously keep away from these cruel ways and get your animals treated by a Veterinary Assistant Surgeon.

7. *Skinning the tongue.*—(நாவழி) The tongue of cattle has got a rough upper surface due to the presence of innumerable ' pappillæ ' or sharp projections. This is to enable the animal to grasp and manipulate straw and other roughage while eating. Some villagers mistake this condition to be abnormal, especially when these ' papillæ ' are a bit longer than usual. And under the wrong impression that these are impediments to good feeding, the village quacks peel off portions of the skin at the tip of the animal's tongue. By this cruel operation the animal is deprived of the use of a beneficial organ endowed by nature, and is unable thereafter to eat anything for a long time. Do not permit the infliction of this painful and useless operation on your animals.

8. *Cutting the ears.*—At the first sign of any kind of ailment in an animal, some villagers cut the tip of the ears and allow blood to flow. This is done with a wrong belief that it relieves pain and cures the illness. But this blood-letting is of no avail at all. This only causes injury and pain and sometimes disfigurement. In some places people cut the ear-lobes of bulls after castration. This disfigures the animals and also deprives them (the animals), of the use of their ears—the organ with which they drive away flies and other insects that annoy cattle. Don't allow the ears to be cut either as treatment or after castration. It only causes unnecessary pain and serves no purpose.

Some people instead of cutting the ear-lobes or the tip of the ears, bore a hole in the ear-lobe with a red-hot iron. This is more cruel and meaningless and should be avoided.

9. *Other cruel methods of treatment.*—(*a*) Cereals like paddy, cumbu, jonna, etc., and pulses like beans are packed into abscesses or other wounds and into the hollow of broken horns. This should not be done. It has no curative value but on the other hand only impedes healing and makes the condition worse.

(*b*) When the free flow of milk from the teats of the cows and buffaloes is obstructed due to mammitis or other such cause, some people insert long thorns or fine green twigs or feathers of birds, etc., into the teat-holes. This is done with a view to remove the " obstruction " in the teat-hole and to effect the free flow of milk. This is very painful to the animal and frequently brings about serious permanent injuries of the teats and udder.

(*c*) After calving some cows and buffaloes develop what is called " prolapse " of the uterus (the womb coming out), due to weakness, prolonged labour, rough handling and other causes. Some village quacks treat this condition by pushing inside (the genital passage) a fairly thick ring made up of twisted cane or green twigs or creepers or even straw. This is done to keep the womb in position, but almost always it is the contrary that happens. The animals strain more, due to the irritation caused by the foreign body and the infection introduced along with it. Generally septic metritis and injuries to the uterus and vagina result from such crude ' treatment.'

(*d*) In lameness of the fore-limbs, some animal-doctors (quacks) make an incision over the shoulder and then pour boiling oil down into the opening. This bring about not a cure but only more pronounced lameness and severe damage of the limbs so treated.

(*e*) For lameness of any kind some villagers have a peculiarly cruel way of " treatment ". This consists in tying up the sound leg (i.e., of the other side), thus compelling the animal to put all the weight on the lame limb. The man believes that the lameness will thus disappear. It does not happen. The lameness is there all right and in a more pronounced form too—all due to his meddling.

Those described above are only some of the most common of the needlessly cruel methods practised by " Village Cattle Doctors " of our Province. It is hoped that discriminating owners of cattle would never allow the practice of such cruelties on their animals. The worthlessness of these " treatments " should be realized and the unnecessary cruelties inflicted on animals avoided.

If any of your cattle are ill, or suffering, go to the nearest Veterinary hospital. If this is not practicable due to long distance, etc., seek the advice of the nearest Veterinary Assistant Surgeon and get your animals treated accordingly. Whenever this is not possible, let simple and harmless remedies or treatment be given to your cattle till the services of a Veterinary Assistant Surgeon are available. But see to it that needlessly cruel or painful operations are not done. Remember always that animals, though

inferior to man in certain respects, are equally susceptible to physical and mental pain. Never allow any treatment to be given to your animals which you would hesitate to administer to human beings.

Part II—Malicious injuries inflicted on animals.

The infliction of injuries with malicious intent has been observed in different parts of this Presidency. The motive behind such cruel practices seems to be enmity towards the owners of the animals or to keep away trespassing animals, etc. Animals so injured, may die if any vital organ has been affected, or even if they survive, may be disabled for life.

Injuring of animals or killing them thereby is a reprehensible practice whether the motive is personal enmity (towards the owner) or is to make a profit (from the hide as is occasionally met with in some places).

Cattle-owners should be very vigilent and be on the look out for such malpractices. And when instances are discovered in a village, the villagers should take collective action and stop such wasteful cruelties. This is particularly important when any cattle-disease breaks out in a village. It has been known that at such times, some unscrupulous people cunningly administer poisons to animals or cause injuries on them resulting in their (the animals') death in such a manner, that if not carefully examined, one may be led to think that these deaths were due to the disease then prevalent in the village.

The more common of these mal-practices that have been observed in our Presidency are described below :—

1. *Malicious injuries—External.*—External injuries, simple or severe, as the case may be, are caused by hitting animals with stones, sticks, sharp bill-hooks and spears. This is generally done to prevent animal-trespass or due to spite towards the owner. These injuries may be on any part of the body, and if vital parts are involved, the animals die. Limbs, ribs, horns, etc., are generally fractured (broken) along with the external injuries.

2. *Maiming.*—Sometimes, animals are injured with the intention of maiming them. The muscles and tendons at the back of the hind or fore limbs are severed with any sharp instrument. Such injured animals, even if they recover from the injuries, become unfit for life (maimed). Similarly, the tails of animals are cut by knives to disfigure valuable cattle.

3. *Injuries to the eyes.*—Out of spite towards the owners, some unscrupulous people put highly irritant material like chilli-powder, etc., into the eyes of animals. This sets up inflammation of the eyes and may ultimately cause total blindness.

4. Sometimes, fortunately very rarely, animals are skinned alive by heartless people in their greed to make money out of the hide. Such animals die in from 12 to 24 hours. This is a very abhorrent practice and should be put down sternly.

5. Various poisonous materials are introduced, either by themselves or soaked in pieces of cloth, into the rectum of animals. This causes severe diarrhœa and dysentery ending in death if not properly attended to.

6. Sometimes, poisonous material is also introduced into the throat of an animal. This causes extreme discomfort and a big swelling of the tongue, throat, dew-lap, etc., as is seen in the disease hæmorrhagic septicæmia.

7. *Criminal poisoning.*—Criminal poisoning of animals may be resorted to for the sake of the hides and skins, or as stated above, due to enmity. The poisonous agents commonly used in criminal poisoning are—

(*a*) white arsenic or arsenious acid;

(*b*) the seeds, roots and other parts of the Oleander plant, and

(*c*) Jequirity seeds (kundumani in Tamil).

The methods of administration of the poisons, etc., have been described in detail in leaflet No. 3 of this series.

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LEAFLET No. 46.]

CIVIL VETERINARY DEPARTMENT.

Fatal Enteritis in Sheep and Goats due to immature amphistomes.

Sheep, goats and occasionally cattle grazing over infected areas in the vicinity of ponds and tanks generally get affected with this kind of disease. The mortality among the affected animals is usually very high causing serious economic loss to stock-owners. It is therefore essential that every stock-owner must be aware of this disease, the symptoms it produces, its causal organism and mode of infection and the steps to be taken to treat the affected animal and prevent the spread of the disease to other healthy stock.

Symptoms.—The affected sheep, goats, or cattle begin to lose their condition. They will show severe diarrhoea, the faeces being dark in colour and foul smelling. Sometimes the faeces may be mixed with partly digested blood. Such animals rapidly become emaciated with a watery discharge from their eyes and nose and their wool will tend to come off in patches. An oedematous swelling develops in the region of their throat. This swelling has a tendency to disappear in the morning and reappear in the evening when the animals return to their pens after grazing. The course of the disease may extend from three to eight weeks or even longer. Recovery is rare and the affected animals invariably die and death is preceded by extreme prostration.

How the disease is produced.—It is produced by the immature forms of certain parasites known as " Amphistomes ". The natural habitat of the adult parasites is the " rumen " or the [illegible] of cattle, sheep or goats. Eggs of these [illegible]asites. They find their way faeces of animals harbouring th[illegible] eggs hatch and liberate the larvae which into tanks or ponds [illegible] kinds of fresh water snails in the tanks and undergo enter certa[illegible] developments in their body. After some time they come out from the snail's body in large numbers in the form of " cercariae ". During heavy rains inundations of the areas adjacent to the tanks take place. When the rains cease, water recedes from those inundated areas. The " cercariae " moving in the water get themselves encysted and attached in large numbers to the undersurface of the blades of the grasses in those areas. Sheep and other stock grazing over those areas swallow a great many of these cercariae along with the grass. Each of these cercariae develops into an adult amphistome. Before the adult stage is reached and before they reach the rumen where they stay as adults, they pass through a developmental phase in the anterior portion of the small intestine. They remain here for six to eight weeks. It is during their stay here that this disease is caused. They produce severe inflammation with haemorrhages and oedema of the affected portion of the bowel by clinging to or remaining half buried into the mucous membrane. If this portion of the intestine of an animal which had died of the disease is examined with a hand lens, the

mucous membrane will be found studded with innumerable small immature parasites of different sizes varying from that of a mustard to that of a pea. In North India this disease is known as "Gillar or Pitto".

Treatment.—When once diarrhoea sets in, no treatment will be of any use as it will only aggravate the already present inflammation. Treatment can be undertaken in the earlier stages but to identify the disease in the early stage is difficult. Therefore efforts should be made to control the spread of infection by adopting preventive measures and these are—

(i) The infected pastures must be completely fenced all round so that sheep, goats and cattle cannot gain access to them for grazing.

(ii) The infected lands must be drained, ploughed up and treated with lime.

(iii) The snails in the tanks must be eradicated first by removing all weeds in and around the tanks and then by mixing copper-sulphate to the tank water in the proportion of 1—50,000 with a view to kill off the snails. Another method is to introduce ducks into the tanks which will eat away the snails.

Conclusion.—The disease generally starts after heavy rains and floods and affected animals may begin to die early in spring. This should attract the attention of the stock-owner. If the grazing lands are traced to an area round about a tank bed, the presence of this disease amongst his stock can easily be understood. As no curative measures are available, preventive steps should immediately be taken to save other animals from falling a victim to this disease. Outbreaks of this disease have been known to occur in the Madras Pinjarapole area and also in Hosur, Salem district. It is possible that the disease is likely to be prevalent in other parts of the presidency. It is easy now for intelligent ryots to identify and report about the presence of the disease. If necessary the help of the nearest Veterinary Assistant Surgeon can be sought for. Such reports about the incidence of the disease are necessary to collect statistical evidences and to eradicate the disease completely from the different parts of the province in order to conserve the stock from the ravages of this deadly disease and thereby cut the economic loss the ryot is put to year after year.

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