Second preliminary report on parasites found in ruminants at the Municipal Abattoir, Baton Rouge, La.

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SECOND PRELIMINARY REPORT ON PARASITES FOUND IN RUMINANTS AT THE MUNICIPAL ABATTOIR, BATON ROUGE, LA.

BY
G. DIKMANS, B. S. A., D. V. M.
PARASITOLOGIST
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GERARD DIKMANS, B. S. A., D. V. M., Parasitologist.*

The work in Parasitology at the Experiment Station was begun, in a systematic manner, in September, 1920, the primary object being to ascertain, as far as possible, the different types of internal parasites with which farm animals in Louisiana are infested.

Being comparatively new, as a special department of the Experiment Station, the work, at the beginning, was considerably handicapped through the lack of the necessary laboratory equipment, and literature for reference.

The work had a two-fold object in view, viz., (1) to obtain some data on the internal parasites of domestic animals in Louisiana; and (2) to afford the writer an opportunity to familiarize himself with the morphology and pathology of the parasites found.

In order to gain the desired information as readily as possible, he was able to make use of the opportunities furnished by the local municipal abattoir, which was kindly placed at his disposal by the city authorities.

Such material collected at the abattoir, as was thought desirable for examination, was brought to the Station laboratory for that purpose. The entire intestinal tract of one or two animals was taken, the various parts washed out separately, and the washings examined for the presence of parasites, which is considered the best method of procedure, as it gives the fullest information on

(a) The types of parasites,
(b) The number of parasites,
(c) The frequency or percentage of infestation,
(d) The relative number of males and females, etc.

Owing to the conditions prevailing consuming too much time, however, a change of procedure was thought advisable, and the work was afterwards divided into four stages, viz.,

*Resigned September, 1922.
(a) Examination of the stomach contents,
(b) Examination of the contents of the small intestine,
(c) Examination of the large intestine,
(d) Examination of the liver, lungs, esophagus, etc.

Washing of stomachs was transferred from the laboratory to the abattoir, and as many as could be conveniently handled were selected and examined, an attempt being made to keep separate those of calves and of grown animals, although this was not entirely successful on account of the method of slaughtering. It was then decided to adopt the method outlined by Hall, in paper No. 119 from the Research Department of Parke, Davis & Co., Detroit, Mich., for the washing of stomachs, viz., washing the contents on a series of sieves varying in mesh from 16-100.

During the vacation of 1921 (being engaged with class work during the College session), the writer was enabled to spend six weeks at the Zoological laboratory of the Bureau of Animal Industry, Washington, D. C., with Drs. Ransom & Hall, two of the foremost helminthologists in the United States.

The writer took with him, for identification, some of the material he had collected in Louisiana, as some of it differed materially from the descriptions given in published reports.

It was while in Washington that the species of stomach worm, described in Bulletin No. 183 of this Station, was identified, and its occurrence, which had previously been reported only for South America and Europe, recorded for the United States.

From publications available in the Washington laboratory, several apparent anomalies of the vulval process of the common stomach worm, Hæmonchus contortus, were also recognized as normal. These features, because of the lack of literature at the Station, had hitherto presented a difficulty in identification. Several interesting points in technique were also acquired while in Washington.

The material collected at the local abattoir, which has been preserved in vials and numbered up to 32, represents that from the stomachs of approximately 200 cattle, and will be found to contain several specimens of the Family Strongylidæ, Sub-family Strongylinae, and Trichostrongylinæ; Genera, Bunostomum, Hæmonchus, Trichostrongylus, Ostertagi, Cooperia; Species, Bonostomum phlebotomun, Hæmonchus contortus, Hæmonchus
Ostertagi similis, Ostertagi ostertagi, Cooperia pectinata, Cooperia pectinata, and Trichostrongylus extenuatus.

This will give some idea of the parasitic flora in the State, or at least as found in the stomachs of cattle slaughtered at the local abattoir.

In addition, ascarids were found on two occasions.

While no specific data are available at the present time, the writer feels safe in estimating that from 75 per cent to 80 per cent of all calves slaughtered at the abattoir harbor stomach worms. However, an effort will be made to obtain exact data on this particular point.

The damage done by these parasites is comparable to that accomplished by the hookworm in the human being, and the problems involved are also comparable. Sufficient has been written at various times, at different experiment stations, and by different authors, concerning the seriousness of this particular parasite.

It may be well at this time, however, to call attention to the fact, that in spite of all that has been said and written, the economic importance of animal parasites to the livestock interests of the South does not, as yet, seem to be fully realized.

"Diseases due to bacteria and filtrable viruses may be said to be spectacular, and demand immediate attention. The ravages of hog-cholera, causing speedy death throughout a herd of swine, are not likely to be overlooked. Anthrax, blackleg, foot and mouth disease, and other fatal diseases, have a sudden onset, and take prompt toll from which the stockman seeks immediate relief. That the causative organisms cannot be seen, only serves to place them in the category of the mysterious.

"On the other hand, animal parasites are not spectacular in their effects. They take their largest toll among young animals, and the loss is credited, by the stockman, and generally to his own satisfaction, to other causes. The young animal has no long previous record of established vitality and strength to make the owner inquire closely as to why his animal should die.

"The loss is attributed to loss of vitality, inherent weakness, or some other plausible cause. There is no warning rise of temperature, and there are few sudden deaths. The lack of febrile conditions inclines one to think that the animal is not
sick, but merely unthrifty. The lack of thrift and the loss of condition may extend over long periods, and establish the idea that the animal in question is a weakling. When it finally succumbs to the long siege by the parasites present, no explanation of the death appears necessary. The animal ‘never did well,’ and the loss is discounted in advance. The parasites themselves are so common, that they, too, are discounted. It is often noticed, and the idea is established, that all animals have them—perfectly healthy normal animals, as well as the unthrifty.

“This has been the prevailing idea. We are beginning to understand the situation better, and to realize what animal parasites do; what unthriftiness means; and what parasitism costs in terms of diminished meat and milk production, poorer quality of meat, decreased horse power, increased susceptibility to bacterial and constitutional diseases and premature death.”—Hall, M. C., Vet. Med. March, 1922.

Smith, in his Manual of Veterinary Hygiene, has the following to say concerning animal parasites:

“The subject of parasitic attacks on the lower animals, especially the herbivora, is of extreme importance. Losses from this cause are very heavy, and in some years a veritable plague. The ravages of stomach and intestinal parasites have received insufficient attention.

“Heavy losses result from these, yet neither prevention nor treatment has received the consideration it deserves, and the same applies to most parasitic diseases. The life histories of the parasites prevent them from being directly contagious, and the necessity for an intermediate host gives a false sense of security; but it may at once be said that sheep with fluke, cattle with stomach worms, and horses with intestinal strongyles, are a great risk of infection on pasture lands. The anthrax animal is only dangerous when its blood is shed or its carcass left exposed, but every evacuation from the above parasitic patients may be a source of future trouble; and in the same way, every cough from a calf or sheep with ‘husk,’ (lung worms) scatters the ova of the parasite broadcast.’”

The stomach worm has been considered, hitherto, mainly in connection with the sheep industry, and is quite a serious barrier to the success of that industry in Louisiana; nevertheless this
parasite also attacks cattle, and is becoming a serious menace to cattle raising in this State. Calves show unthriftness, are stunted in their growth, become anemic (bloodless), and there are occasional deaths. The losses are not so spectacular, as before stated, but they are none the less real.

The *Ostertagi ostertagi*, or stomach nodular worm, while not nearly so numerous, is nevertheless, a serious pest.

Ackert and Muldoon, at Kansas, have reported a case where, out of a herd of eighty-four steers, one-half became visibly affected, and 9 died, due to an infestation with this stomach nodular worm.

The worm is almost constantly found in calves. Many stomachs show erosions, especially in the pyloric region, due to superficial sloughing of the nodule after the passage of the parasite into the alimentary tract.

The cattle hookworm, *Bunostomum phlebotomum*, needs no introduction. Many names have been given to the condition caused by this parasite, such as salt sickness, uncinariasis, etc.

These worms belong to the same family as the hookworm of man, dog, cat, etc., and their effect upon the system is too well known to require further comment. But while the usual habitat of this worm is the small intestine, it invades the stomach in small numbers, and attaches itself to its walls, generally in the pyloric region.

The small nematode, *Trichostrongylus extenuatus*, has been accused of causing gastro-enteritis in calves. While but few specimens were found, it is entirely possible that the method of washing and examining the material may have been responsible for this.

The findings submitted in this report tend to confirm the opinion already generally held, that young animals suffer most from parasitism. This report further brings out the fact that large numbers of animals are affected. This being the case under present conditions, where our cattle have a more or less wide range of territory to roam over; what the condition may be when the animals are more confined to fenced areas, it is not difficult to imagine.

But while it is true that the losses are largely confined to young animals, it does not mean that mature animals are im-
mune to infestation. This was well illustrated a few years ago when, during a period of severe drought, large numbers of Texas cattle were shipped into Louisiana for grazing purposes. Many of these animals, although mature, succumbed to the ravages of stomach worm infestation, due no doubt to their being poor and emaciated, and, therefore, unable to withstand the attacks of the disease.

The treatment for stomach worm disease has received considerable attention, and may be found in publications of this and other Experiment Stations, so that that need not be specially alluded to in this report. It may be said, however, that the Oklahoma Station recommends the addition of a one per cent tobacco infusion to the copper sulphate solution mentioned in Circular No. 31, of the Extension Division of this institution; and they claim 90 per cent to 100 per cent efficiency for this treatment.

In a recent letter from the Federal Bureau of Animal Industry, Dr. Hall recommends carbon tetrachloride (C Cl₄) claiming remarkable efficiency for the drug, not only for stomach worms, *Haemonchus contortus*, but also for the smaller strongyles, such as *Ostertagi ostertagi*, *Cooperia*, and others.

Although the life history of the stomach worm, and its treatment, is known, there are one or two points on which more definite information is desired. The first of these is its longevity on pastures; and the second, the effect of feeding on stomach worm disease. Both of these are of extreme economic importance. The first, in its relation to the use and rotation of pastures; and the second, in its relation to the general prophylaxis against the disease.

On October 30, 1921, the second part of the work, viz., the examination of the small intestine for parasites, was commenced, and the method of procedure was similar to that adopted in the examination of the stomach contents.

In the beginning, the first few feet of the small intestine were opened, and the remainder of the intestinal tract everted in a manner similar to that used in making sausage casings.

Only a few trials, however, were sufficient to prove that this method had no advantage over the ordinary stripping of the intestinal contents into a bucket, or other suitable vessel, and it was abandoned.
The examination of a dozen or more animals was sufficient to convince the writer that the cattle hook worm is not generally found beyond the first four feet of the small intestine, and, therefore, it became a routine practice to cut off this portion and split it along its entire length for examination. The contents of the remainder of the small intestine were then washed into a bucket provided for the purpose.

A total of 170 calves were examined, and a close record kept of hookworm infestation for 142 calves, with the result that 113 of these, or 80 per cent, were found to harbor the cattle hook-worm.

The remainder of the material collected consisted of the following genera and species:

Genus .................... *Cooperia*
Species ................... *Cooperia pectinata*
                                           *Cooperia punctata*
                                           *Cooperia curticei*
                                           *Cooperia oncophora*

Genus ..................... *Trichostrongylus*
Species ................... *Trichostrongylus instabilis*
                                           (provisionally determined)

Genus ..................... *Strongyloides*
Species ................... *Strongyloides papillosus*
                                           (provisionally determined)

Genus ..................... *Bunostomum*
Species ................... *Bunostomum phlebotomum*

Genus ..................... *Capillaria*
Species ................... Undetermined.

In addition to these a large amount of tapeworm material was collected; and ascarids were found on seven occasions.

In connection with these findings, the following points are of interest: The nematode, *Cooperia pectinata*, had, hitherto, been reported only once in the United States, and its regular and frequent occurrence here is, therefore, of interest.

*Cooperia punctata* and *Cooperia oncophora* have both been reported as parasites of cattle in this country, but the presence of *Cooperia curticei* in cattle establishes an apparently new record.

Some of these parasites, however, seem to differ somewhat from the published descriptions, and a further detailed study of them will be necessary.

The finding of *Trichostrongylus instabilis*, *Strongyloides*
papillosus, and of the specimens of Capillaria, also, seems to be new, but it will require further study to establish their identity definitely.

The most significant fact brought out was the large percentage of infestation with cattle hookworm.

As previously mentioned, this nematode has been reported by various authors, and from various sources, as a most destructive parasite of cattle. It belongs to a family, all the members of which, found in different animals, including man, are destructive, and of the greatest economic importance.

As a matter of comparison, the intestinal tracts of about 30 beeves, or mature animals, were examined for hookworms but with negative results, which compare favorably with those obtained in the examination of the stomachs of mature cattle, tending to confirm our previous conclusions, that mature animals suffer very little, if at all, from parasitism.

Another interesting point observed, was that calves, which some time previous to slaughter had been 'lot-fed', showed very little parasitic infestation, although many of them gave evidences of previous infestation. This point was illustrated by the results of the examination of calves during three consecutive months (February, March and April). The animals examined on those dates all showed evidence of better feeding and breeding; and the parasites recovered from them were few in number.

During the course of the year, the alimentary tracts of a few sheep were examined for parasites, and the general observations made with regard to cattle were found to hold true in their case. All of the lambs examined harbored both stomach and hook worms; and the smaller nematodes were also well represented. Cooperia pectinata and Cooperia punctata were found in the sheep. These parasites had not been, hitherto, reported for sheep, so that their finding establishes a new record.

The hookworm is not confined to the duodenum, as is generally the case in cattle, and the intestine must, therefore, be examined at greater length. The material collected has not yet been subjected to a detailed examination.

On other occasions, the livers of cattle have been examined for 'liver flukes.' The species of these parasites have been recorded, viz., Fasciola hepatica and Fasciola magna. The former is usually found in the bile ducts, which are greatly enlarged
and thickened; whereas the specimens of the latter were found embedded in the substance of the liver.

Both of these parasites and the conditions for which they are responsible, have been described in B. A. I. Bulletin No. 19, which may be consulted on these points.

The published report in the aforementioned bulletin, and an article entitled, "Some Notes on Liver Fluke Disease as observed in Northern Rhodesia," by H. H. Hornsby, M. R. C. V. S., (Vet. Journ. No. 551, Vol. 77, No. 5.) show definitely that these parasites may be responsible for serious losses in cattle. They, therefore, deserve earnest consideration on the part of those who are interested in the livestock problems of the State.

The life history of the *Fasciola magna*, while presumably similar to that of the *Fasciola hepatica*, is unknown at the present time. The life history of this parasite, its pathology, and the extent of its invasion, are points about which more definite information is desirable.

Lung worms form another problem which should receive consideration at the hands of the parasitologist and pathologist.

Hog lungs have been examined at different times during the year. On one occasion the writer had the opportunity to examine 12 pairs of lungs for these parasites, nine of which were infected with lung worms—a 75 per cent infestation.

The conditions brought about by these parasites are too well known to require a detailed description in this report.

The examination of the posterior part of the alimentary canal of cattle, including the cecum and colon, has been commenced, but so far only a few animals have been examined. The parasites recovered, however, comprise the *Oesophagostomum radiatum* and the *Trichuris ovis*. Several animals were found to be heavily infested with these parasites; and the inflamed and thickened areas found in the ceca are indications of the injurious nature of the invaders.

In this connection it may be of interest to call attention to an article, in the June, 1922, issue of the North American Veterinarian, entitled "Scours in Young Cattle," by Dr. M. Jacob, of the University of Tennessee. The author describes a serious condition of young cattle found in Tennessee, and names the *Oesophagostomum radiatum* as the cause of the trouble.
A short time ago, the Louisiana Station was visited by Mr. R. Owen Wahl, of the School of Agriculture, at Grootfontein, Union of South Africa. Mr. Wahl stated that this parasite, the nodule worm, caused tremendous losses in sheep in that country.

While it is true that there are several important points about this parasite that still remain to be studied, the work already done, and the observations made by different authors at various places, show that the parasite and its control are of great economic importance.

The results of the work, so far, may be summarized as follows:

The findings of Ransom, published in B. A. I. Bulletin No. 127, have been confirmed, with the following additions:

*Haemonchus similis*, a new stomach worm of cattle discovered and described by Dr. Lauro Travassos, in Brazil, has been found in Louisiana cattle.

*Cooperia pectinata*, reported as a parasite of cattle, has been found in sheep.

*Cooperia punctata*, reported as a parasite of cattle, has been found in sheep—Two new records.

*Cooperia curticei*, reported as a parasite of sheep, has been found in cattle—A new record.

One species of *Trichostrongylus* and one of *Strongyloides*, not previously reported from cattle in the United States, have apparently been found as parasites of cattle during this investigation. These last two, however, will require more detailed study for confirmation.

In addition, Extension Circular No. 60, entitled "Hog Parasites," has been prepared and published in collaboration with M. M. LaCroix, Assistant in Swine Work; and a second publication, entitled "Diseases of Hogs," has also been prepared.

In conclusion, the writer desires to express his sincere appreciation to Dr. W. H. Dalrymple, Veterinarian and former Director, for his valuable aid and encouragement during the entire period of the work.

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