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**OKLAHOMA
AGRICULTURAL AND MECHANICAL COLLEGE
EXTENSION SERVICE**

W. A. CONNER, *Director*

**COOPERATIVE EXTENSION WORK IN
AGRICULTURE AND HOME ECONOMICS**

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**SOME INTERNAL PARASITES
OF OKLAHOMA LIVESTOCK**

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BY JOHN E. GUBERLET
Parasitologist, Oklahoma Agricultural Experiment Station

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SOME INTERNAL PARASITES OF OKLAHOMA LIVESTOCK

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From an economic standpoint parasitic diseases are of grave importance to those who are interested in the progress of the great livestock industry. Many losses occur yearly among our domesticated animals, especially among sheep, hogs, horses, and poultry. Parasitic diseases are frequently not recognized as such and may be diagnosed as some other ailment with similar diagnostic features.

Many troublesome parasites that infest our livestock are so small that it requires very careful search to detect them. Parasites or worms of hogs, from an economic standpoint, undoubtedly rank second in importance to hog cholera. Worms probably cause as many losses in the sheep industry as all other diseases combined. Among poultry the worms produce not only their share of loss in flesh, egg production, and as a direct cause of death, but also in reducing the vitality of the birds and making them good subjects for various infectious diseases. Many parasites attack horses which cause them to lose flesh, reduce their vitality, and sometimes cause death, especially in colts. Young animals are as a rule more susceptible to parasitic infestation than older animals.

Some of the parasitic diseases of our domestic animals can be successfully treated by means of anthelmintics. However, many more of these diseases have not up to the present time been considered as successful from the standpoint of treatment.

The two principal difficulties that arise in the treatment of the so-called parasitic diseases are:

1. Any substance taken into the body which is effective in killing or removing worms from their natural position in delicate tissues, is severe enough in its action to cause some disturbance to the animal harboring them.

2. When worms are removed from an animal, the problem arises as to how long the animal will be free from them. Where the worms come from and how animals get them is, in most cases, unsolved. These questions necessarily arise unless we are familiar with the life history of the parasites of our domestic animals.

At the present time comparatively few of the life histories of the parasites infesting our livestock are known. Not until more of them are known will we be able to prevent infestation or to control successfully the majority of the parasitic diseases.

HOW PARASITES ARE DISTRIBUTED

Most parasites are distributed in one of two ways: either by the adult host scattering the eggs through its feces, or through some intermediate host which distributes the larval stage. In the former we find that most round worms are dis-

tributed by the animal that harbors the parasites and going about from place to place scattering eggs which may be taken up by other animals. But few round worms are distributed through intermediate hosts. Tapeworms are distributed both by means of the feces of the infested animals and by intermediate hosts. The eggs are passed off from an adult host and are taken up by an intermediate host, such as a small animal or insect, and the latter is eaten by another individual of the former species which serves as a host. The chicken tapeworm might be cited as an example. The tapeworm lives in the intestine of the chicken and gives off numerous eggs through the feces. Certain flies feed on chicken droppings and accidentally may swallow some of the worm eggs. The eggs develop to a certain stage in the fly and then the chicken eats the fly and thus becomes infested. Other illustrations are: cats and mice, dogs and rabbits, and dogs and sheep.

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HOW PARASITES MAY BE DETECTED

The question is generally asked, how may the presence of worms be determined? Worms are usually first suspected in animals when they become unthrifty and as a rule dull. This is followed by rapid emaciation, paleness of the skin or mucous membranes, deranged appetite, indigestion, constipation or diarrhoea, and sometimes dropsical swellings occur under the jaw. The coat is always rough and the animals often appear more or less nervous, possibly brought on by the constant irritation of the worms.

If worms are suspected and an animal dies it should be cut open and the alimentary tract examined for the presence of worms. When the presence of worms is indicated before the animal becomes seriously affected, the droppings may be examined with a microscope for the presence of worm eggs. Such examinations may be made by sending some of the fresh feces to a nearby laboratory for determinations of that nature.

Some of the more common parasites occurring in the livestock of Oklahoma are here mentioned together with some of the important facts known concerning their life history, treatment, and manner of prevention.

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THE COMMON ROUND WORMS OF HOGS

(*Ascaris suum*)

This worm is a very common parasite of hogs, especially among young unthrifty pigs. It is a round grayish-white worm tapering at both ends. The male worm is from four to seven inches long while the female may be from six to ten inches in length with a diameter of one-eighth to three-sixteenths of an inch. It usually remains free in the small intestine, but occasionally it may be found in the stomach, bile ducts, gall bladder, and also in the pancreatic duct. When present in large numbers this worm is injurious to the animal by consuming some of the animal's food, causing irritation and secreting a toxin which is absorbed by the blood and produces emaciation.

LIFE HISTORY

The female worm lays thousands of eggs in the alimentary tract. These eggs

pass out with the feces and are very resistant to climatic conditions. The young worms develop in the eggs but do not come out of the shell. The larvae may remain in the eggs ready to hatch for many months. They are eaten by hogs or some other suitable host animal and the digestive juices of the stomach dissolve the egg shells and set the larval worms free. These tiny worms migrate through the intestinal wall and reach the lungs and other organs either through the blood stream or by direct migration. In the lungs and diaphragm they may cause pneumonia and may also be responsible for some cases of "thumps" in pigs. The larvae live for a few days in the lungs and then pass up through the windpipe to the mouth and are swallowed a second time. They then pass to the intestine where they increase in size and reach maturity in about four or five weeks.

TREATMENT

Treating large numbers of hogs is a difficult problem. In drenching hogs great care should be taken that none of the medicine enters the lungs, as this would cause pneumonia and probably death. If medicine is put into the feed it is as a rule not as effective as when given in drench.

Several treatments are recommended, some of which are the following:

I. (For 30 to 50 pound pig)

3 grains santonin

3 grains calomel

Mix in one-half pint of water and give as a drench.

(For 50 to 100 pound pig)

4½ to 5 grains santonin

4½ to 5 grains calomel

II. (For pigs under 100 pounds)

¾ to 1 teaspoonful oil of Chenopodium (American worm seed)

1 ounce castor oil

(For hogs over 100 pounds)

1½ to 2 teaspoonfuls oil of Chenopodium

1½ to 2 ounces of castor oil

These are mixed together and given as a drench.

It may be administered by placing animal on haunches and holding the mouth open with a rope or a piece of wood between the teeth, then pouring the oil into the back part of the mouth from a large spoon or suitable container.

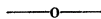
III (For pigs weighing 50 to 75 pounds)

2½ to 3 teaspoonfuls Areca nut

4½ to 5 grains calomel

These may be placed on a small amount of moistened feed. The pigs must be very hungry or they will not eat it. The dose will have to be repeated five or six days later.

Any of the foregoing treatments must be given on empty stomachs to get the best results.



THORN-HEADED WORMS OF HOGS

(*Giganthorhynchus hirudinaceus*—*Echinorhynchus gigas*)

The thorn-headed worm is fairly common in some localities of Oklahoma but as a rule it is not abundant enough to cause any serious trouble. It is similar in

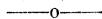
shape and size to the common round worm, except that it possesses cross markings for some distance in the anterior portion. It is attached to the walls of the intestine by a globe-shaped head which possesses hooks. This has the appearance to a certain extent of a thorn. It sometimes burrows through the intestinal wall and causes ulcerated areas. Symptoms are noticeable only when this worm is numerous and then it is shown through a deranged appetite, indigestion, diarrhea, unthriftiness, and more or less emaciation and sometimes death. Treatment is of very little value.

LIFE HISTORY

The female worm lays her eggs in the intestine which pass out to the exterior with the feces. After reaching the soil some of the eggs are eaten by the white grubs (larvae of the May beetle) which act as intermediate hosts. Hogs feeding in dirty, unsanitary pens become infested from eating the grubs.

PREVENTION

Infested hogs should be kept on cement or board floors as much as possible to prevent the eggs from being eaten by grubs. Without the grub the worms cannot develop. Keep the hog lots as clean as possible, and infested lots should be plowed occasionally.



LUNG WORMS IN HOGS, CATTLE AND SHEEP

(Hogs: *Metastrongylus apri*, *M. brevivaginitus*)

(Cattle: *Dictyocaulus viviparus*)

(Sheep: *Dictyocaulus filaria*)

The lung worms of hogs, cattle and sheep are much alike in their effect upon the hosts. They differ only slightly in general appearance. There is a considerable difference in size, however. The worms in hogs measure from $\frac{1}{2}$ to 2 inches in length while those in sheep and cattle are from $1\frac{1}{2}$ to 4 inches in length. Lung worms are always hair-like or thread-like. These worms live in the air passages of the lungs where they cause much irritation and often chronic pneumonia, resulting in unthriftiness, emaciation, and sometimes death. The symptoms, in general, are those of bronchial catarrh. There is a short husky cough which at first occurs at long intervals. Later, this is more frequent and comes on in a paroxysm accompanied by labored breathing. There is a muco-purulent discharge from the nostrils which may at times contain some of the worms or their eggs.

LIFE HISTORY

The life history of only one species of lung worm is known, but it is presumed that the others have a similar cycle. The life cycle of the sheep lung worm was first worked out in this laboratory and briefly is as follows:

The eggs are deposited in the air spaces of the lungs and are then passed up the windpipe to the pharynx and are swallowed. They hatch while passing through the alimentary tract and the larval worms pass to the ground with the feces. If deposited under favorable moisture and temperature conditions they moult a couple of times and in about eight or ten days reach the infectious stage. When the grass is wet with dew or rain, these larval worms crawl upon it or other vegetation where they may be eaten by grazing animals. After they have gained entrance to the

stomach they migrate to the lungs and reach maturity in about six weeks. Wet low land pastures favor the development of the larval worms.

TREATMENT

Medical treatment, as a rule, is of little value. However, the injection of 1 to 1½ cubic centimeters (15 to 25 drops) of chloroform into each nostril is sometimes of value. Two or three treatments may have to be given at intervals of two or three days.

PREVENTION

Prevention consists chiefly in avoiding wet lowland pastures as far as possible and using high and dry pastures. Animals that are well fed seem more resistant to worm infestation than those poorly nourished. If well nourished animals do become infested they suffer but little from the effects of the worms.

STOMACH WORMS IN SHEEP AND GOATS

(*Haemonchus contortus*)

Probably no other parasite is more injurious than is the stomach worm of sheep and other ruminants. This worm is a blood sucker of the worst type and for that reason is a dangerous pest when once started in a flock of sheep. The stomach worm causes more losses to the sheep industry of Oklahoma than any other disease.

The worms are from three-fourths to one and one-fourth inches in length and have the thickness of a rather fine thread. They are striped with red and white and appear spirally twisted. For this reason they are often called the "twisted wire worm." They are so small and hard to see that they are often overlooked in examining the stomach of a dead animal. The worms are found in the fourth compartment of the stomach.

LIFE HISTORY

The eggs pass out with the feces from an infested animal and under favorable conditions of moisture and temperature hatch in a few days. With continued favorable conditions of moisture and temperature the larval worms moult and in 10 days reach the infectious stage. In this stage the tiny worms crawl upon the grass at night while the vegetation is wet with dew or rain. They may then be eaten by sheep or other grazing animals. After gaining entrance to the stomach the larval worms reach maturity in about 3 weeks. Wet and lowland pastures favor the development of the larval worms. They also develop in ponds and animals may become infested from this source.

SYMPTOMS

Lambs and young sheep are generally first affected and suffer most from the stomach worms. Older sheep often suffer also from attacks of these worms but they are more resistant and can tolerate an infection much better than lambs. The symptoms are quite plain and can be easily noticed. They are, unthriftiness, which is followed by dullness, rapid emaciation, and marked anemia. This last condition is clearly shown by the paleness of the mucous membranes of the mouth and eyes, also of the skin. This is the cause of the condition known as "papery skin." In the later stages diarrhea appears in which the droppings are very dark in color and often

contain much soil. Dropsical swellings often appear under the jaw and along the brisket.

TREATMENT

The most satisfactory treatment is the use of a solution containing 1% of copper sulphate (blue stone) and 1% of tobacco infusion. Lambs under 1 year of age should receive 1¾ ounces (50 cubic centimeters) of this solution and sheep over 1 year of age should be given 3½ ounces (100 cubic centimeters).

The solution is made up as follows: Dissolve ¼ pound (avoirdupois) of copper sulphate (bluestone) in ½ gallon of boiling water, using enamel, porcelain or earthenware container. Put ¼ pound finely ground or powdered tobacco into ½ gallon of boiling water, cover and let stand over night. In the morning mix the two solutions in a wooden, enamel, or non-metallic container (copper sulphate corrodes metal) and add 2 gallons of cold water. This makes enough for 100 adult sheep or 200 lambs allowing 10 percent waste. This should be given as a drench on an empty stomach.

The solution may be made up in smaller quantities as follows: Dissolve 1 ounce copper sulphate in one quart of water (boiling). Put 1 ounce of tobacco in 1 quart of boiling water, cover and let stand over night. In the morning mix the solutions and add 1 quart of cold water. This is enough for 25 adult sheep or 50 lambs allowing some for waste.

Great care must be taken in administering the solution. The materials must be weighed and measured out carefully. The animals should be treated while standing on all four feet with the nose elevated to the level of the eyes. The administration of solutions containing copper sulphate, like all other medicines, is safest in the hands of a competent veterinarian.

PREVENTION

Losses from stomach worm diseases may be prevented by avoiding as far as possible wet low land pastures and keeping the animals from drinking water from stagnant pools or ponds in infested areas. In infested areas pasture rotation must be practiced and an occasional medicinal treatment given.

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TAPEWORM IN SHEEP AND GOATS

(*Monezia expansa*, *Thysanosoma actinioides*)

At least two species of tapeworms have been found in the sheep of Oklahoma. These worms are the cause of many losses among lambs. One species lives in the intestine while the other is found not only in the intestine but also in the bile ducts of the liver and the gall bladder. Tapeworms are ribbon shaped and segmented and may be from a few inches to several feet in length with a width of one-eighth to one-half inch. These worms take their nourishment from the digested food in the intestine and give off a toxin which has a serious detrimental effect upon the host.

LIFE HISTORY

The life cycles of the tapeworms of sheep are entirely unknown but it appears that certain insects may eat the eggs from the droppings and are in turn accidentally eaten by sheep.

SYMPTOMS

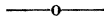
Lambs suffer more than older sheep and they show the symptoms more clearly. A heavy infestation with tapeworms shows an anemic condition, which is indicated by paleness of mucous membranes of eyes and mouth, accompanied by dullness, lack of thrift, and more or less emaciation. Diarrhea is a common symptom. Occasionally segments or portions of tapeworms are passed in the feces.

TREATMENT

A very effective treatment for tapeworms in the intestine of sheep is the copper sulphate-tobacco solution as recommended for stomach worms. Another effective treatment is the administration of one to two dram doses (1 to 2 teaspoonfuls) of powdered Areca nut, according to weight. This may be mixed with bran and given after a fast of 15 to 20 hours. Extract of male fern may be given at the rate of 1 cubic centimeter (15 drops) in 5 cubic centimeters (1¼ teaspoonfuls) of oil per 15 pounds of weight of animal. Medical treatment is of very little value in removing tapeworms from the liver or bile ducts.

PREVENTION

Since nothing is known concerning the life history of tapeworms in sheep very little can be done in the way of prevention. However, if the worms are removed from the animals and a change of pastures is made the infestation may be controlled.



NODULAR DISEASE OF SHEEP AND GOATS

(*Esophagostomum columbianum*)

The nodular disease, which is common in sheep and goats, is produced by the so-called nodular worm. It is a thread-like worm, white in color, and having a length of three-quarters to one inch. The worms cause nodules in the intestinal wall which may vary from the size of a pea to that of a small nut. The nodules are as a rule filled with a greenish pus. These nodules may sometimes be found in the liver and other organs. Nodular worms do not produce much loss unless very numerous.

LIFE HISTORY

The life history is probably similar to that of the stomach worm, however, the details are not completely known. The young worms when taken into the body bury themselves in the wall of the large intestine and thus produce the nodules. When they reach maturity they desert the nodules and live in the cavity of the intestine where the eggs are deposited.

SYMPTOMS

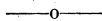
The symptoms for nodular worms are not distinctly seen unless the worms are very numerous: when they are shown there is general debility, paleness of mucous membranes, emaciation and diarrhea, and death may result after a lingering period of prostration.

TREATMENT

Medicinal remedies are of very little value in treating this disease. Plenty of nutritious food is probably the best treatment that can be recommended.

PREVENTION

Pasture rotation is a valuable control measure. Lambs raised in dry lots and fed from raised racks can be kept free from the worms.



LIVER FLUKE IN SHEEP AND GOATS

(*Fasciola hepatica*)

Liver flukes are usually flat leaf-like worms about an inch long, provided with suckers, but are not segmented like the tapeworms. They usually occur in the bile ducts of the liver but sometimes may be found elsewhere. These parasites often cause great losses among sheep. They produce the disease known as liver-rot or "leech-liver".

LIFE HISTORY

The eggs produced by the adult flukes pass out in the feces and if they reach water hatch in a short time. These embryos enter certain snails and undergo development which later gives rise to a form known as cercariae. These are small flukes provided with tails, which enable them to move about. Finally they lose their tails and encyst in the water or on grass. If these cysts are swallowed by suitable animals the larval flukes make their way to the liver.

SYMPTOMS

Sheep are likely to put on fat and seemingly improve in condition in the early stages of liver fluke disease, usually in the summer or fall, probably as a result of the stimulation of the liver. Later they lose in condition, become unthrifty, pale, and feed less. Swellings occur under the jaw and brisket. During the winter sheep become poor in flesh, breathe rapidly and feebly, and are very dull. Diarrhea is usually present, especially in the later stages. Animals may die at any stage of the disease. It is usually best to diagnose this disease in the flock by finding eggs in the droppings or by examining one or more of the dead animals.

TREATMENT

Two remedies have been found satisfactory. These are male fern and kamala. Oleoresin of male fern 3 to 5 grams ($\frac{3}{4}$ to $1\frac{1}{4}$ teaspoonfuls) according to size in 10 cubic centimeters ($2\frac{1}{2}$ teaspoonfuls) of a non-purgative oil, in the morning, two hours before feeding. Administer the treatment on five consecutive mornings.

Powdered Kamala is given to yearlings and older sheep at the rate of 15 grams divided into two doses of 7.5 grams (2 teaspoonfuls) each, to be given at 12 to 24 hour intervals. The 15 grams may be given in one dose to a strong animal but must be divided into two or more for weak animals. The sheep will appear dull for two or three days after treatment. It is advisable to have these drugs administered by a competent veterinarian.

PREVENTION

Avoid wet lowland pastures and have the sheep drink only well water. Manure from infested sheep should not be put on pasture land, especially wet land. Treat sheep in fall when removed from pasture.

GRUB IN THE HEAD

(*Oestrus ovis*)

Grubs which occur in the heads of sheep are the larvae of the sheep bot-fly or "nose fly." These maggots are located in the nostrils and communicating cavities, as the frontal and maxillary sinuses. The grubs, when full grown, may be four-fifths of an inch in length and one-third of an inch in width. They have a pair of hooks at the pointed head and bands of spines encircling the body. At first the grubs are white but as they grow they turn yellow and finally may become black. They cause much loss to sheep not only in loss of flesh but often causing death.

LIFE HISTORY

The fly looks much like a large house-fly and is active during the summer. It deposits a tiny maggot on the nose of the sheep. This maggot enters the nostrils and crawls up into the head. It remains there until the following spring when it crawls out and falls to the ground and buries itself. It will then emerge in 5 or 6 weeks as an adult fly.

SYMPTOMS

The first symptom is the appearance of a "cold in the head." There is a mucous discharge from the nostrils at first, but later this becomes muco-purulent in nature and is often mixed with blood. There is a pronounced catarrhal condition which sheep men call "snotty nose." The grubs cause minute hemorrhages with their spines and hooks and the nostrils become irritated and inflamed. The animal experiences difficulty in breathing. The sheep sneezes frequently and the eyes become inflamed. The head is often carried low or the animal may shake its head frequently. The appetite is diminished and emaciation may follow.

TREATMENT

Treatment for grubs in the head is as a rule not very satisfactory. Pepper placed in the nostrils may cause the animals to discharge some of the grubs through sneezing. The injection of one to one and one-half cubic centimeters (15 to 25 drops) of chloroform into each nostril will sometimes remove some of the larvae if they are in the nostril. If they are in the frontal or maxillary sinus it is impossible to remove them without performing an operation on the skull or face.

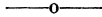
PREVENTION

Smearing the nose of sheep with a preparation that will prevent the fly from depositing its larvae on the nostril is a very satisfactory preventative measure. Various preparations have been used as, equal parts of tar and grease, tar and fish oil, tar and whale oil. Pine tar is also satisfactory. It is advisable to apply the tar the first time by hand. After that it may be applied automatically by using a salt lick consisting of a thick plank or split log in which holes 2 inches in diameter are bored, with salt placed in the holes and the edges of the holes heavily tarred, so that the sheep get the tar on their nostrils as they lick the salt.

WORMS IN CATTLE

Cattle as a rule are but slightly affected with worms. Older cattle seldom show symptoms but calves are sometimes affected to some extent. Stomach worms, tape-

worms, lung worms, flukes, and a few intestinal round worms are the principal forms which attack cattle in Oklahoma. None apparently have been of much economic importance up to the present time. Very little is known concerning their life histories and consequently little can be done in the way of prevention except what is recommended for sheep. Treatment for the various worms harboured by cattle is the same as for sheep except that proportionately larger doses should be given.



BOTS IN HORSES

(*Gastrophilus intestinalis and nasalis*)

The bot-fly is the most common parasite that infests the horse. The fly is parasitic in the larval stage in which the larva or bot, lives in the stomach of the horse. The bots are maggots having spines or hooks on the head and rows of spines forming bands around the body. The anterior end is pointed while the posterior is very blunt. Bots may reach a length of three-fourths of an inch and have a thickness of one-eighth of an inch or more. They seldom if ever cause death, but if very numerous, may be the cause of digestive disorders which may result in unthriftiness.

LIFE HISTORY

The bot-fly is about the size of a honey bee, and also has much the appearance of one. It is found in the adult form from early summer until late fall. It lays its eggs or "nits" on the forelegs, nose or throat of the horse. The eggs hatch in a few days or weeks and are taken into the horse's mouth by the tongue. The larvae later make their way to the stomach where they become attached. Here they remain through the winter and in the spring leave the stomach and pass to the ground with the feces. The larvae burrow into the ground and finally emerge in about 6 weeks as adult flies.

SYMPTOMS

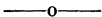
No distinct symptoms are shown.

TREATMENT

The administration of 5 or 6 drams (teaspoonfuls) of carbon bisulphid in a single dose in a hard gelatin capsule will remove the bots from the stomach of the horse. Carbon bisulphid may be given in two doses of 3 drams each with an interval of two hours. The latter case would give an opportunity to suspend treatment if bad results are evident after the first dose. No purgation is necessary. Treatment should be given on an empty stomach. The administration of carbon bisulphid is safest in the hands of a veterinarian.

PREVENTION

Little can be done to prevent horses living or working in fields from becoming infested with bots.



ROUND WORMS OF THE HORSE

(*Ascaris equi*)

These worms are closely related to the round worms in the pig. They are free in the small intestine and injure the host by eating the digested food and giving off

a poisonous substance which is absorbed by the blood. This worm measures from 6 to 12 inches in length. The life history is in all probability similar to that of the round worm of the pig.

SYMPTOMS

Unless numerous, these round worms are not particularly harmful to the host. Young animals suffer most from infestation and show symptoms of local and systemic character. As a result of the irritation caused by the worm there is intestinal catarrh which may be accompanied by diarrhea. Colic may occur. There is a loss of flesh, dullness and the coat becomes rough. Due to the accumulation of gas in the intestines the "pot bellied" condition may result.

TREATMENT

1. Carbon bisulphid as given for the removal of bots is effective in removing round worms.

2. Tartar emetic in two to three drams (teaspoonfuls) doses repeated once at an interval of twelve hours, is also an effective expellant. This is best administered with linseed meal which may be stirred in bran mash. This is a dose for an average sized horse and may be modified according to age or size.

3. Two to four ounces of oil of turpentine and one dram (teaspoonful) of oleoresin of aspidium, in a pint of linseed oil. This may be followed 12 hours later with a pint or two of linseed oil. All treatments for removing worms from horses should be given after a fast of 18 to 24 hours.

PREVENTION

Cleanliness and avoiding lowland pastures as far as possible are the best preventive measures.

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TAPEWORMS IN POULTRY

(*Davainea cesticillus*, *D. tetragona*, *Hymenolepis carioca*,
Choanotaenia infundibuliformis)

Four species of tapeworms have been observed in chickens in Oklahoma. These worms produce much loss in poultry in flesh, reduced egg production, and death. They also reduce the vitality of the birds and make them more susceptible to other diseases. Tapeworms live in the small intestine and get their nourishment from the digested food of the host. They give off a toxin or poison which is absorbed by the blood of the host and may have a detrimental effect. The tapeworms of poultry are similar to those of other animals in that they are flat and ribbon-like. They vary in length from one-half to ten inches and in width from that of a fine thread to one-eighth of an inch.

LIFE HISTORY

House flies and stable flies act as the intermediate hosts of the chicken tapeworms. The flies feed on droppings from infested fowls and may swallow some of the eggs which develop to the proper stage. The flies are then eaten by the birds.

SYMPTOMS

Young birds suffer more than older ones and they also show symptoms more

clearly. However, symptoms for tapeworm infestation in fowls are not clearly defined. There is an abnormal desire for food in spite of which the birds become emaciated and anemic, as shown by comb and wattles. The feathers become rough and lose their luster and the animal may assume drooping attitudes. The droppings are as a rule thin and of a light brownish color, often filled with gas bubbles. To make sure of the diagnosis one or two of the birds should be killed and the intestine examined for worms.

TREATMENT

In treating poultry for the removal of tapeworms lye and tobacco have been found fairly satisfactory at this Station.

1. Take 1 teaspoonful of concentrated lye for 20 chickens. Put lye into a pint of chopped grain or other feed and cook for 1 hour. Let cool and feed to birds when hungry and allow plenty of water. Be sure that each bird gets its share. Keep other foods away for at least 2 hours after giving treatment. The treatment must be repeated 2 or 3 days later.

2. Give one-half teaspoonful of tobacco to each bird. This should be mixed with feed and cooked for 1 hour and fed to chickens after a fast of 15 to 20 hours. This treatment must be repeated 2 or 3 days later.

3. Powdered areca nut is sometimes given to birds to remove tapeworms. It is given at the rate of 10 to 20 grains (about $\frac{1}{4}$ teaspoonful) according to weight. Small chickens may take from 3 to 5 grains. The dose may be repeated three days later.

PREVENTION

Prevention consists in keeping all droppings cleaned up and placed in containers which will prevent flies from feeding on them. The droppings may be buried, burned, or treated with some substance to keep away the flies. Little can be done to prevent flies from feeding or coming about the chicken yards.

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COMMON ROUND-WORM OF POULTRY

(*Ascarida perspicillum*)

This round worm is common in chickens, turkeys and guinea fowls. It inhabits the small intestine and feeds from the digested food of the host. These worms cause a great deal of irritation and consequently reduced vitality and the troubles that accompany them. These worms vary in length from one and one-half to four inches and are about one-sixteenth of an inch in thickness.

LIFE HISTORY

The eggs are given off by the worms and reach the ground with the droppings. The embryos develop within the eggs but do not hatch until swallowed with food or water by the birds. The larval worms are set free in the alimentary tract and in three or four weeks reach maturity.

SYMPTOMS

The symptoms for roundworms in fowls are much the same as those for tapeworms. There is more or less of dullness, the feathers become erect and lusterless and the wings droop. The appetite usually is good, but there is more or less of

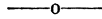
emaciation, the comb becomes pale, and later diarrhea sets in. The droppings may contain a small amount of blood at times. In later stages the appetite is lost and the bird "huddles up" with eyes partly closed and finally dies. Worm symptoms should not be confused with those of other diseases as there is a similarity between them.

PREVENTION

Thorough cleaning and disinfection are necessary to prevention in the spread of round worms. Droppings should be thoroughly cleaned up at all times. Water and feed troughs should be so arranged that the birds cannot get their feet into them.

TREATMENT

The treatment for removing round worms from poultry is the same as for tapeworms.



OTHER INTERNAL PARASITES

There are a great many other internal parasites not mentioned here that are of considerable economic importance to Oklahoma livestock. The few that are taken up are those which cause the most serious losses and are most widespread. Those that are not taken up are as a rule only of local importance.

