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INTERNAL PARASITES
OF THE Horse

By J. SHILKIN, B.V. Sc., Senior Veterinary Surgeon

WHILE actual losses from internal parasites are not of common occurrence in horses, much unthriftiness, debility and colic can be attributed to their presence in the intestines, particularly in young animals.

Infection occurs through the horse swallowing the eggs or larvae which are present in the soil, water or grass. The different species then progress through their various life cycles ending with female worms laying eggs which are eventually passed out in the dung.

Although there are a large number of different species of worms which inhabit the intestine of the horse, only those few species which are considered of importance in Western Australia will be dealt with here.

REDWORMS
(Strongylus and Trichonema spp.)

Two different types of redworms are commonly found in horses. The large redworms (Strongylus spp.) vary in length from one to two inches and attach themselves to the gut wall by means of their mouths. The small redworms (Trichonema spp.) are about half an inch in length and lie free in the intestine.

Both types are usually reddish in colour and inhabit the large bowel and caecum (blind gut).

The life history of all these species is not completely known, but the eggs passed in the droppings will hatch in about 24 hours provided conditions are suitable. The larvae then undergo development and are ready to infest the horse in about a week. At this stage, due to an enveloping sheath, the larvae are capable of surviving for long periods on the grass, although the majority will die in about three months. When the pasture is wet with dew or rain they are able to climb up the blades of grass and are swallowed by the horse as it grazes.

Once inside the animals the course followed depends upon the species. In the case of Strongylus spp. the larvae apparently move through the body in various directions and have been found in the lungs, liver, spleen, pancreas, lymph glands and various blood vessels. Their later course is unknown, but they eventually return to the large bowel where they develop to maturity and eventually lay eggs, so continuing the life cycle. The development of the young worms in the horse may extend over a long period and it may be almost 12 months from the time the worm larvae were swallowed with grass before the worms are mature and laying eggs.

In the case of Trichonema spp. the larvae burrow into the wall of the large bowel, and remain there for some time, before returning to the bowel and developing to the adult stage.

Symptoms.

The condition induced by these worms is perhaps the most common and most serious parasitic disease affecting horses. The adults of Strongylus spp. feed on the intestinal wall and, as they are blood-sucking parasites, anaemia is a common
symptom of the disease. The mucous membranes of the eyes and gums become pale and the animal becomes very weak. In some cases, dropsical swellings may be seen along the abdomen. Injury to the wall of the intestine may pave the way for bacterial infection.

The larvae of the small species may cause the formation of nodules in the intestinal wall. These may give rise to digestive disturbances, resulting in soft and foul-smelling droppings, diarrhoea, and poor appetite. In advanced cases, the appetite may be depraved, causing the animals to eat bark, earth and rubbish. Outwardly the coat is rough, loss of condition is evident and the appearance generally dull and dejected.

One species invades the walls of certain arteries, particularly those supplying the large bowel and as a result of the invasion, the walls of the arteries becomes thickened and obstruct the flow of blood. It is believed that this obstruction may give rise to intermittent attacks of colic, but it should also be realised that such obstructions are frequently discovered in post mortem examinations of animals which have not suffered from colic at all.

Heavily infested horses do not perform well and many cases of thoroughbreds and trotters which fail to race according to expectation have shown remarkable improvement after treatment for worm parasites.

**LARGE ROUNDWORMS** *(Ascaris equorum.)*

These are large yellowish-white worms up to 12 inches long usually found in the first half of the small intestine.

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Fig. 2.—Redworms (Strongylus spp.) (natural size).

Eggs containing minute larvae are deposited in the stomach and eventually passed out in the droppings. No further development occurs unless the eggs are swallowed by the maggots of certain species of flies, particularly the house fly, stable fly and bush fly. Once the maggot develops into the adult fly, the larval worms make their way into the proboscis (sucking organ) of the fly which in turn disorges the larvae into saliva around the horse's lips. Many of the larvae are then swallowed by the horse. Upon reaching the stomach they then develop to the adult stage.

Symptoms.

Whilst Habronema infestation is very common in this country, it is not considered of any great economic importance. The smallest species is possibly the most serious as it burrows into the stomach wall, causing the formation of fibrous nodules and possibly causing digestive disturbances.

There is also an external form of Habronema infestation which may cause trouble when infested flies feed on sores or other

Fig. 3.—Redworms (Trichonemidae) (natural size).
moist places, such as the sheath, penis, or mucous membranes of the eye, etc. The larvae may be set free, and commence to burrow. Growths produced by the burrowing are difficult to heal and such growths on the eye, penis and sheath, particularly, are probably quite often confused with true cancerous growths. The condition frequently encountered in northern parts of Australia and commonly referred to as Swamp Cancer is most probably one of Habronema infestation.

**SMALL STOMACH WORMS**
*(Trichostrongylus axei.)*

These have not been reported in this State and, in any case, are not regarded as of any great importance.

**PIN WORMS**
*(Oxyuris equi.)*

These worms are commonly present in horses in this State. They vary in colour from white to grey or brown, and may be up to six inches in length including the long narrow tail. They occur in the large bowel.

The mature female worm deposits her eggs in clusters round the anus of the horse, but occasionally is passed out of the animal and lays the eggs in the droppings. A small larva develops inside the egg, which then hatches only after being swallowed. The larvae then develop to maturity in the large bowel.

**Symptoms.**

These are of importance mainly on account of the irritation produced round the anus by the female when depositing eggs. This itching causes animals to rub their tails against trees, walls, fences, etc.

**TAPEWORMS**

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inches long and one inch wide. The smallest species has not been recorded in Western Australia.

They are generally found in the small intestine, but may inhabit the large intestine as well.

Whilst it is known that tapeworms generally require the assistance of an intermediate host such as an insect, mite or slug and that each type of tapeworm has its own specific host, the complete life cycle of these particular worms is not completely known.

It has been shown that microscopic orbited mites which live in pastures are the intermediate hosts of the tapeworms of horses.

Symptoms.

Even heavy infestations with these parasites are not regarded as of any great consequence in Australia. Reports from other countries have ascribed such symptoms as general unthriftiness, rough coat and digestive disorders to their presence, but in Australia at least, these symptoms are usually considered to be due to roundworm infestation.

**BOTFLIES**

*(Gastrophilus spp.)*

Three species of botflies, the common botfly, the throat botfly, and the nose botfly, are known to attack the horse, and all three species have been recorded in Western Australia.

The adults are two-winged insects, the common botfly being brownish grey with mottled wings and white face. The throat botfly is smaller and has a reddish thorax with a black band across the abdomen, and the nose botfly is smaller again.

The common botfly deposits her eggs on the hairs of the mane, chest, shoulders, and legs, mostly during the late summer and autumn. The eggs are yellowish in colour and are attached to the hairs for about one-third of their length. Though the eggs are ready to hatch in about seven days they may remain unhatched for months. Hatching only occurs when they are rubbed or licked by the horse.

The throat botfly deposits her eggs on the hairs under the jaws mainly during the late spring and early summer. They are fastened to the hairs for about two-thirds of their length, each egg being attached singly to one hair. Friction is not necessary for hatching to take place.

The nose botfly deposits her eggs on the hairs of the lips. The eggs are black and stalked and are aided in hatching by the moisture round the lips.

On hatching, the larvae of all species enter the mouth, bore their way beneath the mucous membranes of the mouth and tongue and eventually make their way to the stomach. Here they attach themselves to the wall by means of a pair of strong hooks on their mouth-parts. After a period of about eight to 12 months in the stomach they reach maturity and pass out in the dung. Once on the ground, the bots burrow into the soil for a short distance. In a few days the outer skin hardens to form a protective coat for the pupa developing inside. In from three to 10 weeks the adult fly emerges.

Effects.

The most important effects of botflies are those brought about by annoyance and worry at the time of egg-laying. In an attempt to prevent the flies from laying their eggs, horses will keep up constant movement and so obtain insufficient rest.

It is generally considered that the presence of the bots in the stomach even in large numbers does not exert any seriously
harmful effect on the animal. It is possible that the mouth hooks may give rise to some inflammation where they are attached and that large numbers may act as an obstruction to the passage of food.

TREATMENT OF INTERNAL PARASITES

For the control of Large and Small Redworms, phenothiazine is the most efficient drug now available.

The phenothiazine powder is given in the feed in the following doses:

<table>
<thead>
<tr>
<th>Type of Horse</th>
<th>Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Draught horses</td>
<td>1 oz.</td>
</tr>
<tr>
<td>Light draught horses</td>
<td>3/4 oz.</td>
</tr>
<tr>
<td>Saddle horses</td>
<td>1 oz.</td>
</tr>
<tr>
<td>Yearlings and ponies</td>
<td>3/4 oz.</td>
</tr>
</tbody>
</table>

As phenothiazine in full doses may at times unaccountably cause ill effects, even death, the danger can be minimised by dividing the dose into three or four equal parts and giving one part daily for three or four days. Most horses will consume the treated food, particularly if a little molasses is added, and prior starvation is unnecessary. Bran mashes should be fed before, during and after treatment unless horses are on green feed and the bowels are free. The urine becomes a reddish colour when exposed to the air, and treated horses should be spelled until the colour of the urine returns to normal, usually in four or five days. Following treatment, horses should be run in a paddock which has carried no horses for a few months.

Phenothiazine can be used in a preventive way by giving horses 1 to 2 grammes per day in the feed or made up in a small quantity of molasses and bran or some other mixture which the horse likes and which may be licked from the hand or a spoon. The repeated small doses do not kill the adult worms but prevent egg laying almost entirely and also kill the developing worm larvae in the droppings. If this system is followed, contamination of pastures or stables is practically eliminated and horses will not acquire fresh infestations. Daily doses are desirable but once the horse has had about 15 or 20 consecutive doses, omission for a few days is of little consequence.

A new treatment has been recently developed against Large Roundworms. The new drugs are compounds of piperazine and those which have been used include piperazine adipate, piperazine hydrate (or hydrate), piperazine citrate, and a complex compound with the trade name "Safersan." All are very effective against Large Roundworm, Pin Worm and also against the Small Strongyles. For horses up to 12 months of age piperazine compounds are more useful than phenothiazine. They are, however, more expensive. These compounds may be given in the feed and while readily eaten by most horses are unpalatable to some. In these cases the drug can be given in a capsule, ball or drench.

The Large Stomach Worm is not often treated. As the smallest of the species is located in nodules in the stomach, treat-
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ment is not effective. Carbon bisulphide is fairly effective in removing the other species, but as it can be dangerous in inexperienced hands and the method of administration is difficult, treatment of this nature is best carried out by a veterinarian.

Carbon tetrachloride may also be used and is given in a dose rate of 25 c.c. for every 500lb. weight in one to two pints of liquid paraffin. The animal should previously be starved for from 24 to 36 hours.

Treated animals should be well fed subsequently until recovery is complete and the addition of two grains of iron sulphate daily will assist in relieving the anaemic condition induced by the worms.

A second treatment about three months later may be advisable in order to remove those worms which have been wandering through the body.

The Pin Worm is best treated with one of the piperazine compounds mentioned above. Dose rates vary with the different compounds, therefore, follow the directions given by the manufacturer.

As the egg clusters round the anus cause irritation they should be washed away with soap and water and then either mercuric or carbolic ointment applied.

The treatment of Tapeworms is not usually attempted.

The treatment of Bots is best carried out with carbon bisulphide at the rate of 6 c.c. for every 250 lb. weight, with a maximum of 24 c.c. This drug must be given either in a capsule or by stomach tube, but experience is required for both methods of treatment. The animals should be starved for from 18 to 24 hours prior to treatment and no food or water should be given for three or four hours after treatment. Treatment should be carried out about June when the majority of bots will have reached the stomach.

PREVENTION OF PARASITIC INFESTATION

Prevention is much more important in the control of parasitic diseases than medicinal treatment, as prevention measures thoroughly carried out will eliminate or at least reduce the necessity for medicinal treatment.

The chief source of infestation in most cases is the manure. Whilst it is difficult to prevent contamination of the pasture, wherever manure can be conveniently collected, such as from stables and yards, this should be carried out regularly. The disposal may present a problem, but it is possible to treat it so that flies are prevented from breeding in it. One method is to spread it out thinly on farm land so that drying occurs rapidly, and it ceases to become an ideal breeding-ground for flies. This method is, of course, not satisfactory in wet weather. Horses should not be run on land where this is carried out.
Another method is to store it in compact heaps firmed down by beating the manure with shovels, and the outer layers of the heap should be turned into the centre of the heap at frequent intervals. The heat generated inside the heap kills any eggs or larvae that may be present.

Feed-boxes should be raised above the ground and hay should be fed in racks and not thrown on the ground.

Bedding should be changed frequently.

Clean water should be provided in troughs and where possible horses should not be permitted to drink from shallow, stagnant pools.

Pastures should be spelled for at least three months, but whilst spelling from horses may be grazed by cattle or sheep.

Overstocking, of course, increases the contamination of pastures and should be avoided.

Adequate feeding plays a big part in reducing trouble from worm infestation, and it is common for animals to have relatively heavy infestations without showing any obvious symptoms so long as feeding and nutrition generally are good.

Small daily doses of phenothiazine as mentioned earlier will almost eliminate contamination of pastures and stables and are particularly valuable for mares in order to prevent infestations in the foals. Mares should have the daily dose, or at least the last three months of pregnancy, preferably throughout, and it should be carried on until weaning time.

**DIAGNOSIS OF PARASITIC INFESTATION**

Diagnosis is best carried out by examining the droppings microscopically to detect the presence of worm eggs. For this purpose the material must be reasonably fresh, preferably not more than a day old, when it is received at the laboratory.

Failing this, diagnosis must be based on the symptoms, and in some cases by the presence of adult worms which may be passed in the manure.

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