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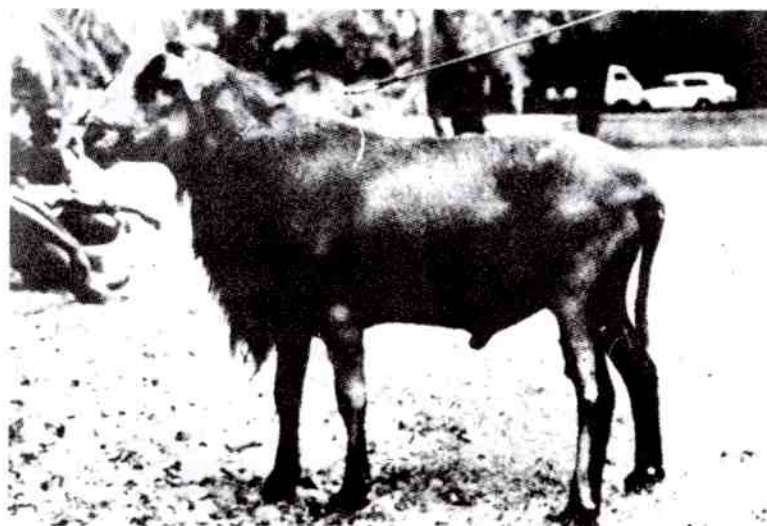
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Factsheet

Internal Parasites in Sheep

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A parasite is a living organism which lives upon or within another living organism which is called a host. There are two groups of parasites, those that live within a host - endoparasite, (*internal parasites*) and those that live or feed on the body surface of a host animal - ectoparasites (*external parasites*). This factsheet discusses the internal parasites of sheep in the CARICOM Caribbean.

Endoparasites must obtain nutrients from their host animal in order to live and reproduce; thereby reducing the host's ability to thrive or for that matter to survive. Many parasites are specific to a species of animal; others may infect several species. Each species of parasite has a preference for a location within the host animal. This has resulted in the parasitic worms being given common names signifying their location in the host. e.g. the stomach worm *Haemonchus contortus*.

Wherever sheep are raised many species of internal parasites will be found and they are probably the chief health problem, causing the sheep to be less disease resistant than those without "worms". In almost all instances of parasitism, more than one species of worm is present. However, the disease state is usually due to one or two species.

Signs of parasitism

Signs of parasitism vary with the severity of infection and the age of the host animal. Anemia is the most important sign while lack of appetite, and general unthriftiness are others. Severe anemia can be detected by looking at the lining of the mouth, the lining inside the eyelids and vulva. Depending upon the severity of anemia, these are pale pink to chalky white. Sheep suffering with heavy stomach worm infections will often develop "bottle-jaw", a mumps-like swelling of the lower jaw. These signs are often seen in several sheep or in a flock, victims are thin and dehydrated, and the vet services can confirm by looking for eggs in faeces. Some sheep develop a watery stool or diarrhea which is caused by the parasites damaging the membrane of the wall of the intestine thus preventing proper absorption of the nutrients from the digested feedstuffs.

Management Practices

Management is equally as important as medication in controlling parasitic diseases of sheep. Sanitation around buildings and yards is very important. Hay or fresh cut grass should not be put on the ground, but in hay racks. Sheep, especially lambs, should be kept off contaminated pastures during the period when parasite larvae are high and avoid wet areas if possible.

Lambs are more susceptible to internal parasites than adult sheep. The greatest threat occurs when the ewes' output of parasite eggs go up soon after lambing. This threat to young lambs can be reduced by deworming the ewes before and after lambing and the lambs at weaning time.

Seasonal Variation in Worm Load

The number of parasites infecting sheep varies with the season. Eggs hatch more readily and immature worms develop faster in the rainy season. As a result, the parasites' life cycle are shorter and more larvae survive in the rainy season leading to an increase in the worm burden in sheep in the wet season.

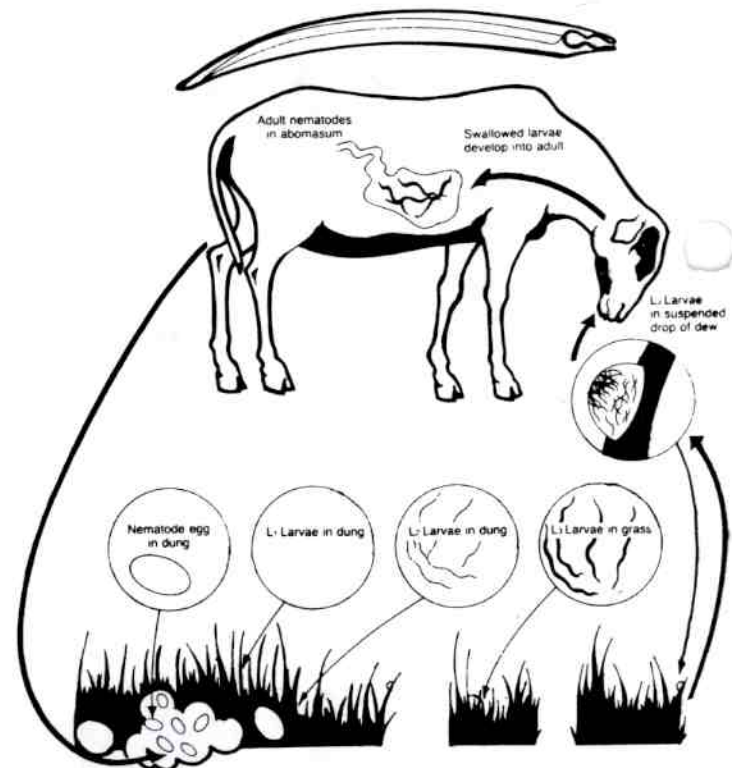
Furthermore, the activity of internal parasites in sheep is affected by the variation in the wet and dry seasons. For example, parasite development generally slows down in the dry season. Infective larvae that enter the sheep just before the on-

set of the dry season may stop developing and remain in larval stages until the onset of the rainy season. This phenomenon is called HYPOBIOSIS. In the hypobiotic state internal parasites save energy by not producing eggs that would certainly die & excreted from the sheep but they are also more resistant to anthelmintic (*deworming*) drugs.

Roundworm (*Nematodes*)

Parasitic roundworms are often blood-sucking and live in the stomach, intestines and lungs of sheep. With the exception of hookworms, lungworms and threadworms, roundworms have similar direct lifecycles Fig. 1. The female stomach or intestinal roundworm produces microscopic eggs which pass in the manure. In the rainy season a tiny worm or larva hatches from the egg within a few days and can reach the infective stage within 4 to 6 days. These larvae can live on pasture up to 6 months.

Fig. 1. Life Cycle of Typical Roundworm



Adapted from the original in *Parasites of Sheep* 1981 Published by MERCK & Co Inc. Rahway, New Jersey, USA.

Sheep become infected by eating grass contaminated with larvae. Once consumed the larvae develop to adult worms in the stomach in 14 to 28 days where they survive for many months producing thousands of eggs which pass daily in the manure.

On the other hand, larvae of the sheep hookworm, *Bunostomum* spp. can infect the animal by boring through its skin well as by being eaten in contaminated grass. Following infection, the larvae are transported via the blood to the lungs from where they migrate to the intestine.

Young animals are most severely affected by roundworms. Anemia is probably the most obvious symptom which can be seen as paleness (*white rather than pink*) of the mucous mem-

branes around the eyes, inside the mouth, rectum and vagina. Bottlejaw or fat faces, which is a swelling under the jaw, is another symptom and in other cases there is a swelling on the lower abdomen. Most sheep infected with stomach worms may produce scant, hard manure.

Intestinal Roundworms

Small numbers of intestinal roundworms, cause no significant damage. However, with numbers ranging between 40,000 and 80,000 the wall of the intestine becomes inflamed and eventually thickened resulting in the loss of most of the nutrients in the manure. A fluid imbalance may cause a persistent diarrhea (*wet droppings*) which weakens the animal. Heavily infected sheep are poor-doing animals and usually lag behind the rest of the flock.

Lungworms

Adult lungworms are found in the large breathing tubes and windpipe. A few worms cause little or no significant damage. However, if several hundred worms are present in the breathing tubes, they may cause death due to suffocation. As a result of the invasion by lungworms, the tubes of the lungs produce a thick, sticky mucous. Air passing through the mucous causes a bubbly froth which is drawn back into the tiny air sacs. Large areas of the lung cease to function, and, if enough damage occurs, death will result due to suffocation.

Female lungworms (*Dictyocaulus spp.*) lay eggs (that contain the first stage larva) in the airpassages. These eggs are coughed up and then swallowed. The eggs hatch in the intestine and the first stage larva is passed in the manure. After a few days, the larvae cause infection when they are eaten in contaminated grass.

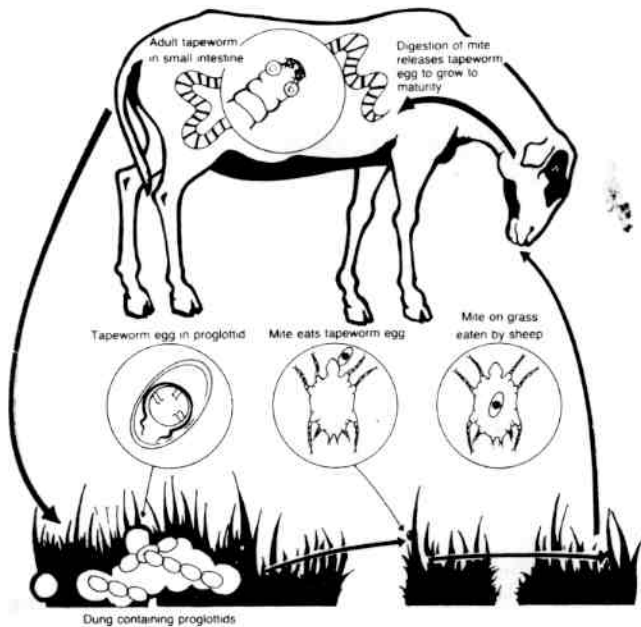
Tapeworms (Cestodes)

Tapeworms are very common in sheep and are found in the small intestine. They are flat and ribbon-like usually about one metre in length. The rear segments are sacs of eggs which resemble grains of rice and break off and pass in the manure. Oribatid mites, a microscopic insect found in the grass, eat the eggs and the parasites develop into tiny cysts inside the mite. Sheep become infected when they eat the mites as they graze. The immature tapeworm is released from the mite and attaches to the wall of the small intestine where it develops into the adult worm Fig. 2.

Although these parasites seldom cause serious problems in adult animals, lambs are highly susceptible to infection. Immunity to tapeworms is developed with age; sheep over one year old seldom harbour adult tapeworms or have only small numbers of these parasites.

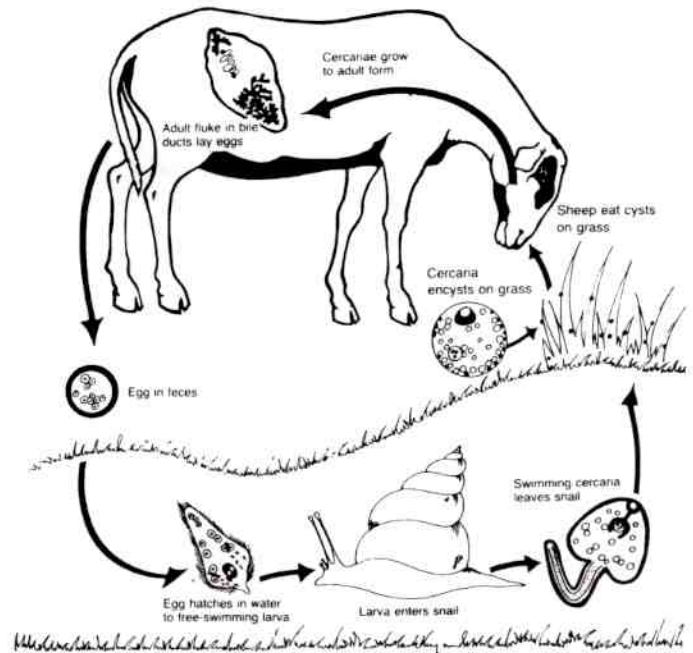
Sheep infected with tapeworms generally show no symptoms of the infection and treatment is very effective.

Fig. 2. Life Cycle of Tapeworm



Adapted from the original in *Parasites of Sheep 1981*. Published by MERCK & Co. Inc. Rahway, New Jersey, USA.

Fig. 3. Life Cycle of Liver Flukes



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Flukes and flatworms (Trematodes) (Fig. 3).

The common liver fluke is a flatworm which causes major problems in sheep. These parasites can seriously damage the liver and heavily infected animals can die without any visible symptoms. Sheep with a lower level of infection may appear dull, weak, anemic and usually tire easily.

Fluke eggs are passed out in the manure. The eggs hatch and a free-living miracidium larva emerges, however, to survive adequate water must be available. The miracidium larva swims about seeking a certain type of snail to further develop. After 30 days in the snail, development is complete and again if there is sufficient water about, the larva leaves the snail and attaches to vegetation where it encysts. This is the infective stage and if consumed by a sheep as it eats the forage it becomes infected by the parasite.

The easiest way to control the liver fluke is by controlling the snail population with chemicals. Copper sulphate sprayed on pastures at concentrations of 1 part per 100,000 to 1 part per million will kill the snails within one day.

Coccidiosis

Coccidiosis is an intestinal disease of sheep which is caused by a microscopic one cell parasitic protozoan *Eimeria* spp.. It is generally accepted that there are 9 or 10 species which affect lambs. Although the disease may be present in other animals, sheep cannot be infected from any other animal except goats and other sheep.

Microscopic egg-like oocysts are passed in the manure of infected sheep causing contamination of the premises or pasture.

After a few days eight parasites are formed within each oocyst. These oocysts may be swallowed in feed or water, releasing parasites within the gut. Each parasite enters a single intestinal cell and multiplies there eventually killing the cell and releasing thousands more parasites. The new parasites penetrate and kill new cells eventually stripping the intestine of its lining.

Coccidial infections are self limiting, and, unless the rate of infection is great enough to result in clinical disease, the lamb may develop an immunity.

If large numbers of oocysts are swallowed destruction of a great many cells of the intestinal wall will result. This causes thickening of the wall and severe scouring, sometimes with blood loss in the manure. Animals, especially lambs may weaken rapidly and die in 2 or 3 days. Cool, moist, overcrowded, dirty conditions favour the survival and accumulation of oocysts. Lambs raised under such conditions are vulnerable to heavy infections causing severe death losses due to diarrhea.

Diarrhea in lambs under one week old is not caused by coccidiosis, since it requires 8 to 14 days for diarrhea to result from infection. Confirmation of coccidiosis requires the microscopic examination of fresh manure for the presence of oocysts.

Disclaimer

Mention of anthelmintics in this Factsheet does not constitute recommendation or endorsement, nor does omission constitute an adverse criticism. Names are cited solely as examples.

TREATMENT FOR CONTROL OF INTERNAL PARASITES

Parasite	Drug		Remarks
	Generic	Trade Name	
Most stomach and intestinal worms	Levamisole	Tramisol	Safe effective - any stage of breeding cycle
	Oxfendazole	Nilverm Synantic	Safe effective - any stage of breeding cycle
	Thiabendazole	TBZ, Omizole	Safe effective - any stage of breeding cycle
	Thiophanate	Nemafax	Safe effective - any stage of breeding cycle
	Albendazole	Valbazen	Do not use 1st third of pregnancy
	Fenbendazole	Panacur	Safe effective - any stage of breeding cycle
	Mebendazole	Ovitelmin	Safe effective - any stage of breeding cycle
	Halozon	Halox	Safe effective - any stage of breeding cycle
		Loxon	Safe effective - any stage of breeding cycle
Liver fluke	Albendazole	Valbazen	Do not use 1st third of pregnancy.
		Vermadax	Safe effective - any stage of breeding cycle
Tapeworms	Oxfendazole	Synantic	Safe effective - any stage of breeding cycle
	Albendazole	Valbazen	Do not use 1st third of pregnancy
	Fenbendazole	Panacur	Safe effective - any stage of breeding cycle
	Mebendazole	Ovitelmin	Safe effective - any stage of breeding cycle.
Lungworms	Levamisole	Tramisol	Effective only against adult lungworms
	Oxfendazole	Nilverm	
	Mebendazole	Ovitelmin	Effective against lungworms
Coccidia	Sulfa-quinoxaline	Sulquin	Feed at low levels continuously or at high levels for several days
		Sulfa-methazine	Sulmet
	Sulfa-dimethoxine	Agribon Albon/2.5	Drench, oblets, safe any stage of breeding cycle.
	Amprolium	Amprovine	Safe as a drench or fed continuously at low level in feed.



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