

# Stomach and Intestinal Worms of Sheep

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## Introduction

Any form of existence in which two different organisms live in such close association that one party benefits and the other suffers is called parasitism. The party that benefits is the parasite and the one that suffers is called the host. All parasites have arisen from free living forms. The internal parasites of sheep have taken up their abode in the stomach and intestine and their new form of life has led to many modifications of structure and function; particularly is this so in the reproductive system which has reached a height of perfection which enables the parasite to produce many thousands of eggs daily.

It is obviously detrimental to the parasite to destroy its host and thus end its own life. The damage is done accidentally, especially if the number of parasites becomes too high. In nature, a slight degree of parasitism is regarded as a normal condition to which the animal host develops a natural resistance. It is only when this resistance is reduced by other adverse environmental conditions, or when infestation becomes abnormally high, that the host suffers unduly and that symptoms of what is called parasitic disease actually appear.

The more intensive animal production has become by the practice of heavy stocking of specialised animals on improved pastures, the more frequent and serious has become parasitic disease, until now it is one of the major causes of loss in our animal industry. This loss, moreover, is insidious and continuous as, apart from deaths there is frequently a serious reduction in growth and development, a lowering of production, and increased susceptibility to other diseases.

From a consideration of the fore-

going, it is apparent that parasitism is a natural condition, that the great majority of animals normally harbour a number of parasites and that it is only when heavy infestation is facilitated by environmental conditions or a lowering of resistance that parasitic disease develops.

An appreciation of these facts is essential to an understanding of the methods of parasite control and treatment of sheep. Complete eradication is impracticable, but a condition of equilibrium between the host and its usual parasites should be the aim. In few instances can this condition be maintained by the use of medicinal agents alone. Equally important is the adoption of methods of management designed firstly to minimise the ratio of reinfestation, and secondly to maintain the natural resistance of the sheep.

## The Life Cycle of Parasites

The life history of a typical worm parasite of the sheep is as follows: The adult males and females live in the stomach and intestine. The females lay eggs in such enormous numbers that heavily infested sheep may pass in their droppings as many as one to two million eggs per day. Under favourable conditions of warmth and moisture tiny larvae hatch from these eggs in about 24 hours. After passing through two non-infective stages on the ground, the larvae reach the third or infective stage in about five days. Infection of the host is brought about by the larvae being swallowed with the food, this process being facilitated in many instances by the tendency of the larvae to migrate from the droppings up blades of damp pasture grasses in the thin film of water covering them. In the gut of the host the larvae grow into adult worms, the

females of which reach sexual maturity and commence egg-production about three weeks after infection first occurred.

### Parasitic Disease

This is typically a disease of the young animal, occurring most commonly after weaning and during lean winter periods. Nevertheless, it may develop in sheep of all ages under circumstances which lead to a lowering of natural resistance or which predispose to a high rate of infestation.

Of about eighteen varieties of worm parasites that can infect sheep, some are more important and more common than others. Three of the more important varieties will be dealt with, but it must be appreciated that in the majority of outbreaks a mixed infection of about a dozen varieties is present, usually with one or two predominant types.

#### The Large Stomach or Wire Worm:

(*Haemonchus contortus*).

This worm occurs in the fourth stomach. It is about an inch long and the curious red and white spiral markings of the female have given it the name of the "Barber's pole" worm. By active blood sucking it causes a bloodless condition of the animal which is recognisable by a paleness of the skin and membranes of the mouth and eyes and a tendency to a dropsical swelling under the jaw. It does not induce scouring, and about a thousand worms are necessary to develop severe symptoms.

#### The Medium Stomach Worm

(*Ostertagia circumcincta*).

These are fine brownish worms about half an inch in length, and are most numerous around the opening of the fourth stomach into the intestine. About ten thousand are necessary to cause death.

#### The Small Intestinal Worm:

(*Trichostrongylus* species).

From the symptoms which it causes, this parasite is known as the "black scour" worm. It is found in the first part of the small intestine, and occasionally in the fourth stomach. During post mortem, numbers up to twenty thousand, sufficient to prove fatal, may be completely overlooked by the untrained observer. In order to see these worms, the lining of the intestine should be scraped, the scrap-

ing placed in water in a glass dish and held above a dark background. They appear as tiny white threads about an eighth to a quarter of an inch long. Their presence in the gut irritates the bowel resulting in a persistent black scour to which the animal ultimately succumbs. There is no anaemia.

The general symptoms of worm infestation are known to most farmers. The symptoms may vary according to the type of worm parasite present but they usually commence with the appearance of general unthriftiness which is frequently attributed to other causes. In most cases there is a serious loss of condition, persistent or intermittent scouring, coughing, lack of appetite, dullness, thirst and a dry harsh appearance of the wool. At post-mortem most animals are thin and wasted and there are no obvious abnormalities apart from the presence of parasites. In this respect it is important to arrive at a rough estimate of the number of worms present before attributing death to parasitic disease.

### Treatment

Apart from the large stomach worm, against which most of the recognised drugs have a high efficiency, effective treatment of parasitic disease is achieved only by the use of mixtures containing Bluestone (Copper sulphate) and Nicotine sulphate. Since the great majority of outbreaks, at least in Canterbury, are caused by mixed infections with a variety of types, bluestone and nicotine must be used as the universal drench. Up to the present it is the only mixture available that has any efficiency against intestinal worms but at best the efficiency is only about 60-70 per cent.

#### Bluestone and Nicotine

This mixture is made up in 2 per cent, 4 per cent and 5 per cent strengths, depending on the size of drenching apparatus available.

2% solution: Dissolve 1lb. bluestone in 5 gallons of water and add 16 fluid ozs. of 40 per cent commercial nicotine sulphate (Black leaf 40).

4% solution: The same quantities as above in 2½ gallons.

5% solution: The same quantities as above in 2 gallons of water.

Dose	2 per cent	4 per cent	5 per cent
Adults	2 ozs.	1 oz. (30 cc.)	20 cc.
Two-tooths	1½ ozs.	¾ oz. (25 cc.)	15 cc.
Lambs 8-12 months	1 oz.	½ oz. (15 cc.)	10 cc.
Lambs 4-8 months	¾ oz.	⅜ oz. (10 cc.)	8 cc.
Lambs under 4 months	½ oz.	¼ oz. ( 8 cc.)	5 cc.

NOTE: The solution must be made up in enamel, glass, wooden or earthenware vessels and should not be used through other than glass, brass or copper drenching guns. In the case of very weak and anaemic sheep the dose rate should be reduced to that of the next lower age group.

In the uncommon circumstances where the predominant parasite is the large stomach worm, effective treatment can be obtained by the use of the following:—

1. Bluestone solutions made up as above without the nicotine, administered in the same doses.
2. Carbon tetrachloride (tetra-chloride) in liquid paraffin:— Single strength (carbon tetrachloride 1 part, liquid paraffin 4 parts). Dose: adult sheep 10 cc., lambs 5cc. Double strength (carbon-tetrachloride 2 parts liquid paraffin 3 parts). Dose: adult sheep 5cc., lambs 2½ cc.

NOTE: Under certain rare circumstances, about which very little is known, the use of this drug causes a high mortality. As a precaution, therefore, it is a good plan to dose a few of the sheep at least four days before the proposed general treatment to determine the reaction to this drug.

### Drenching

When administering a drench, the sheep should be held securely in the standing position with the head almost parallel to the ground, and any tendency to throw the head back should be checked since this increases greatly the chances of the fluid entering the windpipe. The sheep should be handled carefully, the drench administered slowly, making certain that the animal gets the full dose. When drenching guns are used the nozzle should be directed carefully towards the back of the mouth and the plunger depressed slowly, otherwise a proportion of the drug will be squirted directly into the windpipe. After careful administration, there is no coughing.

Contrary to popular belief, it is not necessary to fast the animals before treatment; they should, how-

ever, be retained in the yards, or at least kept away from water, for a few hours after treatment.

When drenching is used as a preventive measure it should be repeated at intervals of three to four weeks. In the treatment of sheep actually exhibiting symptoms, drenching should be repeated in 10 to 14 days and then at intervals of three weeks.

### Phenothiazine: (Pheno-thi-azine)

This drug was first tried as a worm drench about two years ago. Although barely out of the experimental stage, the claims made for its high efficiency and low toxicity indicate that Phenothiazine bids fair to revolutionise the methods of internal parasite control, provided that it can be put on the market in sufficient quantities, in a suitable form and at a reasonable price. Although likely to be somewhat more costly than those already in use, there can be little doubt that if, under commercial conditions, it retains its reputation, sufficient quantities will be made available in suitable form. It is a greenish-grey powder which is chemically related to the dye substance methylene blue. This powder may be suspended in water and given as rather a bulky drench, or pressed into fairly large tablets which are administered easily with the aid of a balling gun or tablet forceps. Some of the drug is excreted in the urine, giving it a distinct red colour. The doses recommended are lambs 15 grammes, hoggets 20 grammes, and adults 25 grammes.

### Control

A critical examination of the details of the life cycle of a typical worm parasite brings to light certain features of great importance in relation to control measures. These features are:—

1. The enormous numbers of eggs passed in the droppings of infected animals. This brings about a rapid and severe contamination, particularly of heavily stocked pastures.
2. The extraordinary ability of the embryonated eggs and infective

larvae to withstand adverse environmental conditions such as heat, cold, sunlight, or desiccation. They may lie dormant for periods of up to two years, at any time during which the occurrence of favourable conditions may cause them to resume development.

3. Early stage eggs and the first and second stage larvae are readily destroyed, particularly by the desiccating effect of direct sunlight.
4. The period of time—just less than one week under favourable conditions of high temperature and humidity—taken by the larvae to reach the infective stage. Obviously, more time is taken during cold dry weather. Moving of stock every five days for as long intervals as possible will thus effectively reduce reinfestation.
5. The tendency of the infective larvae to migrate up the leaves of grass in the thin film of moisture covering them. This is an important feature during damp, warm weather, especially in long pastures, in naturally wet undrained areas, and applies also in unduly close grazing.
6. The period of three weeks necessary for the completion of the whole cycle. This is related to the frequency of drenching.
7. That increase in parasite numbers cannot occur unless the sheep ingest more infective larvae; that is, no multiplication occurs inside the sheep.

One further feature not mentioned in the life cycle is that when the natural resistance of the host is high, large numbers of infective larvae fail to develop in the host and of those that develop many fail to reach sexual maturity and egg production.

From a consideration of these facts, the farmer is able to assess for himself the importance of the many and extremely varied circumstances, too numerous to treat in detail, which may predispose to heavy infestation, and he can therefore take the necessary precautions. Nevertheless a few of the more important practical points in control may be briefly mentioned. These may be arranged in three groups which, in the majority of cases, are equally important.

## I. The Use of Drenches.

1. Rely on drenches to prevent rather than to treat heavy worm infestation.
2. Commence drenching early when weather conditions or other circumstances predispose to heavy infection.
3. Repeat treatment as required.
4. Use efficient drugs only.
5. Do not rely on drenching alone as a means of control.

## II. Maintain the natural resistance of the host.

1. This is mainly a matter of careful organisation of the feed supply to ensure an abundant nutritious ration distributed over the whole year in accordance with the varying requirements of the animals. Many of the methods used to ensure this, such as controlled rotational grazing, etc., are also very effective in reducing the rate of reinfestation.
2. Provide dry feed and mineral licks when necessary.
3. Teach animals to eat dry feed at an early age.

## III. Minimise the rate of reinfestation.

1. Control grazing so that the pasture is neither overgrown and moist nor too short.
2. Practice rotational grazing with intervals no longer than five to seven days in one paddock.
3. Use cattle to remove rough coarse growth from pastures.
4. Drain and lime damp low-lying areas.
5. Supply water in troughs.
6. Dose ewes two or three times before lambing at intervals of three to four weeks. Ewes can be safely dosed up to two weeks before lambing.
7. Wean lambs on to clean young pastures or forage crops.
8. Drench newly introduced sheep before mixing with the flock.
9. Harrow pastures to spread droppings and thus allow sunlight to kill eggs and larvae.
10. When feeding off such crops as rape and turnips in breaks do not allow sheep back on to the old breaks.
11. Dose sheep before shifting them to new pastures.
12. In severe outbreaks draft off the tail end of the mob and feed them a complete dry feed ration in bare yards or in the woolshed.
13. Avoid overstocking.

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