1988

G88-864 Handling Internal Worm Parasitism in Sheep

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G88-864-A

NebGuide

University of Nebraska Lincoln

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Published by Cooperative Extension, Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln

Handling Internal Worm Parasitism in Sheep

This publication acquaints the reader with methods of preventing, controlling, and treating parasitism in sheep.

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Introduction

Parasites or worms affecting the digestive system are a severe health problem in sheep production. The economic losses from parasitism can be extensive, ranging from mortality or death loss to weight loss, reduced weight gain, reduced wool production, decreased milk yield resulting in lower lamb weights, poor reproductive performance, and the cost of medications and handling.

Coccidiosis, another costly intestinal parasite, but not caused by worm infestation, will be discussed briefly.

Damage/Symptoms

Economic losses or damage produced by gastrointestinal worms (internal worms of the digestive system) are generally nutrient losses and damage to the lining of the intestine. Some of the primary

species produce their effect from hemorrhage through their blood-sucking characteristics. Others cause malnutrition-like symptoms due to decreased appetite, diarrhea, and loss of nutrients, including protein, into the digestive tract. Mixed infections also may contribute to the severity of the problem in many cases.

Signs of gastrointestinal worm parasitism may vary depending upon severity of infestation, general health of the animals involved, and other factors.

Animals showing signs of severe parasitism generally will be quite unthrifty in appearance. They may be off feed, suffer severe weight loss, have diarrhea, and be severely anemic. Animals with severe blood protein loss can develop "bottle jaw", a soft swelling in the jaw and throat area. Death can occur in severely affected animals.

Less severely affected or chronically parasitized sheep show lesser signs of parasitism. These animals may show intermittent diarrhea, weight loss or reduced weight gains, reduced wool production, decreased milk yield, and poor reproductive performance.

Inapparent or subclinical parasitism may be the most costly. These animals may show no outward signs which can be attributed directly to worm parasites, but they actually are not producing to their optimum potential. Susceptibility to secondary disease, such as pneumonia, may increase in these, as well as in other acute and chronic infestations. Dollar losses of inapparent parasitism are difficult to assess, but generally the more severe the infestation, the greater the economic loss.

Occurrence

All sheep are susceptible to internal parasitism, but younger animals ages 2 to 12 months have a higher incidence. This is due to development of a measure of resistance to some species of worms from previous infestations as animals grow older. Since young animals tend to be more likely to carry a worm burden, they also are more likely to be heavy shedders of worm eggs into the environment. For these reasons, preventative measures are important for all sheep and critical for young animals.

Life Cycle

Parasite life cycles are described as either direct or indirect. Most sheep parasites have direct life cycles. The adult parasite with a direct life cycle resides inside the host animal from which eggs are shed into the environment. These eggs go through several stages until they become infective (third stage larvae). Ingestion of this immature stage of the parasite allows the life cycle to proceed.

An intermediate host, such as an insect, is required for parasites with an indirect life cycle. Examples include the tapeworms, *Moniezia*, and *Thysanosoma*. Infective larvae develop inside the intermediate host. These insects containing the larvae are then consumed by the primary host animal.

Several topics relating to parasite life cycles need to be addressed to apply this knowledge in prevention and control programs.

1. *Seasonal Development of Infective Larvae* — Peak infective levels of larvae on contaminated pasture occur during late summer and fall. It may be most beneficial to use dewormers early in the grazing season to prevent escalation of the worm problem. Some parasites may overwinter on pastures. Thus deworming prior to the grazing season may not always provide desired levels of prevention. Environmental factors leading to the highest level of infective larvae occur during

summer and fall. Pasture parasite control programs need to prevent these buildups and provide treatment of animals infested under these conditions.

2. *Periparturient rise* — This term is used to define the increase in worm egg production in ewes around lambing time. This situation occurs when, for reasons which remain unsolved, certain worm species undergo a period of arrested development in the animal. Then, at about lambing time, these parasites suddenly begin to mature. This characteristic, called hypobiosis, results in high numbers of worm eggs being shed into the environment which can heavily expose newborn lambs.
3. *Reinfestation* — It is important to remember that sheep in a contaminated environment will tend to become re-exposed to new infective larvae shortly after any deworming treatment. Thus it is important to follow a planned parasite control program that will tend to keep parasite loads and exposure at minimal levels.
4. *Immunity* — Sheep do tend to develop resistance to infestation by some species of worm parasites. This immunity can be overwhelmed by exposure to high numbers of parasites. Stressed animals tend to be more susceptible to parasitism due to their lowered immune defense mechanisms.
5. *Prepatent period* — This time period is defined as the interval between ingestion of infective forms of the worm and the appearance of eggs produced by adult worms in the manure of the affected sheep. Generally, this is the time period in which damage may become evident in affected animals. In sheep, this time period is normally 2-4 weeks depending on the worm species involved.

Coccidiosis

Coccidiosis is a disease of major importance to the sheep industry. Appearance of affected animals can be similar to those seen with worm parasitism. Affected animals typically show diarrhea and passage of blood in feces. Poor growth and death losses are encountered. The condition is caused by a small, protozoan parasite which invades the lining of the intestinal tract. Diagnosis is obtained similarly to that of worm infestations. Management and drugs used for prevention and treatment of coccidiosis are different than those used in worm parasitism.

Diagnosis

Diagnosis of gastrointestinal worms should be confirmed whenever possible. Clinical signs alone are not to be interpreted as diagnostic since other health and nutritional problems can cause relatively the same signs.

Fecal examination of manure samples is the most frequently used diagnostic tool. Composite samples from several animals in the flock or from individual animals should be examined microscopically.

Post mortem or necropsy results from a recently dead animal or from a sacrificed, diseased animal provide the best results. The abomasum and intestines can be examined for presence of worms and evidence of infestation. Contents can be viewed with a magnifying glass or dissecting microscope to aid in identification of worm species.

Control and Prevention Strategies

Successful parasite control and prevention programs require planning. Arbitrary or spontaneous dewormings will usually stop death loss and cases of acute parasitism. These animals often are reinfected almost immediately by infective larvae and their worm burdens may return to near

pretreatment levels. Each program should have as a goal the elimination of chronic subclinical parasitism and environmental contamination.

Attention must be given to good management as well as dewormers (anthelminthics) for any program to be successful. Problems with internal parasitism tend to rise with increasing concentration of animals and moist, humid environmental conditions. Sheep raised under range conditions in arid areas tend to suffer less loss to parasitism than sheep raised in less arid areas.

Several approaches to deworming programs are suggested.

1. *Prelambing Deworming of Ewes* — A deworming treatment at this time is the best opportunity to interrupt the parasitic life cycle in sheep flocks. It prevents the potentially damaging increase in parasites which occurs at lambing time. It greatly reduces exposure of larvae to newborn lambs by eliminating adult worms before production of large numbers of eggs. It also helps to insure a low parasite burden when the flock is turned out on grass. Sheep treated in this manner tend to have much lower levels of parasitism. Attention should be given to delayed development or hypobiotic worms. It may be best to give late lambing ewes a second deworming treatment.
2. *Deworming While on Grass* — Worms which have lived over winter on pasture are eliminated with this practice. This procedure is most important in sheep grazing in areas of moderate to high parasite exposure. Deworming is done about three weeks after turnout on grass and continued at three week intervals depending on parasite exposure and risk. Four week intervals may be too long as some parasites will be mature and will be producing eggs at that time. This practice helps to avoid parasite buildup in pastures later during the grazing period.
3. *Reducing Pasture Exposure* — Reducing the numbers of infective worm larvae eaten by lambs and adult sheep is a primary goal of a control program. If possible, mechanically harvesting spring grass can result in removal of a large percentage of infective larvae or will delay grazing until most of the winter carryover of worm larvae has died out. Also, yearly rotation of pasture using other species, such as cattle, will tend to break the parasitic cycle since there is little crossover of worm species. *Haemonchus contortus* is one exception.
4. *Treat and Move Practices* — This approach involves movement of sheep, following the worming treatment, to fresh pasture or pastures where risk of exposure is low.
5. *Fall Deworming* — Animals are rid of parasites accumulated during summer months with this procedure. This approach is especially important if a spring and early summer preventive program is not used. Diagnostic assistance such as fecal examination is helpful in many cases to determine if deworming is necessary.

Practical parasite control measures vary according to environment and type of management. Planning a program which can be reliably implemented and carried out in individual flocks is important.

Anthelminthic Selection

Selection of the proper dewormer depends upon factors such as worm species involved, drug resistance encountered, Food and Drug Administration approved drugs available, and method of administration. Some of the commonly used, effective dewormers in other species have not yet been approved for use in sheep. Two examples are ivermectin (Ivomec) and fenbendazole (Panacur, SafeGuard).

Levamisole (Levasole, Tramisol, Ripercol) in drench and bolus forms is approved for use in sheep. Care must be taken to use the proper dosage (8 mg/kg). Levamisole is effective against lungworms (*Dictyocaulus*) in sheep. It has a high level of effectiveness against the common gastrointestinal worm parasites. It is not effective against sheep tapeworms, however.

Thiabendazole has been approved for use in sheep for a number of years. It has been used widely in the sheep industry. In some flocks, several species of worms have developed resistance to this drug. It can still be used effectively by most flock owners.

The economic losses due to tapeworms are not great. When present in large numbers, they can be a threat to animal health. They are unsightly and annoying to many flock owners. Although not approved for use in sheep, fenbendazole is an effective anthelminthic for these parasites.

Note: Mention of nonapproved dewormers is for information purposes. They require extra label recommendations for their use. A veterinarian-client-patient relationship is needed for legal use of these medications.

Resistance to Dewormers

Although occurrence varies in different areas of the country and from flock to flock, resistance to anthelminthics does occur. In some cases, a parasite may become resistant to a whole class of anthelminthics, rendering more than one available dewormer ineffective.

Planned, timely, parasite control programs using deworming and other management procedures are most effective in avoiding the buildup of a resistant parasite population.

Conclusion

Planning is the key element in successful gastrointestinal worm control in sheep flocks. Key points are:

- Use prelambing deworming treatment.
- Use larvicidal drugs where possible to increase effectiveness against delayed and immature forms.
- Consider treatments during the grazing period.
- Use different dewormers from year to year.
- Implement grazing management techniques that will minimize worm buildup on pastures.
- Use diagnostic aids whenever questions of possible parasitism arise.

Where trade names appear, no discrimination is intended and no endorsement by the University of Nebraska Cooperative Extension Service is implied.

Available Anthelminthics

	FDA Approval*	Dosage	Other
Gastrointestinal Worms			
Thiabendazole (TBZ)	Approved	50 mg/kg	
Levamisole (Levasole, Tranisol, Ripercol)	Approved	8 mg/kg	larvacidal
Morantel Tartrate (Nematel, Rumatel)	Approved	10 mg/kg	
Febandazole (Panacur, SafeGuard)	Not Approved	5 mg/kg	larvicidal
Ivermectin (Ivomec)	Not Approved	200 mcg/kg	larvicidal
Gastrointestinal Tapeworms			
Fenbendazole (Panacur, SafeGuard)	Not Approved	10 mg/kg	

Pyrantol pamoate (Immorthal)	Not Approved	25 mg/kg	
Lungworms			
Levamisole (Levasole, Tramisol, Ripercol)	Approved	8 kg/mg	
Fenbendazole (Panacur, SafeGuard)	Not Approved	10 mg/kg	
Ivermectin (Ivomec)	Not Approved	200 mcg/kg	larvicidal
*Unapproved drugs if used must be administered under extra label drug usage guidelines.			

Major Nematode Parasites of Sheep* **

Scientific name	Common name	Prepatent Period	Location of infection
Haemonchus spp.	large stomach worm	15-28 days	abomasum
Ostertagia spp.	med. stomach worm	17 days	abomasum
Trichostrongylus spp.	stomach & intestinal hairworm	20-25 days	abomasum & small intestine
Cooperia spp.	small intestinal worm	15-20 days	small intestine
Nematodirus spp.	thread-necked worm	Less than 27 days	small intestine
Bunostomum spp.	nodular worm	41 days	large intestine
Chabertia ovina	large mouthed bowel worm	50 days	large intestine
Dictyocaulus spp.	lungworm	32-57 days	lung
Trichuris	whipworm	30 days or more	large intestine

*Griffiths, Henry J.: A Handbook of Veterinary Parasitology. Univ. of Minnesota Press, Minneapolis, 1978.
**Jensen, R. and Swift B., Diseases of Sheep, Lea & Febiger, 1982.

File G864 under: ANIMAL DISEASES
C-3, Sheep
Issued April 1988; 5,000 printed.

Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Elbert C. Dickey, Director of Cooperative Extension, University of Nebraska, Institute of Agriculture and Natural Resources.