



# Internal Parasite Control in Sheep in Oklahoma

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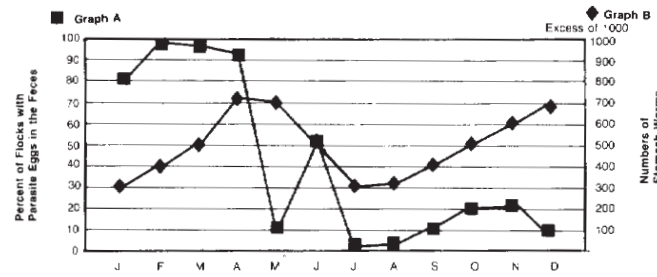


Figure 4. Monthly parasitism in Oklahoma determined from eggs in the feces and worm counts in lambs in central Oklahoma.

ewes just prior to dry, hot weather. The animals will be freed of parasites and the hot, dry conditions of July and August will eliminate most of the parasites on the pasture. The third treatment should come sometime prior to the expected increase in rainfall in September. The fourth treatment should come very late in the year. Since Oklahoma winters are not severe enough to kill the parasites on permanent pastures, the treatment should come when the animals are removed from permanent pasture. If only permanent pasture is available, the last treatment should be given when there is little permanent pasture left for grazing, and the animals are being fed hay. There will be very little opportunity for the ewes to pickup larvae during this time.

## Treatment Methods

There are many methods available to Oklahoma sheep producers for treating stomach worms. Oral drenching is the most common method used. Tramisol, Thiobendazole, Levamisole, and Ivemectrin, are a few of the products available for use by mouth in oral form. Producers should contact their veterinarian to obtain more effective "wormers".

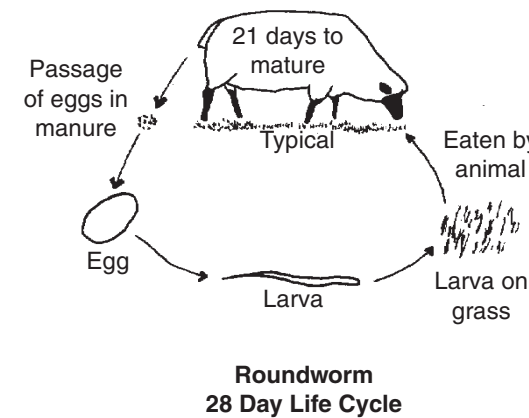
Deworming through feed, through drinking water, and through injectable and paste wormers are additional treatment methods. Several companies have developed wormer pellets, which can be used in the feed. The important thing to remember when using pellets is that you have to get the pellet into the sheep in order for this treatment to work well. To do this, we recommend that you provide plenty of bunk space (12 inches per head) by dividing the flock up and only feeding twenty-five head at a time. This prevents crowding and insures more equal intake. This treatment works best if the sheep are accustomed to eating pellets; if not, mix the pellets with grain to insure intake.

There are several products that come in injectable or paste forms. You should consult your veterinarian or recommendations on the use of these products. Only a limited number of deworming products have been approved for use by the sheep industry. However, if there is an active veterinarian-client working relationship between you and your veterinarian, he can give you a prescription to obtain products that will insure an effective treatment.

Parasites could easily be ranked as the number one health problem in Oklahoma sheep production. Our relatively mild climate and yearly rainfall provide a good environment for parasites to survive and be available to grazing sheep during most of the year. Thus, sheep producers are constantly fighting the battle against internal parasites. To help win the battle, one should gain a better understanding of the life cycle and optimum environmental development conditions for parasites; as well as the symptoms, preventive management programs, and treatments associated with parasitism in sheep. If the sheep producers of Oklahoma will apply the principles presented in this fact sheet, they can decrease losses caused by parasites in their flocks.

## Life Cycle of Stomach Worms

In Oklahoma, the number one cause of parasitism in sheep is the roundworm or the large stomach worm (barber-pole or wireworm). There are many other types of parasitic worms. However, in this fact sheet, we will refer to all of them in general terms since controlling the large stomach worm will usually control the others. Tapeworm, which is not a roundworm, is an exception, but it will not be discussed in this fact sheet. Most types of sheep roundworms have a similar twenty-eight day life cycle. Adult worms are found in either the fourth stomach (abomasum) or intestines, depending on the type. The adults lay eggs that pass to the ground in the feces. The eggs embryonate and hatch in twenty-four hours, and the released larvae become infective to sheep in five to seven days (if environmental conditions are right).



The larvae crawl up on the grass and are consumed by the grazing sheep. The larvae attach in the gut, mature into adult worms in twenty-one days, and egg laying begins again.

## Seasonal Parasite Transmission and Pasture Contamination Patterns

There are times during the year when parasites (larval stages) in the external environment will hatch and develop rapidly into the infective stage; and other times they either rest in dormancy or are killed because of adverse environmental conditions. An understanding of why and how external environmental factors affect the numbers of parasites available for sheep to consume will help in fighting the battle against parasites.

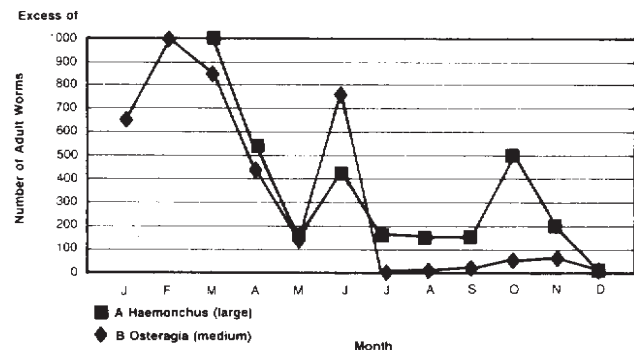
Parasite larvae on the pasture survive well in an environment that is moist and warm. When the temperature is between 50° and 98° (optimum 70°-80°F) and there has been at least 2 inches of rainfall during the month, parasites will thrive and develop on the pasture. These infective stages will persist on the pastures for months until the adverse conditions develop or die naturally three to ten or more months later. However, if the environment is dry and hot over an extended period of time (two weeks or more), most of the larvae on the pasture will be killed.

The seasonal parasite transmission pattern (when ewes are consuming worms) has been studied in Oklahoma. The study has provided us information on the effect of environment on the survival of infective larvae on the pasture. For example, as shown in Figure 1, sheep in central Oklahoma pick up the largest number of larvae in late winter and early spring (mid February to mid April). Typically, the temperatures are mild and monthly rainfall is in excess of 2 inches. One would expect the large numbers of parasites being picked up by the sheep to continue until drier and hotter conditions of the summer months. But, we find that often by late March, there is a notable decrease in the numbers of parasites that sheep are picking up. An explanation for this decrease could be due to the tall grass that reduces the opportunity for the sheep to graze close to the ground where the larvae reside; thus fewer parasites being picked up than one would expect.

When the grass is grazed closer during the last of spring and early summer, the soil condition of a relatively higher moisture and a lower temperature results in more parasites and an increased consumption as illustrated in Figure 1. Sum-

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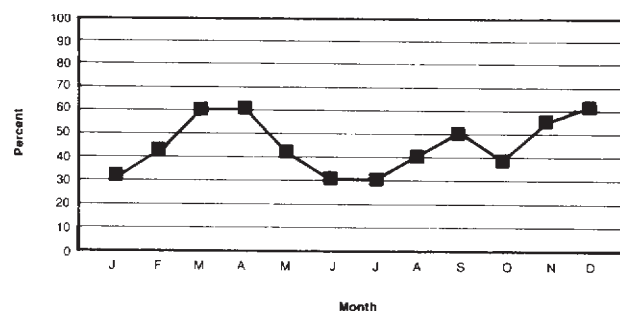


**Figure 1. Transmission of large and medium stomach worms from mid-February 1983 to mid-January 1984 in central Oklahoma.**

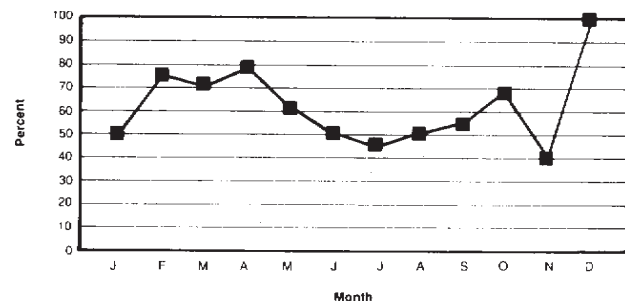
mer temperatures with little or no rainfall kill the larvae, which results in very little parasite consumption as illustrated in Figure 1. Remember, infected sheep are continually contaminating the pastures with eggs. With the milder temperatures and increased rainfall of autumn, there is an increase of larvae consumption. Eggs, passed by the sheep, develop and build up in this more favorable environment. This is also illustrated in Figure 1.

Producers should understand the difference between the seasonal parasite transmission pattern and the seasonal parasite pasture contamination pattern. Transmission takes place when sheep are picking up worms from the pasture. Pasture contamination is a reflection of the percent of sheep that are carrying parasites and putting the eggs back out on the pasture through their feces. Both Figures 2 and 3 provide evidence that sheep pastures are being contaminated and indicate the relative amount of contamination that is taking place throughout each year.

In 1983, stomach worm egg counts were monitored by fecal flotation examinations in 65 flocks comprising 6,610 head of sheep. In 1984, monitoring was repeated in 248 flocks totaling 40,397 sheep. In both years, the samples were randomly collected and tested on a composite basis per flock per month. As seen in both figures, when the temperature and rainfall increased in the spring the number of flocks carrying stomach worms also increased. A peak was reached in the March to May periods. The number of flocks having parasite eggs in their feces determined this. As hotter, drier weather came in June and July, the number of flocks with parasite eggs in their feces decreased. However, it should be mentioned that



**Figure 2. \*1983 % of ewe flock carrying stomach worm eggs in their feces per month. (65 flocks)**



**Figure 3. 1984 % of ewe flock carrying stomach worm eggs in their feces per month. (65 flocks)**

when flocks were found to have parasite eggs in their feces at a medium to heavy level, recommendations were given to deworm. These treatments as well as the reduced available infective larvae during the warmer, drier months may account for the decrease in flocks with parasite eggs in their feces during June and July.

If the winter is mild, larvae that have accumulated on the pastures during the fall will continue to develop and survive. If the winter weather is more severe, the larvae on the ground will go into dormancy. Oklahoma winters generally are not cold enough or long enough to cause a major kill of the larvae. It should also be mentioned that adult worms in the animal will survive through the winter unless treated.

At times, 4<sup>th</sup> stage larvae are imbedded in the stomach wall in an arrested state, and they may later emerge and mature. If this arrestment of larvae occurs in the fall, they will overwinter and finish development in the spring. This occurrence of a sudden increase of worm eggs in the feces has been termed the "spring rise."

### Recognizing the Symptoms of Parasitism

In early stages of parasitism, sheep will appear unthrifty even though they are on an adequate level of nutrition. It will be difficult to get the ewes to gain weight. As parasitism progresses into the disease state, the animals will appear to be weak or listless. They will be slow getting up and may need to be prodded. In severe cases, the wool will develop tender spots in the fibers and may begin to slip off. The ewes will also become emaciated.

In later stages lambs often begin to scour. The symptom of scouring is not seen in the ewe very often. In both young and old sheep the color in the eyes will appear pale and white. The small vessels that are usually visible in the white portion of the eye become invisible. This is a sign of anemia. A condition referred to as "bottle jaw" often occurs. The loose tissues under the jaw and tongue fill with fluid and become swollen. Finally, death may occur.

Fecal flotation examinations will be the quickest method to confirm physical symptoms. High egg counts can usually be found in animals in late stages of the disease. However, we cannot over emphasize the fact that prevention through routine monitoring and deworming is the best preventative tool available to the sheep producer. Attacks from parasites can be confirmed even before physical symptoms begin to appear through early and regular fecal flotation examinations.

### Routine Monitoring as a Preventive Tool

One of the best ways to prevent parasitism in your sheep is to monitor for parasite buildup in your flock on a routine basis. This can be done by taking fecal samples to your veterinarian to get a fecal flotation examination and an estimation of eggs present. If samples are taken every thirty to forty-five days, a warning can be given when parasite eggs show up or evidence of increased parasitism is indicated in the feces. This will enable a producer to stop parasitism before it becomes a serious problem. Usually if we wait until physical symptoms occur, the damage and economic loss have already occurred. Monitoring through fecal flotation examinations on a routine basis will be one of the best tools you can use to prevent and control parasitism in your flock.

### Pasture Management Methods to Prevent Parasite Buildup

Preventing parasite buildup on pastures should be the goal of every sheep producer. To have a complete parasite program, pastures must be grazed and managed in a way that will decrease the number of infective larvae on the grass. The traditional system of continuous grazing on one large pasture leads to contamination buildup and overgrazing during several periods of the grazing season. This often results in extended periods of time when the animals are picking up large numbers of larvae and, at the same time, contaminating the pasture with millions of eggs. Even with regular deworming treatment, there is no escape from parasites. The most effective way to break the buildup is to deworm the sheep and then move them to a clean pasture.

Additional research is still needed before conclusive recommendations can be given on pasture grazing systems that will prevent parasite buildup. Nevertheless, using information accumulated thus far, five methods of pasture management that should help prevent parasite buildup are given here.

One method is to subdivide large single pastures into four or five smaller pastures. We know that larvae will overwinter on the pasture and be available for consumption in the spring. However, larval intake will be much lower if ewes are grazed on subdivided pastures for a one to two week period and then moved to the new, cleaner pasture before the first pasture is overgrazed. By leaving the grass higher it becomes more difficult for the ewes to pick up overwintered larvae. If the ewes are relatively free of parasites when they start spring grazing, it will postpone or prevent parasite buildup from occurring. This would cover the March to June grazing period. Deworming treatments (as explained later) would be given at designated times or at pasture changes. Summer heat and dry weather would then begin to eliminate infective larvae. In the fall the same grazing methods could be used.

A second approach would be to rotate other livestock species behind the sheep to pick up the parasites left by them. Since sheep parasite larvae do not normally infect cattle and cattle do not readily acquire sheep parasites, cattle can be used to graze the pastures after the sheep during the spring months of rapid pasture growth. In this manner the cattle would pick up and consume the sheep larvae leaving the pasture cleaner for the sheep on their next grazing. Horses can also be used instead of cattle to accomplish the same task.

The third method of pasture management, used particularly in connection with subdividing pastures to prevent parasite

buildup, is harvesting or haying pastures after the first grazing. Haying would remove larvae on the pastures and allow the sun to dry out and kill a high percentage of the larvae left on the ground.

A fourth pasture management method is to rotate between permanent pasture and cultivated pasture. It is a common practice in Oklahoma to produce wheat pasture, sorghum pasture, and permanent pasture. For example, a rotational grazing pattern could be used as follows: wheat pasture, permanent pasture, wheat or turnip pasture, permanent pasture, sorghum pasture, and back to permanent pasture. Deworming treatments could be given before going on to each cultivated pasture. This pasture management practice could definitely prevent parasite buildup.

A fifth management practice that is highly recommended is to provide the ewes an area that is relatively parasite-free at lambing time, however this procedure requires special handling of the lambs. One could lamb ewes in dry lot and then keep the lambs off pasture or wean the lambs at an early age and grow them out in dry lot. Another choice would be to graze ewes and lambs on cultivated pasture, which tends to stay relatively free of parasites.

Another alternative would be to designate a pasture that ewes have never grazed for lamb use only. This pasture could be used after weaning. Lambs are less resistant to parasitism and cannot compete with ewes on permanent pasture. The lambs will be the first to show signs of parasitism, and it will take a considerable amount of time, extra feed, and expense to put body condition back on once it is lost.

The use of any combination of the above methods of pasture management would be of value over traditional systems as a means to prevent parasite buildup.

### Timing Treatment for Parasite Control

Recommendations can be given as to when sheep should be treated for stomach worms in Oklahoma based upon the information presented in Figure 4. These treatment recommendations should be used in combination with the preceding pasture management recommendations. Figure 4 is a chart of field data and research to demonstrate that a seasonal parasite contamination and transmission cycle occurs in sheep in Oklahoma. The broken line represents the percent of flocks carrying parasite eggs in their feces. Parasitism as indicated by egg counts reaches a peak in April and May, decreases in July and August and then increases in the fall. The solid line shows that the parasite transmission curve reaches a high in February and March, falls to a low in July and August and then increases again in the fall. Note that the rise in the transmission curve appears prior to the rise in the flock contamination curve. This indicates that as soon as environmental conditions are optimal for parasite development, sheep begin to pick up and spread parasites. Using this information, treatment recommendations can be given as indicated by the "X's" along the broken curve line.

Four treatments per year should control parasitism in the majority of Oklahoma flocks. The first treatment should be given in middle to late February, just as the parasite larvae are beginning to be picked up. This will deworm the sheep and drastically decrease the available parasites that would normally infect the highly susceptible newborn lambs. The second treatment should be given in May to deworm the