

Internal Parasites in Sheep and Goats

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What parasites are commonly found in sheep and goats?

Parasites commonly found in sheep and goats can be divided into two general categories: external (skin) and internal (organ) parasites. Because **internal parasites tend to prefer a specific organ**, there are multiple types. The most common internal parasites in sheep and goats are: lung worms (*Dictyocaulus* spp. or *Muellerius capillaris*); stomach worms (*Haemonchus contortus*, commonly called barber pole worm); liver flukes (*Fasciola hepatica*); and intestinal parasites, the most common of which are coccidia (*Eimeria* or *Isospora*).

How do sheep and goats get infested with parasites?

When animals “get” parasites, we refer to it as an infestation and not an infection, which is caused by bacteria and viruses.

Parasites grow and reproduce in certain environments. Sheep and goats that live in those environments are at high risk of becoming infested.

- Lung worms and liver flukes grow and reproduce inside snails, which live in stagnant water. Sheep and goats that have access to stagnant water are at risk of being infested by these parasites.
- The eggs and larvae of stomach worms are commonly found on wet vegetation, like dewy grass. Larvae can move up the grass where they are eaten by sheep or goats.
- Coccidia mostly affect young animals because they have not yet developed their immune defenses. Coccidia commonly live on the ground but are usually not a problem unless there is overcrowding of animals.

How do parasites cause disease?

Most of the damage caused by parasites is due to mechanical irritation of the tissues they affect and the obstruction of an organ when there are too many worms.

Lung worms

Lung worms irritate the bronchioles inside the lung and cause a local reaction with mucus and white blood cells (phlegm) that are trying to get rid of the parasites. The irritation and pain causes the animal to cough.

Stomach worms

Stomach worms are voracious bloodsuckers and will destroy the lining of the stomach to access the bloodstream. The destruction of the lining of the stomach can cause colic (abdominal pain), diarrhea, anemia, and weight loss due to the animal's inability to digest feed completely.

Liver flukes

Liver flukes burrow tunnels in the liver, causing scarring as the body tries to repair the damage. Because scar tissue is not functional, the liver loses part of its normal function, which includes filtering the blood of toxins and waste products. The accumulation of these toxins in the animal's blood can severely damage other organs, including the brain. Therefore, a common sign of liver fluke infestation is depression or stupor.

Coccidia

Coccidia live in the lining of the intestines and destroy the crypts that the animals need to absorb nutrients. Therefore, the most common sign of coccidian infestation is diarrhea (detected by dirty hind ends), and failure to thrive or weight loss.

What are typical signs of parasitism?

- **Weight loss**—Animals don't get all the nutrients they need.
- **Diarrhea**—Detected by dirty tail and hind end (Figure 1).
- **Rough hair coat**—When nutrients are insufficient, the animals' hair loses its luster.
- **Depression**—Animals keep their head and ears down and are not willing to stand for long periods of time.
- **Weakness**—Animals are easier to catch or unstable when walking.
- **Anemia**—Animals' gums, perineum, and eyes appear white due to blood loss (Figure 2 and Figure 3).
- **Fever** or, in the late stages of disease, **cold extremities** (e.g., ears and legs).
- **Fast breathing** (lung worms)—Animals try to get oxygen into their damaged lungs.
- **Coughing** (lung worms)—Animals cough from the irritation of their damaged lungs.
- **Bottle jaw** (stomach worms and liver flukes)—Animals have fluctuant swelling under the jaw from the accumulation of fluid (submandibular edema). Sometimes it can spread to under the abdomen.

How to test for parasites?

The standard method to test for parasites is to look under the microscope for parasite eggs in the feces of the animals—even for lung worms. When animals cough up lung worms, they will sometimes swallow some of the worms, which then enter the intestinal tract and lay eggs. Thus, lung worm eggs can also be found in feces. The various parasite families have different egg shapes, which helps in identifying them. However, to determine the specific parasite, other tests may be needed.

Testing strategies:

- **Group testing** is less expensive but less specific. If the sample is positive for parasites, it will not be possible to know which animals are infested and which are not, and therefore **all** animals in the group will have to be treated.

Procedure: Take approximately 10 fecal pellets

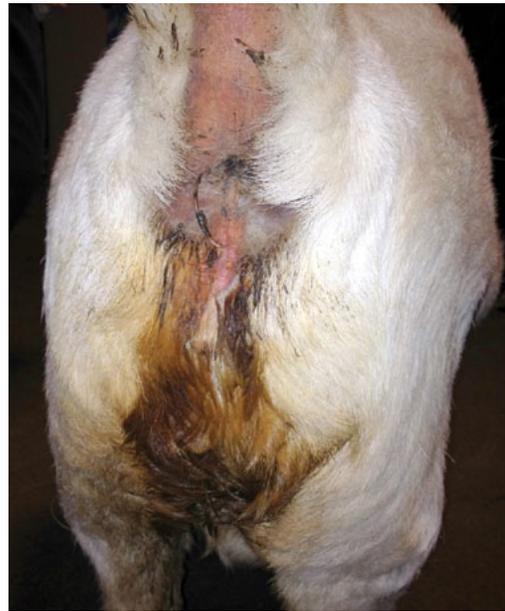


Figure 1. Evidence of diarrhea on a goat: dirty hind end.

from 3 to 5 animals and place them into a ziplock bag. Make sure to mix the pellets well.

- **Testing individual animals** is more specific because you can establish the parasite burden in each animal and the effect of the treatment. After treating individual animals, separate them from those that are not treated.

Procedure: Take approximately 20 fecal pellets from each animal and place them in individual ziplock bags identified with the animal's name or ID number.

Work with your veterinarian to establish the most appropriate testing strategy for your premises. As a general recommendation, if it is the first time you are testing your herd, it is best to perform a group test to see if parasites are an issue on your premises. It is generally suggested to test each pen as a separate group, even if it is your first time testing your herd. Individual testing is best used to identify potential carriers or high shedders to target for possible culling.

When to treat parasitism?

Treatment recommendations have changed over the years. **The current recommendation is to treat only when necessary and only the animals that need it.** This implies the need for testing (as explained above).

Common times to test include before lambing/kidding and at weaning.

Finding parasite eggs under the microscope does not necessarily warrant treatment of infested animals. For example, lung worms and liver flukes should be treated any time eggs are found, but for stomach worms and coccidia, it is recommended to only treat when high burdens are observed (see Table 1). The reason for this is that treating low burdens of stomach worms and coccidia can increase the chance of parasites developing drug resistance. Having susceptible worms in the environment helps control the population of resistant parasites because they mate with susceptible worms.

For stomach worms (*Haemonchus contortus*, commonly called barber pole worm), a simple visual inspection of the eyes can determine if animals are infested with a high burden of parasites. Animals that are losing a lot of blood due to the bloodsucking parasites show pale mucosae in some areas of the body such as the gums (Figure 2), the perineum (Figure 3), and under the eyelids. Sheep and goats should have pink mucosae. If these tissues are pale, it is likely because of blood loss. Colored charts are available on the Internet to categorize the color of the inside of the eyelids using the FAMACHA© system.

How to treat parasitism?

There are only a few drugs approved to treat parasites in sheep and goats. According to the Animal Medicinal Drug Use Clarification Act (AMDUCA), all drugs used in food-animals need to be approved by the

Table 1. Commonly used limits to establish treatment against parasites

Liver flukes	any number of eggs found in feces
Lung worms	any number of eggs found in feces
Barber pole worms	>500 eggs/g feces
Coccidia	>1,000 oocysts/g feces

Food and Drug Administration and have a specified withdrawal time for meat and milk (if applicable, for dairy sheep and goats). Using a drug in any way other than that listed in the drug pamphlet is considered extralabel drug use and **can only be done by veterinary prescription.**

Table 2 lists the dewormers currently approved for use in sheep and goats and the parasites they are effective against. It is very important to notice that all dewormers are not effective against all parasites. In addition, some dewormers that used to be effective against a specific parasite are no longer effective, due to the development of resistance in some worms. Therefore, **just because you apply a dewormer doesn't mean you've killed the worms**; you have to be sure to use the right dewormer for your specific situation. Sheep and goats have a much higher metabolism rate than cattle. Therefore, drug dosages will likely be higher than those listed for cattle.

Treatment should be adjusted to the worm burden. When the burden is very high, killing all parasites at



Figure 2. Comparison of the gums of a normal sheep (left) and a sheep with severe anemia due to a high burden of stomach worms (right).



Figure 3. Pale perineum in a sheep with severe anemia due to a high burden of stomach worms. A white gauze is shown for color comparison.

Table 2. Current drugs approved for use in sheep and goats.

Active ingredient	Liver flukes	Lung worms	Barber pole worms	Coccidia
Albendazole	X	X	X	-
Ivermectin	-	X	X	-
Levamisole	-	X	X	-
Moxidectin	-	-	X	-
Lasalocid	-	-	-	X
Decoquinate	-	-	-	X

once can create more problems, such as plugging the digestive tract with dead worms. In these cases, it may be preferable to treat with lower doses at frequent intervals. Consult with your veterinarian about the best option for your specific circumstances. As indicated above, most of these treatments will require veterinary prescription.

Some dewormers can be given orally or be injected subcutaneously (under the skin). Generally speaking, injected dewormers intended for treating gastrointestinal parasites take longer to take effect than oral medications and last longer at low concentrations. This long action at low concentrations is considered to induce resistance. However, given your specific circumstances, your animals may respond better to injectable rather than oral dewormers.

Affected animals should be separated from unaffected animals at the time of treatment. Treated animals should be moved into an area that can be easily cleaned and disinfected.

After treating affected animals, wait 3 to 4 weeks and retest to determine the effectiveness of the treatment. Animals that still have high burdens after treatment should be retreated and then retested 3 to 4 weeks later. Animals that still have high burdens after a second treatment are likely to be very susceptible and can act as carriers for parasites, infecting other animals in the

flock. These animals should be culled from the flock to decrease the burden of parasites in the entire flock and to increase the susceptibility of parasites in the flock to dewormers. This action can prevent animals' reinfestation and need for treatment.

Treatment of parasitism should include eliminating risk factors that will contribute to future reinfestation, as well as selecting animals that are resistant to parasite infestation.

How to prevent parasitism?

The best prevention is to reduce your animals' exposure to parasites by providing a clean environment—beginning at birth—and avoiding overcrowding of pens or premises. Balanced nutrition is very important to keep animals healthy and help them develop appropriate resistance to external pathogens, especially for dams before and after lambing/kidding.

Other important preventive actions are to:

- Avoid pasturing in damp areas and during early morning and evening hours, when there is dew on the pasture.
- Rotate pastures to avoid high burdens of parasites.
- Select animals from bloodlines that show low worm burdens.

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