

# Disgusting Tapeworms!

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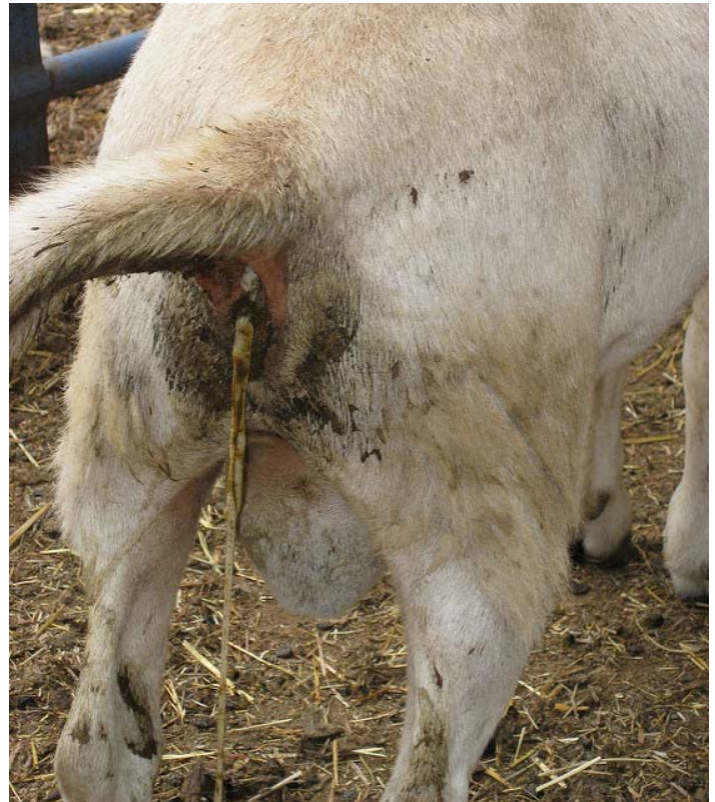
## Tapeworms Biology

The most common tapeworm of sheep and goats is *Moniezia* (pronounced Moe-knee-zee-ya) *expansa*. Adult tapeworms live in the small intestine. They are segmented animals that can be up to about 6 feet in length, which seems enormous, but the whole length of the small intestine of a sheep is about 65 feet long!

At the very front of the worm is the scolex, which has four suckers that are used for attaching to the wall of the intestine. You might think of the scolex as the head, but it does not have an opening for taking in food. Instead, tapeworms absorb nutrients across their whole body surface. Right behind the scolex is the region where new segments are continuously being produced and added to the chain of segments, so that the older a segment is, the further it is from the scolex.

A mature tapeworm consists of hundreds or thousands of segments. Tapeworms are egg machines and segments are really nothing but packages of reproductive organs. Each *Moniezia* segment has two sets of ovaries and testes. By the time a segment reaches the end of the worm it is packed with fertilized eggs. The segment is released from the worm and passes out into the environment. These individual segments are often seen in manure (figure 1). They are wider than they are long, up to about 1/2 inch in width.

Sometimes long strings of segments are passed from an animal, probably because of tapeworm death (their life span is about 3 months) or a process called “destrobilization” that occurs when a tapeworm undergoing stress in the intestine drops most or all of its



Passing a tapeworm

Image by S. Schoenian

segments and then grows new segments. Sudden change in diet has been associated with destrobilization.

***While many internal parasite infections of sheep and goats can only be diagnosed with the use of a microscope, tapeworm infections are all too apparent. Tapeworm segments, either individually or in long chains, can be seen in manure or even emerging from the host animal, and are a familiar sight to most sheep and goat owners.***



### Tapeworm Life Cycle and Diagnosis

A tapeworm egg in the environment can only continue developing if eaten by a free-living pasture mite. Normal pasture contains millions of these microscopic free-living mites. Inside the mite, the tapeworm develops over a period of 1 to 4 months into a form that can infect a sheep or goat. Tapeworm larvae can overwinter in infected mites.

Sheep and goats routinely consume pasture mites while grazing and when a mite with a fully developed larva is eaten, the tapeworm larva will complete its development to the adult stage in the small ruminant small intestine. It takes about six weeks for a mature tapeworm to form and start shedding segments containing eggs. Infection is far more common and apparent in lambs and kids than in adult sheep and goats. Animals develop an immune response to tapeworms that may not completely prevent infection, but will limit the number and size of tapeworms.

Tapeworm infection is usually diagnosed by seeing segments in manure, but individual tapeworm eggs can also be seen on a routine fecal exam. The number of tapeworm eggs seen on a fecal exam does not provide information about how many tapeworms are present because eggs are passed in the segments and are not evenly distributed in manure samples. In fact, tapeworm eggs may not be seen at all in a fecal exam, even when segments were observed in an animal's manure.

### Impacts of Tapeworms

Of course, the important thing about tapeworms for the small ruminant producer is whether they affect animal health. It seems likely that a parasite the size of *Moniezia* would do substantial damage to any sheep or goat it parasitizes by robbing the host of nutrients or causing diarrhea or intestinal blockages. Surprisingly, intestinal blockages caused by tapeworms are normally very rare. Although they are big, tapeworms are not inert objects in the intestine that easily get tangled up in clumps that block the intestine.

But, what about long term effects on growth? There have been a few studies over the years on the effects of tapeworms in sheep, and they do not provide strong evidence that weight gains in lambs are affected by the presence of tapeworms. However, there have been a few studies conducted recently in which treated lambs showed increased weight gain compared to untreated animals.



Tapeworm segments in feces Image by S. Schoenian



Heavy infestation of tapeworms Image by S. Schoenian





So, should sheep and goats be treated for tapeworms? Here are the pros and cons:

**Pros:**

- Some people find tapeworms distasteful (I find that hard to understand, but I'm a parasitologist!)
- There is some evidence that weight gains in lambs are improved by treatment.
- It has been suggested that heavy loads of tapeworms may alter intestinal function enough to create a more favorable environment for other disease causing organisms, although at this time there is no direct evidence to support this theory.

**Cons:**

- There aren't many studies, but the conclusion from the majority is that there is no production benefit from treatment. This means there was no weight gain advantage or reduction in clinical disease (diarrhea, etc.) in treated animals.

- The hypothesis that heavy tapeworm infection may be associated with changes in intestinal function that could predispose sheep and goats to bacterial disease has not been tested in any controlled experiments. Situations that lead to heavy tapeworm infections might also lead to increased rates of clostridial infection without a cause and effect relationship.
- The only approved product in the U.S. for treatment of sheep for tapeworms is albendazole (Valbazen®). This product is also approved for goats as a treatment for liver fluke. There are already high levels of resistance in barber pole worm (*Haemonchus*) to albendazole (and the related drug fenbendazole: Safeguard® and Panacur®). Treatment for tapeworms with Valbazen® increases selection for resistant barber pole worm. The most effective drug for tapeworm treatment (praziquantel), which has no activity against barber pole worm, is not approved for use in small ruminants in the U.S.

Why might there be differences in study results? There could be several factors involved: the first is that drugs vary in their efficacy against tapeworms, so in some of the older studies treatment for tapeworms may not have been effective enough to show a treatment benefit. Differences in tapeworm load or timing of treatment may also have an effect. But perhaps more important is that many factors affecting general animal health can influence how much benefit antiparasitic treatment will have. The results of field research are always strongly influenced by interactions of diet, environment, and other disease problems.

There has also been a suggestion that enterotoxemia (overeating disease) caused by *Clostridium* bacteria may occur more often in animals with heavy tapeworm infection. There have been no experimental studies to support this hypothesis, but researchers found that a common rat tapeworm reduced the muscular activity of the small intestine of infected rats and this change was associated with a change in the species of bacteria in the intestine. Possibly *Moniezia* could have a similar effect in the small ruminant intestine and lead to increased rates of bacterial disease in the presence of other specific nutritional or environmental conditions that haven't been identified.



Whether you decide to treat for tapeworms or not, it is not necessary to treat animals every time you see segments in the manure. If there is a significant effect on sheep and goat health and production it probably requires heavy infection.

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