Tapeworms and Bladderworms

DOMESTIC ruminants in the United States may harbor three species of adult tapeworms and five species of bladderworms, or larval tapeworms.

These larval tapeworms develop to maturity in certain nonruminant hosts, such as dogs and related animals and man.

Adult tapeworms of ruminants are flat, ribbonlike, segmented parasites up to several yards long and three-fourths inch wide. They are attached to the lining of the small intestine by a small head, or scolex, which has four suckers without hooks. The segmented body, or strobila, consists of hundreds of segments, or proglottids.

Two species, *Moniezia expansa* and *M. benedeni*, commonly occur in the small intestines of domestic ruminants and some of the wild ruminants in the United States. Both parasitize cattle, sheep, and goats, but *M. benedeni* is the species usually found in cattle and *M. expansa* is the one usually found in sheep.

Of all the parasites of ruminants, these tapeworms are the best known to farmers because of their large size and because ripe segments can be seen easily in fresh manure. Their mode of transmission was unknown until 1937. Dr. H. W. Stunkard, of New York University, then discovered that small mites, known as oribatid or beetle mites, were the intermediate hosts of *M. expansa*. Parasitologists in the Soviet Union have since determined that *M. benedeni* also is transmitted by oribatid mites.

When microscopic tapeworm eggs, or the segments containing eggs, are voided on pasture with the droppings of infected ruminants, each egg already contains an oncosphere, or small tapeworm larva. Oribatid mites eat the tapeworm eggs with their food. Inside the mite the oncosphere penetrates to the body cavity and develops into the next larval stage, known as a cysticercoid, in about 2 months. Large numbers of oribatid mites live in the humus layer of soil and migrate onto forage plants, especially in the early morning, when the grass is moist with dew.

Ruminants swallow infected mites while grazing on contaminated pastures. In their digestive tracts the cysticercoids escape from the mites.

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The young head of the tapeworm attaches itself to the lining of the small intestine, and from it grows the long strobila. These tapeworms become mature in about 35 days. Thereafter segments and eggs are discharged with the droppings.

The effect of these tapeworms on ruminants is still unsettled. Because of the simplicity of making a diagnosis and the large size of these worms, they have been often held responsible for outbreaks of disease and losses of stock when other parasites, or other disease-producing agents, may have been the causes. Diarrhea, emaciation, convulsions, and death have been ascribed to tapeworm infections in calves, lambs, and kids and to adult animals as well. Convincing proof that these parasites were primarily responsible usually has been lacking.

Investigations with tapeworm infections uncomplicated by other agents of disease have been carried out only with *M. expansa* in lambs. The results showed that this parasite produced at most only minor effects of doubtful significance to the health of the animals involved.

Control of these two tapeworms can be achieved through medication to remove them from their hosts. Spray grade of lead arsenate, administered in doses of one-half gram for lambs and kids, 1 gram for adult sheep and goats, and up to 2 grams for calves and cattle, is safe and effective treatment for removing the worms.

Infected mites may live a year or longer on pasture, and there is no practical method of destroying them over a large area.

Another tapeworm, *Thysanosoma actinioides*, commonly known as the fringed tapeworm because of a fringed rear border of its segments, occurs primarily in range sheep in the Western States. It occurs infrequently in cattle and goats and is not uncommon in various wild ruminants, such as deer, elk, moose, and antelope. It is shorter than the moniezias. It is often found in the main bile ducts of the liver as well as in the small intestine.

A high percentage of western range lambs at slaughter have fringed tapeworms in their livers. It has been estimated that more than 2 million sheep livers, worth more than half a million dollars, are condemned annually by meat inspectors because of this parasite.

Its life history is unknown. An intermediate host is probably involved. Many attempts at direct transmission have been unsuccessful. Perhaps small insects or other small invertebrate animals act as intermediate hosts.

The economic importance of the fringed tapeworm is due primarily to its effect on the bile ducts of the liver, which become enlarged and inflamed and make the liver unfit for human food. Sheep in most instances suffer only slight ill effects from the fringed tapeworm.

Efforts to control the fringed tapeworm must be largely limited to development of treatments for their removal from sheep until the life history of the parasite is known. Several chemicals have been tried, but none has proved to be entirely satisfactory.

The bladderworms that parasitize cattle, sheep, and goats are *Cysticercus bovis*, which occurs in the adult stage (*Taenia saginata*) in man, *Echinococcus granulosus*, *Coenurus cerebralis*, *Cysticercus tenuicollis*, and *Cysticercus ovis*, which occur as adults in dogs and related canines. Ruminants serve therefore as their intermediate hosts.

The bladderworms are larval tapeworms with a small scolex, or head, inverted into a small, membranous, bladderlike sac, or cyst, which contains fluid. The scolex of the larva is similar to (but smaller than) that of the adult.

Sometimes, as with the gid bladderworm (*Coenurus*) and also the hydatid worm (*Echinococcus*), many immature tapeworm heads, or miniature bladderworms, develop within a cyst derived from a single tapeworm egg.

The life histories are much the same. Dogs harbor the adult tapeworms after
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eating the cysts in dead animals left unburied on the range or in offal from cattle or sheep slaughtered on the farm or at unsupervised slaughterhouses, where there is improper disposal of viscera and diseased parts of carcasses. Infection of man occurs through eating the bladderworm in raw or incompletely cooked beef.

After the proper host swallows the bladderworm, the tapeworm head or heads, as the case may be, push out from the bladder, attach to the intestinal lining, and develop to maturity. Adult tapeworms produce large numbers of eggs, which leave the host in the feces.

The ruminant host acquires bladderworms by eating tapeworm eggs eliminated in the feces of dogs or man on pastures or in such places as would otherwise contaminate food and water. Once the eggs are swallowed, larvae hatch from them in the digestive tract. These active organisms then penetrate the intestinal wall and are carried by means of the circulating blood and their own movements to various locations in the body, where development into bladderworms is completed.

The hydatid worm, the gid bladderworm, and the thin-necked bladderworm locate in the internal organs of ruminants.

The hydatid cyst may reach a diameter of 6 inches and is found in sheep, goats, swine, and cattle. It has been reported in deer, moose, caribou, other animals, and man. The parasite locates in or on the liver, lungs, and heart and sometimes in the brain.

The gid bladderworm, Coenurus cerebralis, is found in sheep and goats and rarely in cattle, and is the larval stage of a tapeworm (Multiceps multiceps) of dogs and other canines. Once in the bloodstream, the young parasite may be carried to various parts of the body. Those that reach the brain complete their full development and may attain the size of a hen's egg or larger. The damage due to migration and growth of the parasite in the brain results in muscular incoordination and in a circling, stumbling gait—the animal is "giddy" and the "gid" is said to reflect that condition.

The thin-necked bladderworm, Cysticercus tenuicollis, is the larval stage of a tapeworm of dogs and other canine animals and is known as Taenia hydatigena. It is about an inch in diameter. It is found in the liver or in the body cavity attached to the membranes attached to the internal organs. The parasite migrates within the liver. When invasion is massive, the liver surface has ridges or serpentine markings along the paths taken by the parasites. Sheep are more commonly parasitized than cattle.

Two other species of bladderworms occur in the muscles and are responsible for a condition termed "measles." The larval form, Cysticercus bovis, which precedes the tapeworm, Taenia saginata of man, is found in cattle. These parasites occur as small, spherical or elliptical bladders, one-fifth to three-fifths inch long and one-eighth to one-third of an inch wide. They may occur throughout the muscles of the body, but they are most commonly found in the muscles of the heart, neck, tongue, and diaphragm.

The bladderworm, Cysticercus ovis, is responsible for sheep measles. It is the larval stage of a tapeworm known as Taenia ovis, which occurs in dogs. They occur as small, oval cysts about one-third inch long and one-sixth of an inch wide in locations similar to those of C. bovis.

The effect of bladderworms on the ruminant host depends on the number of parasites and the parts of the body invaded. Destruction of tissues, because of invasion and migration of large numbers of worms, makes the host visibly ill and it may die, but such cases are uncommon.

Mild infection with the various bladderworms produces no appreciable effect on the host, unless the hydatid
worm reaches sufficient size to crowd vital organs or to be ruptured. As a matter of fact, infections of bladderworms usually go undiagnosed, except for the gid parasite, which develops in the brain. Their presence in the brain causes progressive nervous disorder or paralysis, which leads to the death of sheep or their ultimate destruction as unprofitable to the owner.

The significant loss from the bladderworms is encountered when inspectors condemn grossly infected carcasses or parts of carcasses containing parasites as being unfit for food. Such disposition is made because of the appearance of the meat and (in the case of beef measles) because of the danger of transmitting tapeworms to man.

THE CONTROL OF BLADDERWORMS of cattle, sheep, and goats depends largely on measures taken to break the parasites' life cycles.

Refuse from slaughtering, dead animals, and other sources of parasitized meat should be burned, buried, or otherwise made inaccessible to dogs or other canine species.

Farm dogs that might have access to infective meat should be kept free of tapeworms through medicinal treatment by a veterinarian. The remedies most widely used are arcoline hydrobromide, Nemural, Anthelin, and Diaphentane-70. The last three are proprietary. Only the first one mentioned is satisfactory for removing the hydatid tapeworm. All are dangerous in untrained hands. Stray dogs may be kept out of pastures by proper fencing or other measures.

The cysticerus (C. bovis) of the human tapeworm can be kept from cattle by disposal of human feces in such a manner as not to contaminate the food and water.

TAPEWORMS AND BLADDERWORMS in sheep and cattle contribute a share in loss of meat production alone that is conservatively estimated at 667,000 dollars annually. But regardless of whether or not individual species are of major or minor economic importance, it is desirable and good practice to control all such pests.

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For further reading:


