Farm Dog Parasites, Carcass Condemnations

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If you are new to sheep farming, you may not know that some dog parasites can be the cause of carcass condemnation at slaughter.

Sheep farmers spend considerable time managing parasites to minimize their impact on the sheep flock. Equally important for those that use livestock guardian dogs and or stock dogs is management of dog parasites, in particular tapeworms, especially since they can result in carcass condemnations and the subsequent economic loss.

Several dog and wild canid (foxes, coyotes, wolves) tapeworms can infect your sheep, causing cysts in carcasses that result in partial or complete carcass condemnations. In Ontario these include *Taenia hydatigenia, Taenia ovis (*sheep measles)*, and Echinococcus granulosus (*hydatid disease) (1).

Condemnations of partial and whole sheep and lamb carcasses cost the industry. The loss not only includes the value of the whole and partial carcasses and organs condemned, but also the transportation cost to slaughter, the cost of disposal of condemned carcasses, as well as the labour cost of dressing those carcasses.

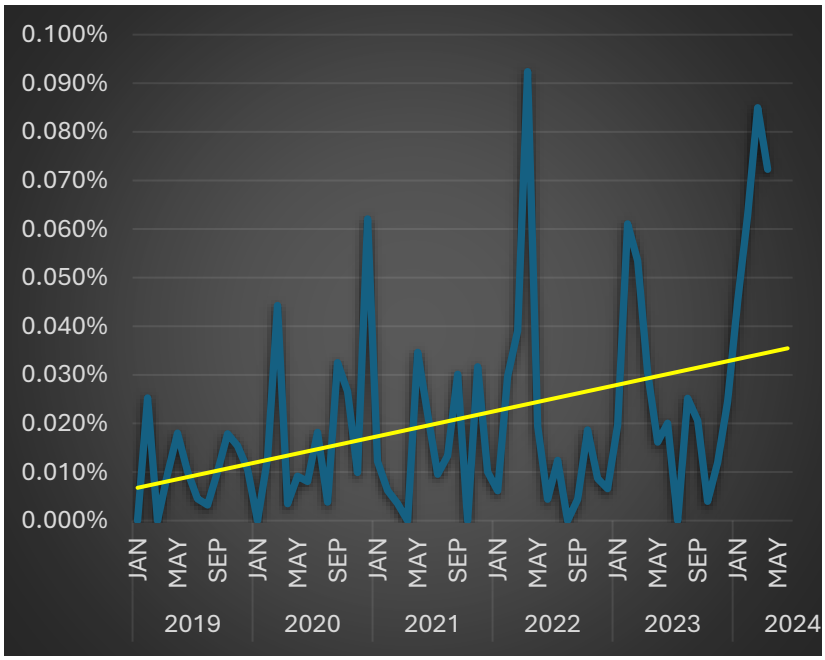


Figure 1. C.ovis carcass condemnations (percent of provincial inspected sheep and lamb slaughter)

Carcass condemnations in provincially inspected plants in Ontario are tracked and reported by Ontario Ministry of Agriculture, Food and Rural Affairs.

Condemnation rates of whole carcasses due to *Cyctycercus ovis* (sheep measles) have been 0.01 to 0.02 percent of total sheep and lamb slaughter during the period of 2019 through 2023.

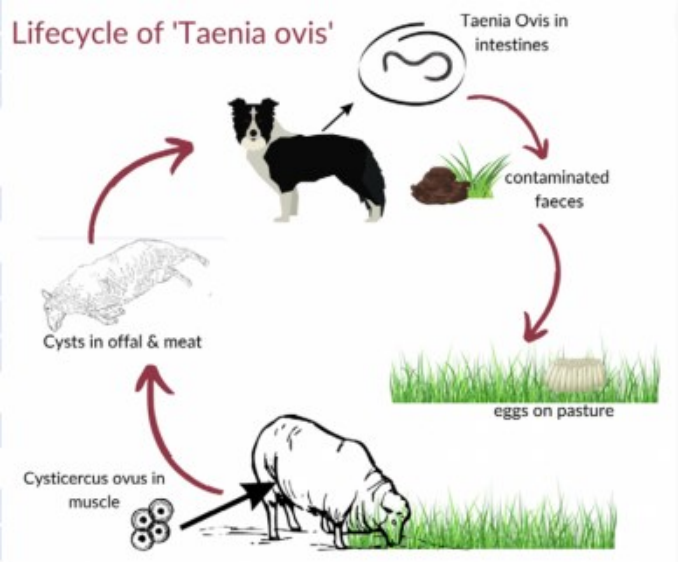
Condemnation rates for *C.ovis* (the larval stage of *Taenia ovis*) appear to be trending upwards in the past several years as shown in Figure 1. Changing this trend requires sheep farmers to vigilantly assess and address risk factors on their farms.

Understanding the life cycle of canid tapeworms helps identify those risk factors for sheep becoming infected and management strategies to minimize those risks.

Tapeworm lifecycle

Tapeworms have indirect life cycles that require their passage through at least one intermediate host (insects, mites, mammals). Sheep are intermediate hosts for some of the canid tapeworms mentioned above while voles and deer mice are the intermediate host for others.

Dogs and other canids become infected when eating meat and organs contaminated with cysts. Once in the dog's gut, the cysts release the young tapeworms, which attach to the gut wall and start producing segments. Within 5 to 8 weeks (prepatent period) the tapeworms mature and start shedding segments, with each segment containing thousands of eggs (2). These segments are excreted in the dog feces and can also be found on its coat especially near the rectum.



Credit: *https://www.torchfarmandequine.co.uk*

Sheep become infected when ingesting pasture, stored feed or water contaminated with eggs or gravid segments of the tapeworm.

Once ingested by sheep, the young larvae hatch out in the gut, go through the intestinal wall, reach the blood stream and migrate to their target tissue, where they encyst. When dogs or other canids eat the tissues containing these cysts, the larval tapeworm completes development to an adult tapeworm in the dog's intestine and the cycle repeats itself. The larval cysts may remain infective for dogs for up to one year.

The tapeworms of primary concern in Ontario where sheep are an intermediate host include (3):

1. *Taenia hydatigenia* a tapeworm parasite of dogs and other canids (coyotes, wolves, foxes, very occasionally cats, etc.). Intermediate hosts include sheep, goats, cattle, deer and other wild ruminants, occasionally horses. Its larval stage (cyst) is known as *Cysticercus tenuicollis*. Target tissue in sheep is primarily the liver (2);
2. *Taenia ovis* another tapeworm parasite of dogs and other canids (coyotes, wolves, foxes, very occasionally cats, etc.). Intermediate hosts include sheep and goats as well as various wild ruminants. *Cysticercus ovis*, also known as sheep measles, is the larval stage of *T. ovis*. These cysts can appear as active clear fluid-filled cysts or degenerated firm nodules with scar/calcified tissue. Usually found in the heart, diaphragm, oesophagus, tongue, head muscles and/or in the carcass muscles. (4);
3. *Echinococcus granulosus (*also known as E. canadensis and hydatid worm*)*. Wildlife intermediate hosts include cervids (moose, elk, caribou, deer). Domestic intermediate hosts include cattle, sheep, goats, pigs, and horses. *E. granulosus* is present throughout Canada

where suitable wildlife hosts (wolves, coyotes, cervids, domestic mammals) exist (1). Target tissue in sheep are primarily the liver and lungs (2).

Managing on-farm risk factors

There is no treatment that will kill or remove cysts in infected sheep. Control efforts, therefore, should focus on minimizing known on-farm risks and regular treatment of all farm dogs for tapeworms being very important. Research investigating the epidemiology and control of *Cysticercus ovis* infection on Canadian sheep farms involving trace-back of 237 carcasses condemned in Ontario, between 2009 and 2011, revealed they originated from 133 farms across Canada. This study found that farm dogs scavenging deadstock and failing to dispose of deadstock properly were significantly associated with condemnations in multivariable analyses (5)

- ***on-farm deadstock management*** needs to prevent scavenging by dogs and wildlife. This becomes especially important if you've had sheep diagnosed with tapeworm cysts. Once the local population of wild canids is infected with these parasites, it will be increasingly difficult to prevent grazing sheep from becoming infected.
- ***how and what we feed our dogs and sheep***. Not feeding farm dogs (and cats) raw, incompletely cooked, or incompletely frozen meat and other tissues from infected intermediate hosts. Meat and organs from livestock and wildlife should always be thoroughly cooked or frozen to prevent transmission. Recommended best practice is to only feed commercial dry dog food or thoroughly cook (to 72˚C core temperature) or deep freeze meat before feeding it to dogs. Australia recommendations are freezing for 21 days. New Zealand recommendations are meat frozen for at least 10 days at meat core temperature of minus 10˚C. Although challenging with grazing flocks, prevent dogs from defecating in sheep feeders and where sheep feed is stored. Where that's not possible, prompt removal and disposal will help reduce the exposure risk.
- ***receiving protocol for new dogs***. All new dogs need to be isolated and treated for tapeworms and held in isolation for at least 3 days.
- ***visiting dogs.*** Confirm with owners that the dogs have been treated with a wormer that is effective against tapeworms. The treatment must have been given between 3 and 30 days before their arrival (6)
- ***infected wild canid and wild ungulate presence on farm***. Once the local population of wild canids is infected with these parasites, it will be increasingly difficult to prevent grazing sheep from becoming infected.

Other tapeworm to be aware of

Although not known to infect sheep, another zoonotic canid tapeworm to be aware of is *Echinococcus multilocularis*. Previously thought to be rare in Ontario*, E. multilocularis* is now considered endemic in Ontario becoming a reportable disease as of January 2018 (7). This due to findings of a research project that evaluated 460 coyotes and foxes carcasses collected from southern Ontario trappers from November 2015 through March 2017. Overall, 24% of coyotes and 21% of foxes tested positive for *E. multilocularis* (8). Wildlife intermediate hosts for *E. multilocularis* include rodents (lemmings, voles, deer mice), while dogs and humans can serve as aberrant intermediate hosts (1).

Dogs that become infected with *Echinococcus granulosus* and *E. multilocularis*, are rarely diagnosed in part because the eggs are indistinguishable from each other and from the eggs of Taenia species (1). Being zoonotic, people can also be aberrant intermediate hosts for both species of *Echinococcus*.

Treatment Strategies for Dogs

The goal of treating farm dogs for tapeworms is to reduce environmental contamination with eggs.

Not all dog wormers are effective against tapeworms.

There are several products approved in Canada for treating tapeworms in dogs and cats. The Ontario Animal Health Network maintains an excellent reference list of anti-parasitics for cats and dogs and the type of parasite they treat. *www.oahn.ca/resources/anti-parasitics-table-for-cats-and-dogs* (10).

Because livestock guardian dogs and stock dogs have free-range while working, they should be considered as high risk for consumption of wildlife - rodents and other small mammals and possibly deer carcasses. Therefore, such animals should be treated regularly (monthly in regions endemic for *E. multilocularis*) with praziquantel, year-round (1). Please note that only some praziquantel products are specifically labeled for treatment of *Echinococcus* spp. (11).

Work with your flock veterinarian to develop a farm-specific treatment strategy for your farm dogs.

Protect yourself

E. granulosus and *E. multilocularis* are zoonotic and can infect humans, although diagnosed disease in Ontario is considered low. Dog owners should practice the following preventative measures (12):

- Wash hands with soap and warm water after handling pets, and before handling food.
- Teach children the importance of washing hands to prevent infection.
- Wash fruits and vegetables prior to eating them.
- Wash hands after handling soil.
- Pick up pet feces promptly and wash your hands thoroughly afterwards.
- Laboratory or veterinary clinic employees handling fecal samples should wear gloves

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