

MENINGEAL WORM

By Kay Orlando, DVM

The meningeal worm, *Parelaphostrongylus tenuis*, is a parasite of the whitetail deer. In the definitive host, whitetail deer, infections are subclinical. In other hosts such as goats, sheep, and llamas neurological signs are produced when an infection occurs. Adult worms in the whitetail deer live in subdural spaces and venous sinuses of the brain. Eggs produced by the worms enter the circulation and are carried to the lungs. Larvae hatched from these eggs migrate up the airways, are swallowed, and then passed in the feces. The larvae are then ingested by slugs or snails where they develop into infective larvae over a period of 3 to 4 weeks. Grazing deer ingest the slug or snail carrying the infective larvae. The larvae then penetrate the intestine and migrate to the spinal cord within 10 days of ingestion. There they mature another 20 to 30 days and then travel to the brain where they reside as thread-like adults in the subdural spaces or venous sinuses.

In an aberrant host such as a goat, the normal life cycle goes awry. When the goat ingests the mollusk, the infective larva emerges and penetrates the intestine and begins migration. But because it is not in the correct host, it does not mature or migrate normally. When the confused larva reaches the spinal cord, the inflammation and tissue destruction it causes produces neurological signs. The most common clinical signs are those involved with this destruction and inflammation of the spinal cord and to some extent the brain. Symptoms of spinal cord lesions include paralysis of one or more limbs, knuckling, toe dragging, abnormal gait, and inability to rise. Since lesions can occur anywhere along the spinal cord, clinical signs are variable. Signs of brain involvement include circling, blindness, and head tilt. Clinical signs can occur as late as 9 weeks after ingestion of the infective larvae.

There are no diagnostic tests for infection with the meningeal worm in goats. Since the parasite does not complete its life cycle, there are no larva found in the feces. There is no current effective therapy for infection. Once the larvae enter the nervous tissue, none of the anthelmintics are effective against them. Ivermectin and febendazole may have value in reducing the migration of the larvae. In areas where the meningeal worm may be a concern, efforts are aimed at control. Pasturing goats in higher well-drained ground reduces the exposure to mollusks. Removing goats from pasture during the wet and cool season will also reduce exposure.

VACCINATING FOR CLOSTRIDIA

By Kay Orlando, DVM

The clostridial group of gram positive bacteria is a nasty group. They are anaerobes – meaning that they live without oxygen. All produce powerful toxins which are frequently fatal. Vaccinating for some or all of them is an important part of a herd health program. The following are some of the clostridial vaccines currently on the market. The herd's location and problems will determine which vaccine is best. Your veterinarian is your best source of information on which vaccine is most appropriate for your herd and the vaccine schedule for your herd.

Tetanus toxoid: This product produces resistance to the toxin produced by *Clostridium tetani* which causes tetanus. It is a common problem in goats and is recommended as a basic vaccine included in a herd health program. Yearly vaccination with tetanus is recommended.

Enterotoxemia type C & D: Another common clostridial problem in goats is enterotoxemia (overeating disease) caused by *Clostridium perfringens Type C or D*. Breeders commonly refer to this vaccine as just "C & D". It too needs to be a part of the basic vaccine program. Goats do not produce as good an antibody titer to this disease as sheep. In problem herds the vaccine may need to be given as often as every 4 to 6 months.

Enterotoxemia combined with tetanus: The vaccine for enterotoxemia can be purchased combined with tetanus.

8-Way vaccine (multivalent vaccine): This vaccine combines the enterotoxemia and tetanus vaccine with those for the organisms that cause blackleg and malignant edema. They include *Clostridium chauveii*, *Clostridium septicum*, *Clostridium novyi Type B*, *Clostridium hemolyticum* (also known as *Cl novyi Type D*). These clostridial infections are uncommon in goats and are much more common in cattle and sheep. They are spore-forming soil organisms that usually gain entrance through grazing low lying, wet pastures or from head butting or fighting among bucks. Since goats are browsers, their eating habits make them less likely to encounter the clostridial spores found in the soil. Goats in areas known to have problems with these disease organisms should be vaccinated every 6 to 12 months.

Because conditions under which goat herds are kept are so diverse across the nation, each breeder must individually decide which clostridial vaccine works best for them. Sterile abscess are common with any of the clostridial vaccines given under the skin. Using a product that is meant for intramuscular injection may help. In herds with problems with overeating disease, using the enterotoxemia vaccine every 6 months with a separate tetanus vaccine every year may be the choice. In areas where cattle or sheep have been reported with malignant edema or blackleg, the multivalent vaccine may be the choice. However, there may be a significantly lower immune response for enterotoxemia C and D in the multivalent vaccine as compared to the enterotoxemia C and D vaccine with or without tetanus. Use the dosage for sheep given on the vaccine. Kids from vaccinated does should be vaccinated at 6 to 8 weeks and boosted in 4 to 6 weeks. Kids from unvaccinated dams should start at 3 to 4 weeks. Unvaccinated adults should be given two vaccines 4 to 6 weeks apart. Boosters are given yearly (or more often if indicated) and 4 weeks before kidding.