Meningeal worm (deer, brain worm)

Parelaphostrongylus tenuis

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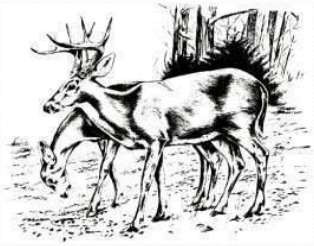


- Parasite of White-tailed Deer - Nonpathogenic
- Small ruminants are an abnormal host (sheep, goat, llama, alpaca)
- Parasite has indirect life cycle – snails and slugs needed for infection

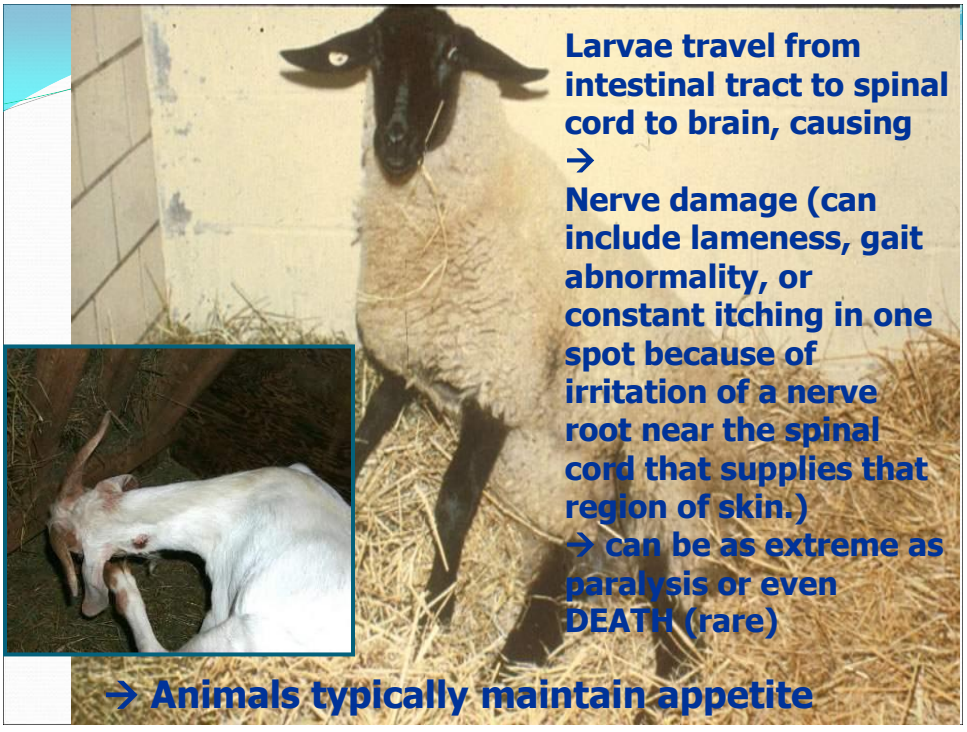
Prevalence of *P. tenuis* in White-tailed Deer

- New York
  - 58% of adults
  - 33% of juveniles
  - ~90% of hunter killed deer around Ithaca
- Few in each deer but very long living

Infection of Aberrant Hosts

- stay longer in spinal cord
- worms active, coil on themselves
- may reinvade cord or brain
- immune response
- usually don't produce eggs to complete life cycle

- Current research – takes a little over 3 months to develop to L3 in snail -> possibly less chance of infection for about 3 months after winter is over
- Sheep or goat does not have to eat snail. The L3 emerge from snail in snail slime trail and can survive on vegetation
- After 9 days of infection can't kill worm in the natural host (deer).
- May take 60 days or more for signs to develop.



Larvae travel from intestinal tract to spinal cord to brain, causing →
Nerve damage (can include lameness, gait abnormality, or constant itching in one spot because of irritation of a nerve root near the spinal cord that supplies that region of skin.)
→ can be as extreme as paralysis or even DEATH (rare)

→ Animals typically maintain appetite

Treatment of *P. tenuis* in aberrant hosts

- no controlled studies in sheep and goats
- Cornell part way through 2nd year of an on-farm study comparing two treatment protocols on naturally infected sheep and goats on 14 farms in Ithaca, NY region
- Infected animals scored on a "neurologic score card" and video taped within the first day or two of treatment and post treatment

Cornell On-farm Experiment

Protocols (for 30 kg [66 lb.] goats or lambs)

8 cc Safeguard or Panacur (10% Fenbendazole) orally for 5 days or 25 mg/kg;

This is 5 times the labeled dosage for a one day treatment (2.5 times the one day dosage generally recommended to treat barber pole worm in goats)

At 50 mg/kg for 5 days it has a 28 day withdrawal goats, 80 day sheep (because no tolerance in sheep) (previously told 10 days for goats at 25 mg/kg)

Cornell On-farm Experiment

Protocols (for 30 kg [66 lb.] goats or lambs) CONT.

3 cc **dexamethasone injectable** 2 mg/mL IM for 3 days, followed by 1½ cc for 2 days (**0.2 mg/kg live weight for first 3 days and 0.1 mg/kg next 2 days**).

However, dexamethasone can induce labor in late pregnancy → Ewes and does in last month of gestation will receive flunixin meglumine (Banamine®) 50 mg/mL at the rate of 1 cc/100 lb. live weight (1.1 mg/kg) orally for 5 days instead.

Cornell On-farm Experiment

Protocols (for 30 kg [66 lb.] goats or lambs) CONT.

1½ cc Ivermectin Placebo SQ for 5 days (Control) or 1½ cc ivermectin 1% injectable SQ for 5 days (Ivermectin); 15 mg per 30 kg live weight or 0.5 mg/kg, 500 µg/kg;

This is 2.5 times the labeled one day dosage (1.25 times the one day dosage normally recommended to treat barber pole worm infections in goats)
This 5 day dosage → 96 day withdrawal both goats and sheep

Theoretically, Ivermectin cannot pass through the blood brain barrier → should not aid in treatment

Current Status

- 24 animals included in the study thus far (12 goats, 12 sheep) 16 showed improvement at end of treatment period. However, several caught early and signs mild enough that it was difficult to evaluate their neurologic signs. 2 worse when evaluated , the remainder still ongoing and will be evaluated in the next few days.
- One goat that was much worse immediately after treatment (no longer able to stand) improved greatly without really much additional treatment - runs with the herd now.
- Three animals excluded because they also showed signs referable to brain diseases such as polioencephalomalacia. Thus, we were unable to determine if their problem was truly deer worm and they were given thiamine as well. Others excluded because they had close by slaughter dates.