Farm Production & Practice

Ministry of Agriculture and Fisheries

The tissue worm, *Elaphostrongylus cervi,* is a parasite found in low numbers of red deer and wapiti on deer farms throughout New Zealand. At present it is not considered of great significance to deer health in this country but its presence could limit the export of live deer to Australia.

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Tissue Worm In Red Deer

Symptoms and Control

Other index entries: *Elaphostrongylus cervi,* wapiti.

Description

The adult *Elaphostrongylus* are slender nematode worms (up to 60 mm in length), usually found coiled on nervous tissue or in the connective tissue between muscle blocks. Tissue adjacent to the worms may have a greenish tinge caused by a host reaction to the presence of the parasite. At these latter sites they are not particularly harmful to deer. When close to or in the brain or spinal cord they can be very harmful.

This parasite has been found only in deer and as yet constitutes no threat to other domestic animals. In Europe and Asia, it is primarily a parasite of the larger species of deer, i.e. red, sika, maral (Altai wapiti) and reindeer. Presumably, *Elaphostrongylus* came into this country with some of the original importations of deer.

A close relative, *Parelaphostrongylus,* is a parasite of North American deer, i.e. white-tailed and mule deer. As far as is known, *Parelaphostrongylus* does not occur in New Zealand.

Distribution

Approximately 50% of wapiti and a proportion of red deer and wapiti-red hybrids captured in and around the wapiti block of Fiordland carry burdens of *Elaphostrongylus.* The parasite is known to complete its life cycle on at least one farm in Western Southland and presumably does so on other farms in this area. A survey of 85 farms in Southland, Otago and South Canterbury conducted during 1980–81 revealed 46% with infected stock. During a survey in 1981 of 108 farms throughout New Zealand *E. cervi* was recovered from 16 farms in the North Island and 22 in the South Island.

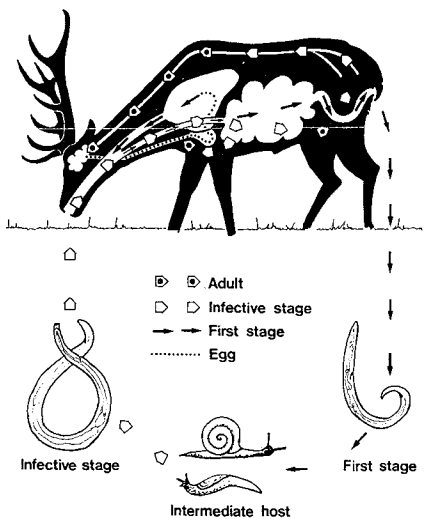

Fig. 1: Life cycle of *Elaphostrongylus cervi.*

Life History

Adult female worms lay eggs which are carried to the deer's lungs in the blood. They hatch into larvae which break into the lungs, are passed up the air passages, swallowed, and are voided by the host deer in the mucus coating on the faeces (fig. 1). The first-stage larvae are tolerant of climatic variations and can survive under natural conditions for over 2 years. Further development does not occur until a larva actively penetrates the foot of a suitable snail or slug intermediate host.

The spread of *Elaphostrongylus* is not likely to be limited by the distribution of suitable snail or slug intermediate hosts. Furthermore, dispersal of larvae on pasture away from faecal droppings may increase infection of slugs in pasture litter. Geographic limitations will be defined by prevalence and intensity of infection in specific mobs or herds on particular farms.

In the intermediate host, worms develop through the second larval stage to the infective third larval stage in 27–50 days, depending on temperature. Infective larvae can survive in snails for up to 2 years and can retain their ability to infect deer for this length of time. A deer becomes infected when it consumes a snail containing infective larvae. The larvae are released from the snail by digestion in the stomach to burrow through the gut wall of their host. They then travel by an unknown route to their final site (connective tissue or nervous system) and develop into adults.

Adult female *Elaphostrongylus* commence laying eggs approximately 80–125 days after the infective larvae have been accidentally consumed.

Adult *Elaphostrongylus* are long-lived in deer and can produce eggs for over 6 years. Red deer housed indoors after being artificially infected continue to shed larvae 3 years later without reinfection.

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Effects of Infestation

Three types of reaction to *Elaphostrongylus* infestation have been described:

- An acute reaction, characterised most commonly by weakness or paralysis of the hind limbs, resulting from the association of worms with the brain or spinal cord. This acute reaction to *Elaphostrongylus* has not yet been shown to occur in New Zealand, but hind limb paralysis commonly attributed to copper deficiency (so-called enzootic ataxia) is seen. This syndrome induced by mineral deficiency has not been well documented in deer and experimental clinical data remain inconclusive.
- A chronic reaction with symptoms of ill thrift has been described in reindeer and attributed to connective tissue infestation with *Elaphostrongylus.*
- A type of pneumonia induced by the migration of larvae through the lungs.

In New Zealand, only lightly infested deer have usually been encountered. Neither the acute reaction nor the ill thrift of the chronic reaction has been seen here but pneumonia due to migrating larvae has been observed. Temporary ataxia and blindness have been observed on occasion in artificially infected animals. Chronic coughing has also been a symptom of infection in these and other animals.

Significance of *Elaphostrongyius*

This parasite was first described in 1931 in Scottish deer but has only been observed in Scotland recently and, presumably, does not constitute a problem. In Asiatic USSR, on the other hand, *Elaphostrongylus* is a major cause of disease in farmed deer. *Elaphostrongylus* infestation of farmed deer in New Zealand must be monitored during the next few years to determine if this parasite is going to become more prevalent and therefore an animal health problem here.

The implications of infestation of deer in New Zealand at present are:

- Exports of live deer to Australia may be restricted.
- Carcasses of infested animals may need trimming at slaughter for aesthetic reasons to remove worms and discoloured tissue.
- Heavily infected carcasses have been condemned during meat inspection at deer slaughter premises.

Immunity and Susceptibility

In the USSR, deer up to 18 months old are more susceptible to infestation than older age groups. Presumably, immunity of some type reduces the susceptibility of the older age groups to infestation. Animals are not immune to reinfection and are susceptible as suckling or mature animals. Infections in animals have been followed for 3 years and it appears that the infection may last for the animal's lifetime.

Diagnosis

An infestation is diagnosed by finding characteristic *Elaphostrongylus* larvae in the faeces, or washings from the lungs, or by finding worms in connective tissue of the body. Worms are rather difficult to find when not in prominent positions.

The presence of *Elaphostrongylus* larvae in faeces indicates that a deer has a worm burden but their absence does not necessarily indicate that an animal is free of infection.

To determine whether an animal has *Elaphostrongylus* when there are no larvae found in its faeces requires knowledge of the history of the farm and/or the animal. If stock brought on to the farm are infested but none of the stock born and raised on the farm become infested, it can be inferred that *Elaphostrongylus* has not completed its life cycle on that farm. Hence, any stock born and raised on that farm are free of infection and any introduced stock that have been on the property for more than 4 months and are not passing larvae in their faeces can be assumed to be free.

However, if stock born and raised on the farm develop an infestation, it can be inferred that *Elaphostrongylus* can complete its life cycle on that farm and hence all stock on the farm can potentially be infected. To confirm that a deer from such a farm is uninfected it would have to be kept for 4 months on a property where *Elaphostrongylus* does not complete its life cycle, then have its faeces checked for larvae.

Treatment and Control

Results from a recent trial suggest that some drenches are not very effective in treating *Elaphostrongylus.* This conclusion was drawn from the presence of infected animals after routine drenching. Limited success was detected after repeated drenching with two of the benzimadazole anthelmintics and a parasiticide. Although first-stage larvae have been shown to be removed from faeces following treatment live adult worms remain. The significance of this finding remains to be evaluated.

It is likely that effective control would require the elimination from pasture of slugs and snails which act as intermediate hosts. Suitable exterminating agents are extremely expensive to apply and their success is dependent on many climatic and environmental factors that may seriously reduce the value of their use.

Further Information

Contact your veterinarian or MAF.

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