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Source: Bulletin of the Wildlife Disease Association, 5(3) : 348-350

Published By: Wildlife Disease Association

URL: <https://doi.org/10.7589/0090-3558-5.3.348>

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THE ROCKY MOUNTAIN ELK AS A RESERVOIR HOST FOR PARASITES OF DOMESTIC ANIMALS IN WESTERN MONTANA

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(Paper No. 983, journal series.)

Introduction

Aside from the value of studying wild-life diseases for evidence of their effects on game species, their potential for infecting domestic animals always remains a possibility. The long-term objective of this study was to determine if elk could serve as a reservoir for parasites of domestic ruminants by acting as a permanent source of mites, ticks and parasitic worms which are transmissible to livestock. The area involved in the study was in general the portion of Montana south and west of the Yellowstone River. This included the region adjoining Yellowstone National Park which is primarily National Forest land and is used as seasonal range by several thousand elk each year.

Our approach has been to compare the prevalence of similar parasites in elk and domestic ruminants within the same geographic area, as an indication of the potential rate of cross transmission which could occur in the area. As sources of information on livestock parasites, inci-

dence and intensity data were compiled from records of the Veterinary Research Laboratory at Montana State University and the Montana Livestock Sanitary Board. Information on elk parasites originated from a series of recent studies* on parasitism in elk from the northern section of Yellowstone Park and adjacent parts of western Montana. To supplement this information, the susceptibility of cattle and sheep to elk lungworms has been tested in cross transmission experiments using infective larvae cultured from captive wild elk.

Of special interest when considering the implications of elk as maintenance hosts for livestock parasites are the seasonal movements of elk herds, and the extensive use of National Forest range-land for summer grazing by domestic livestock. Both factors would contribute to the dispersal of parasites and tend to increase the chances for contact between domestic animals and range areas contaminated by elk or other wildlife.

Results

Lungworms

In order of importance as a parasite of Montana elk, the thread lungworm (*Dictyocaulus* sp.) is probably the most significant. In one series of 298 animals, 35% of the calves and 44% of the adult elk were infected with an average of 47

worms per animal. Comparative rates of infection in cattle in western Montana averaged about 10% in calves and less than 1% in adult cows.⁴ There has been considerable speculation whether cattle and elk lungworms are interchangeable, since there are no clearcut morphological

*Sponsored by Montana State University, The National Park Service, The National Science Foundation and the Montana Fish and Game Department.

differences between the wild and domestic forms. However, experimental evidence has indicated that larvae isolated from elk were essentially noninfective in domestic calves, and suggested that distinct strain differences existed between the elk and cattle isolates.⁵ Attempts to infect sheep with elk lungworm larvae have also yielded similar results. On the basis of these findings, as well as the comparative incidence data cited previously it appears that distinct domestic and wild strains of *Dictyocaulus* exist in this area, and field transmission of this infection from elk to cattle or sheep is unlikely.

Gastrointestinal Nematodes

Stomach and intestinal roundworms formed a minor part of the parasite populations of Montana elk. Incidence data indicated that 10% of the animals or less were infected with the four genera of gastrointestinal nematodes encountered during the study, and individual worm burdens typically were light. By comparison, the medium stomach worm (*Ostertagia* spp.) occurred in a majority of the cattle and sheep examined, and several *Nematodirus* species are considered important parasites of range sheep in this region. Both of these nematodes have been incriminated in serious clinical disease problems in range livestock, but their potential for dissemination by elk appears to be minor. Of the other gastrointestinal nematodes occurring in ruminants in the area, *Capillaria* and *Trichuris* are considered to be of minor importance in both domestic livestock and elk.^{1,7}

Tapeworms

Two genera of tapeworms occurred in elk. The common tapeworm (*Moniezia* sp.) was a sporadic elk parasite, with less than 2% of the animals showing the infection. However, it was more common in cattle in the area, and was a frequent parasite of Montana range lambs. On the other hand, the fringed tapeworm (*Thysanosoma actinioides*) was a common parasite of elk in this region.

Incidence in 181 animals from the northern Yellowstone herd was 41%, with an average infection of 4.3 worms per animal.⁸ In sheep, the infection rate with fringed tapeworms was about one-third of that in elk, and worm burdens were consistently lower. On this basis, it appears that elk could act as a significant reservoir host of *Thysanosoma* in western Montana. However, the relatively low infection rate in sheep may suggest that this is not an effective method of dispersal for this parasite, in spite of the hypothetical possibilities which exist.

External Parasites

Of the four types of external parasites recovered from elk in western Montana, only two have been reported on domestic animals. *Dermacentor albipictus*, the winter tick, was common on elk during the winter and spring months, with the incidence at that time approaching 100% in the northern Yellowstone herd. It has appeared occasionally in cattle and horses, but the heavy infestations seen in elk apparently do not often occur in livestock. The ear tick (*Otobius megnini*) has been reported in isolated instances on cattle in southeastern Montana, and on several occasions on dogs and cats in other parts of the state. However, the first report of the ear tick on elk was in 1968 on two yearling cows from the upper Lamar drainage in Yellowstone Park. This raises the question whether its erratic appearance in cattle and other domestic animals may result from contact with infested wildlife reservoirs which maintain the parasite on a permanent basis.

Occasional elk infestations with psoroptic mites (*Psoroptes equi* var. *cervinae*) have been found in animals from the northern Yellowstone herd. However, no psoroptic scabies has appeared in Montana livestock for a number of years, and the state is considered to be free of this disease in both cattle and sheep.⁹ In addition, Hepworth and Thomas² were unsuccessful in attempts to induce infestations in cattle and sheep with mites taken from elk, and concluded that elk were not likely to transmit scab mites to either of these species.

Discussion and Conclusions

One application of the data has been to indicate the presence of established elk parasites which ultimately may become important in livestock in the region. From the survey findings, it has been possible to make theoretical projections on two infections which occur in wild elk but currently do not have important counterparts in domestic livestock in Montana. The original indication that lungworms were common in the northern Yellowstone elk herd prompted a more thorough analysis of the distribution of lungworms in Montana cattle, with the result that the widespread occurrence of this parasite in Montana cattle was recognized for the first time.⁴

The finding of the ear tick in elk has stimulated a re-examination of the status of this parasite in Montana cattle. The

assumption has been that ear tick infestations found in domestic livestock were limited to imported animals. Now, it may be necessary to reconsider this supposition, in view of the infestations discovered in native elk.

Of the 13 genera of parasites recovered from elk during the survey, only two are confined to elk alone, and 9 of the 13 are known to occur in domestic animals in western Montana. However, comparative rates of infection suggest that lungworms, fringed tapeworms and winter ticks are the only parasites shared by wild and domestic ruminants which are more common in elk than in livestock. Therefore, it appears unlikely that elk presently constitute a significant wild reservoir of livestock parasites in the area involved in this study.

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