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Survey for Meningeal Worm (*Parelaphostrongylus tenuis*) and Ear Mites in White-tailed Deer from Northern Idaho

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ABSTRACT: During the fall hunting season of 1990, 95 white-tailed deer (*Odocoileus virginianus*) heads were collected from hunters in Boundary and Bonner Counties in northern Idaho (USA), an area currently occupied by woodland caribou (*Rangifer tarandus caribou*). The heads were examined for adult and larval meningeal worms (*Parelaphostrongylus tenuis*) by physical examination of the brain surfaces, and the Baermann technique, respectively, and for ear mites by examination of ear scrapings. Meningeal worms or mites were not detected.

Key words: Meningeal worm, brain worm, *Parelaphostrongylus tenuis*, mites, *Psoroptes* sp., white-tailed deer, survey.

The Selkirk herd of caribou (*Rangifer tarandus caribou*) in northern Idaho (USA) is the only free-ranging herd of caribou in the contiguous United States. The entire herd consists of approximately 50 to 60 animals, with animals ranging freely between Idaho and British Columbia (Servheen and Lyon, 1989). Other ungulates that share a significant portion of the caribou range are white-tailed deer (*Odocoileus virginianus*), mule deer (*Odocoileus hemionus hemionus*), elk (*Cervus elaphus*), bighorn sheep (*Ovis canadensis canadensis*), moose (*Alces alces*) and Rocky Mountain goats (*Oreamnos americana*). In 1984 the woodland caribou was listed as an endangered species in Idaho, and in 1985 a caribou recovery plan was approved (U.S. Fish and Wildlife Service, 1985). Because meningeal worm (*Parelaphostrongylus tenuis*) infection is lethal in caribou (Anderson, 1971; Trainer, 1973; Nichols et al., 1986; Bergerud and Mercer, 1989), presence or absence of *P. tenuis* in areas where caribou exist is important in the caribou recovery plan and the survival of caribou in these areas. The objective of this study was to determine the prevalence

of *P. tenuis* in white-tailed deer heads from an area of northern Idaho that has a resident caribou population. White-tailed deer are the normal definitive host in which adult *P. tenuis* develop and produce eggs and larvae on the surface of the brain (Anderson, 1963; Anderson and Prestwood, 1981). A second objective was to determine the prevalence and species of ear mites in the same deer.

Between 2 and 23 November 1990, 95 heads of white-tailed deer were collected from hunters at Idaho Department of Fish and Game check stations in Bonner ($n = 57$) and Boundary ($n = 38$) Counties in northern Idaho (48°00' to 49°00'N, 116°00' to 117°00'W), the two northernmost counties adjacent to Canada where caribou exist. Approximately 25% were fawns and 75% were older deer. Sexes were not recorded, but approximately 60% were females and 40% were males. Deer heads were frozen and later sent to Washington State University (Pullman, Washington 99164, USA) for examination. Heads were thawed at room temperature (20 C) and then cut longitudinally in half with a band saw. In the cutting process, the dorsal sagittal and intercavernous sinuses were opened. The halves of the brain were removed from the skull and examined grossly for nematodes or discoloration caused by *P. tenuis*. One half of the brain was placed in warm water (approximately 40 C) in a glass Baermann funnel for approximately 14 hr. Sediment was withdrawn and examined for larvae with a light microscope (100×).

Because the heads were available, we also examined the ears for mites with emphasis on *Psoroptes* sp. Cotton-tipped swabs were inserted into the ear canals and

roughly twirled, and then used in a scraping motion to remove surface material from the ears. Swabs were placed in individual glass vials and later examined with a dissecting microscope (40×).

Nematodes were not detected on the brains, brain discoloration was not observed, larvae were not detected from brain sediments, and mites were not recovered from the ears of any deer.

The known geographic distribution of indigenous *P. tenuis* infection does not include most of western North America, and excludes northern Idaho and British Columbia (Anderson and Prestwood, 1981), indicating that caribou mortality due to *P. tenuis* infection is unlikely. Our survey in Idaho supports the fact that *P. tenuis* is probably not in this region at present. Previous parasite surveys based on fecal analysis from caribou in this herd in 1990 revealed dorsal-spined larvae essentially indistinguishable from *P. tenuis* in 31% of 36 fecal samples (W. J. Foreyt, unpubl. data). Live larvae were recovered from feces with the Baermann apparatus, placed on slides, and inactivated with heat at approximately 65 C for 2 or 3 seconds. Inactive larvae were measured with a Bioquant Digitizing Morphometry Software/Hardware system (R&M Biometrics, 561 Ohio Avenue, Nashville, Tennessee 37209, USA), interfaced with an IBM XT computer. Mean length of 59 larvae from those fecal samples was $445.5 \pm 25.9 \mu\text{m}$, which is longer than most genera of protostrongylid nematodes including known species of *Parelaphostrongylus* (see reviews by Pybus and Shave, 1984; Gray et al., 1985). The larvae were considerably longer than the mean lengths of 358 to 423 μm for first stage larvae of *Parelaphostrongylus andersoni* recovered from 56% of the caribou examined in different populations in central and northeastern Canada (Lankester and Hauta, 1989), and were compatible with first stage larvae ($451 \pm 17 \mu\text{m}$) of an unknown protostrongylid species of caribou in northeastern Alberta (Gray and Samuel, 1986). Postmortem evaluations of

five caribou from the Selkirk herd between 1987 and 1990 have not revealed adult *P. tenuis* on the brains, or other adult protostrongylid nematodes which would aid in identifying the unknown larvae (W. J. Foreyt, unpubl. data). The significance of the parasites that pass dorsal-spined larvae in feces of caribou in this herd is unknown.

We also were interested in examining the deer heads for mites, primarily *Psoroptes* sp., because these mites have been reported in sympatric free-ranging mule deer and bighorn sheep (Boyce et al., 1990), as well as in captive mule deer and white-tailed deer that shared the same pasture with scabies infected bighorn sheep (W. J. Foreyt, unpubl. data). Mites were not detected in these deer and may indicate that psoroptic mange is not present or prevalent currently in sympatric ungulates in this area.

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