SARCOCYSTIS IN CARIBOU (*RANGIFER TARANDUS TERRAENORAE*) IN NEWFOUNDLAND

RA Khan and D Fong

Department of Biology and Ocean Sciences Centre, Memorial University of Newfoundland, St John's, Newfoundland, Canada A1C 5S7 and Newfoundland Wildlife Division, Clarenville, Newfoundland, Canada.

Abstract. Prevalence of species of *Sarcocystis* in muscle of 36 caribou, *Rangifer tarandus terraenorae*, shot in Newfoundland, Canada, was 53%. A greater percentage of infected animals were obtained from the central part of the island. The highest concentration of microscopic sarcocysts, 1/mm^2 of tissue, was observed in a 5–year old animal. Although widely distributed throughout the body, cysts were more prevalent in the tongue and diaphragm. The potential of *Sarcocystis* in caribou as a food-borne disease organism in man cannot be overlooked in view of its prevalence in meat and its widespread consumption, when lightly cooked, in rural Newfoundland.

INTRODUCTION

Infection with species of *Sarcocystis* has been reported previously in big game mammals (Cawthorn 1989) including caribou, *Rangifer tarandus*, from Alaska (Neiland, 1981). Six new species were described from reindeer in Norway (Gjerde, 1984a,b). *Sarcocystis* species are known to cause mortality in domestic animals and morbidity in man (Dubey *et al*, 1989). Caribou (*R. tarandus terraenorae*) are hunted in Newfoundland for meat and the presence of sarcocysts in a 5–year old animal raised the possibility that the infection might pose a potential hazard to human health. The present study was conducted to ascertain the prevalence, intensity and significance of *Sarcocystis* species in caribou shot and consumed in Newfoundland.

MATERIALS AND METHODS

Samples of muscle were collected from two herds of caribou located in the eastern and central areas of the province. Samples were taken from tongue, diaphragm, esophagus, masseter, sternum and hind leg and fixed in either 10% buffered formalin or Bouin's fluid. These were subsequently processed by conventional histological methods and sections, cut 7 µm in thickness, stained with hematoxylin and eosin. The number of cysts/mm^2 of tissue was estimated and compared between samples.

RESULTS

The microscopic sarcocysts were generally small, and sac-like with mean dimensions of 466 ± 72 × 130 ± 27 µm. The cyst wall was thin measuring 8.0 ± 2.1 µm in thickness and villar protrusions 7.4 ± 0.6 × 0.05 µm. Based on these dimensions, this species appears similar to *S. grüneri* Yakimoff and Sokoloff, 1934 described from reindeer in the USSR. In the absence of transmission electron microscopy to ascertain more information on the villar protrusions, this identification is considered tentative.

Prevalence of sarcocysts in caribou was 53% of 36 animals examined, including three yearlings that were not infected. More infected animals (58% of 26) were observed from the central than in the eastern (40% of 10) herd. Intensity of the sarcocysts was up to 1/mm^2 of tissue in a 5–year old animal whereas it was somewhat lower in the others. Cysts occurred more often in the tongue (75%) and diaphragm (75%) than in other areas of the body. No differences in sex were observed.

DISCUSSION

The prevalence of sarcocysts in the muscle of caribou in Newfoundland (53%) was considerably lower than that reported in Alaska, where 95% of 120 animals were infected

(Neiland, 1981). Since there are more predators in species and numbers in Alaska, it is not surprising that the prevalence of sarcocystis in caribou is greater than in Newfoundland. In Scandinavia, the infection was reported in reindeer from Spitzbergen and Norway (Gjerde, 1984a). Since the life cycle of all species of *Sarcocystis* is heteroxenous, alternating between prey and predator hosts, it is likely that the latter host is the red fox, *Vulpes vulpes*, since it is the most common carnivorous scavenger on the range (barren ground) used by caribou. Although the major predator of caribou is black bear, *Ursus americanus*, it is unlikely that this omnivore can serve as a definitive host. Additionally, sarcocysts have been reported in bears (Ursidae) including the black bear, from Alaska (Neiland, 1981).

The presence in Newfoundland caribou of sarcocysts which appear similar to *S. grüneri* described from European reindeer is interesting in view of the fact that the latter were introduced into the island in 1908 (Lankester and Fond, 1989). The introduced herd was taken to central Newfoundland where most died. The presence of the red fox, one of the definitive hosts of *S. grüneri*, could conceivably have perpetuated the infection in Newfoundland if the parasite was introduced. At least one parasite, *Elaphostrongylus cervi* is believed to have been introduced into Newfoundland by European reindeer (Lankester and Fong, 1989). On the other hand, the *S. grüneri*-like parasite could have been present in the native caribou which originated from Labrador following glaciation. Moreover, there are unconfirmed reports of sarcocysts in caribou from Labrador. Evidently, further studies are required to determine speciation and origin of sarcocysts infecting caribou in Newfoundland.

Approximately 2,000 caribou are shot each year in Newfoundland and the meat might represent, especially in rural areas, a major source of protein. Some species of *Sarcocystis* of both domestic and wild ungulates are known to cause diarrhea in man and the infection can be more pronounced in AIDS patients (Dubey *et al*, 1989). The potential of infected caribou meat being consumed and causing disease cannot be overlooked especially when cooked improperly.

Thorough cooking and freezing of infected meat are effective control methods (Saleque *et al*, 1990).

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