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and 35 days respectively after the first evidence of infection.

Adult *A. americanum*, when fed as nymphs on an infected deer, are capable of transmitting *Theileria* infection to susceptible deer. The incubation time after allowing the ticks to feed on the susceptible deer was probably 14 days, however this cannot be concluded without considering the possibility that some

ticks may have attached following the first release. The incubation time then would have been 21 days.

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JOHNE'S DISEASE IN A MOOSE (*Alces alces*)

In the last half century Johne's disease has been reported in most ruminants and also in some non-ruminants, such as horses and pigs, in which *Mycobacterium paratuberculosis* was observed in the alimentary canal, without signs of the disease.

A survey of Johne's disease in captive wild animals was published by Katic (1961, Nord. Vet. Med. 13: 205). Johne's disease has not been reported in moose, therefore we present this clinical communication on a captive moose from the Ontario Zoological Park.

Case Report

A female moose calf, only a few days old when presented to the zoo in June, 1965, was raised by bottle feeding. In December of 1966, the animal started to lose weight and developed intermittent diarrhea. Although there was transient improvement after treatment by a local veterinary practitioner, the animal did not show signs of recovery and did not thrive.

In March, 1967, a sample of feces was sent to us for bacteriological examination. As microscopical examination of feces revealed acid-fast organisms not unlike *M. paratuberculosis*, arrangements were made to collect blood from the animal and to examine the serum for complement-fixing antibodies against *M. paratuberculosis*. The test, performed by the Animal Diseases Research Institute at Hull, Quebec, was reported as positive. On the basis of microscopical

and serological findings, a diagnosis of Johne's disease was made.

The moose, by this time in a weakened state, was brought to the Ontario Veterinary College for observation; however, it died four days after arrival.

On postmortem examination, the animal was found to be extremely emaciated and to have extensive edema in the subcutaneous and subserous tissues. The small and large intestines appeared relatively normal. Mesenteric lymph nodes were swollen and edematous but microscopic examination of fixed tissues did not reveal acid-fast organisms. Histologically, the mucosa of the ileum contained a large accumulation of epithelioid cells, lymphocytes and plasma cells, but no acid-fast organisms were seen. However, acid-fast organisms were seen in impression smears made postmortem from lymph nodes and intestinal contents.

Discussion

It is interesting to note that the clinical and postmortem picture of Johne's disease in wild animals usually resembles the disease in sheep rather than cattle. The main clinical sign in sheep and wild ruminants is prolonged unthriftiness leading eventually to emaciation. Scouring is rarely observed in sheep and wild animals. The diagnosis of Johne's disease in sheep in New Zealand and Australia is based on demonstration of acid-fast bacteria in fecal smears and positive results to the complement-fixation test (Armstrong, 1956,

New Zealand Vet. J. 4: 56). According to Chandler (1956, Vet. Rec. 68: 819), the complement-fixation test was at least 80 percent effective in detecting positive cases in clinically suspicious sheep. The Johnin skin test has little value in the diagnosis of Johne's disease in sheep.

The postmortem findings in sheep and wild animals dying of Johne's disease is variable, but thickening of the bowel, characteristic for cattle, seldom occurs.

Our observations were similar to those of Bourgeois (1944, Schweitz. Arch. Tierheilk 86: 115) who described Johne's disease in a female Japanese deer (*Pseudaxis sika*) in a Swiss zoo.

M. paratuberculosis infection is generally the result of exposure to sub-clinically or clinically infected animals. Spread occurs by infective feces contaminating pastures and drinking water. It has also been shown that lambs and calves may be infected *in utero*. This

could have occurred in the case described here. After infection, which usually occurs in young animals, the incubation period is very long, so that signs of disease do not appear for many months or even years. Whether infected animals develop clinical signs depends upon the presence of one or more contributing factors such as poor nutrition, parasitic infestations, mineral deficiencies and possibly other factors.

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ACCIDENTAL CHOKE IN WHITE-TAILED DEER

Esophageal obstruction by apples, potatoes, beets or turnips, commonly occurs in domestic ruminants. Two cases of esophageal obstruction (choke) have been observed in free-ranging deer (*Odocoileus virginianus*):

Case #1: On the morning of September 14, 1960, a 190 lb. mature, 8 point buck deer was found dead in the vicinity of an abandoned apple orchard. The carcass was still warm. Although the mouth was wide open and tongue protruded, the cause of death was not apparent until at necropsy, an apple was found firmly lodged in the upper end of the esophagus. On the basis of tooth wear, the age of the deer was estimated approximately 12 years. Both central incisors were missing and the lateral incisors were worn to the gum line.

Case #2: A yearling male deer, found

near an abandoned orchard on August 13, 1966, was estimated to have been dead at least a month. Although post-mortem change was far advanced, the cause of death was evident. A small green apple was found in the esophagus. This deer had 3 inch-long spike antlers, in the stage of "velvet".

COMMENT

Lost and worn teeth may have predisposed to esophageal obstruction in case #1; youth and inexperience may have been a factor in Case #2. Whether or not there were predisposing causes, it is apparent that esophageal obstruction should be considered among the probable causes of death when deer are found dead in the vicinity of apple orchards.

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