

## **TICK TRANSMISSION OF THEILERIASIS IN A WHITE-TAILED DEER 1**

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#### TICK TRANSMISSION OF THEILERIASIS IN A WHITE-TAILED DEER<sup>1</sup>

Theileriasis, a hemolytic disease of white-tailed deer (*Odocoileus virginianus*), was found in 57% of hunter killed deer in East and Central Texas. Mortality resulting from this disease is low providing nutritional levels are adequate, but the disease is thought to play a part in periodic die-offs of deer (Robinson *et al.*, 1967. J. Wildl. Mgmt., 31(3): 455-459).

The transmission of *Theileria* sp. in nature has been assumed to be due to ticks or other blood sucking arthropods. Neitz (1956, Ond. J. of Vet. Res. 27: 116) lists six species of *Rhipicephalus* and seven species of *Hyalomma* as vectors of *Theileria parva* and *T. annulata*. In most instances, transmission occurs from larva to nymph to adult rather than transovarially.

The high incidence of theileriasis in Texas deer appears to occur in those areas where *Amblyomma americanum* (Lone Star Tick) is the most abundant tick found on deer. An attempt was made to transmit *Theileria* by feeding *A. americanum* nymphs on an infected deer and then, as adults, on a non-infected deer.

Both the infected and non-infected deer were mature animals. Samples of blood were taken twice weekly for over 6 months prior to these experiments. Both animals had been splenectomized. A *Theileria* parasitemia ranged from 1 to 20% in the infected animal, whereas no *Theileria* infection could be found in the non-infected deer for a period of 5 months prior to use.

First-stage *A. americanum* larvae from eggs laid by an engorged female collected from a steer were fed on chickens, collected and allowed to molt to the

nymphal stage. Seventy nymphs were released in an ear bag attached to the infected deer. At the time of nymph release, the carrier deer had a 10% *Theileria* parasitemia and a packed cell volume (PCV) of 20%. Four days after application, 30 engorged nymphs were collected and allowed to molt.

A muslin ear bag was fitted over the ear and tied to the animal. Before securing the bag to the deer, the deer's head was shaved and a stoppered plastic vial containing the ticks was inserted into the bag. After securing the bag base with adhesive tape, the stopper was removed manually, thus releasing the ticks within the enclosure of the ear bag. An oral tranquilizer (Tranimum, an experimental drug supplied by Hoffman LaRoche Company, Nutley, New Jersey) was administered to the experimental deer at the time the ear bag was secured. Although ear bags were used successfully in non-tranquilized deer, some degree of tranquilization or sedation was helpful in keeping the animals quiet and prolonging the time the deer would allow the bag to remain in place.

Sixty days after the engorged nymphs were collected, 15 adults from the previously described feeding were released in the region of the head and neck of a non-infected deer. Four days later, no attached ticks could be found. A second group of 10 adult ticks from the same initial feeding then were released in an ear bag on the same non-infected deer, 7 days after the first release. Ten days after this second release, 6 ticks were attached and partially engorged. Fourteen days after the second time ticks were released, *Theileria* were found in a stained blood film from the exposed deer. A high *Theileria* parasitemia of 34% and a low PCV of 18% developed 32

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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,