White-Tailed Deer as Hosts of Cattle Fever-Ticks*

Authors: KISTNER, THEODORE P., and HAYES, FRANK A.

Source: Journal of Wildlife Diseases, 6(4) : 437-440

Published By: Wildlife Disease Association

URL: https://doi.org/10.7589/0090-3558-6.4.437

White-Tailed Deer as Hosts of Cattle Fever-Ticks*

THEODORE P. KISTNER and FRANK A. HAYES
Southeastern Cooperative Wildlife Disease Study
Department of Pathology and Parasitology
College of Veterinary Medicine
University of Georgia
Athens, Georgia

Abstract

A penned study for obtaining definitive information on the status of white-tailed deer *(Odocoileus virginianus)* as a host for cattle fever-ticks *(Boophilus microplus)* was conducted on St. Croix of the U.S. Virgin Islands. Four generations of fever-ticks were propagated on one deer during a six month period.

Nine wild white-tailed deer also were collected from four insular estates to evaluate the carrier status of these animals on an island where cattle fever-ticks are indigenous. Two deer were infested with *B. microplus* where contact with domestic livestock had not occurred for 20 years; five deer were free of *B. microplus* where a vigorous cattle dipping program had been practiced for three years; and, two deer were infested with *B. microplus* where contact with fever-tick infested cattle occurred at irregular intervals.

It was concluded that white-tailed deer constitute a host species for *B. microplus* and must be considered in future fever tick eradication endeavors. This study also suggested that, through routine dipping of cattle, fever ticks may be eradicated from an area where cattle and deer cohabit the same premises.

During fever tick eradication efforts in Florida, Puerto Rico, and the U.S. Virgin Islands, wild deer infested with *B. microplus* were encountered. Since all stages of this tick were recovered from deer, it was assumed that fever-ticks could negotiate repeated life cycles on these animals.[1] Fever tick eradication therefore was considered impossible as long as wild deer remained within an area.[2,4] In the absence of suitable alternatives for dealing with this situation, widescale reduction of deer was considered necessary for achieving tick eradication.[4]

Proceeding under these guidelines, deer were killed and domestic livestock dipped in accordance with U.S. Department of Agriculture regulations. In Florida alone, an estimated 20,000 deer were killed before fever tick eradication was completed in 1945.[1] Adherence to a similar plan led to successful eradication of fever-ticks in

*This study was supported by an appropriation from the Congress of the United States, with funds administered and research coordinated under the Federal Aid in Wildlife Restoration Act (50 Stat. 917) and through Contract No. 14-16-0008-674, Bureau of Sport Fisheries and Wildlife, U.S. Department of the Interior.

Puerto Rico, but the plan failed in the U.S. Virgin Islands. In the latter regard, it was a consensus that wild deer prevented successful fever tick eradication.[1]

Despite repeated involvement of white-tailed deer during past cattle fever tick eradication programs, it was not until 1966 that Park *et al.*[3] offered proof that *B. microplus* could undergo repeated life cycles on penned deer. These investigators found that fever-ticks were self-perpetuating on deer for 327 days, which was the duration of the experiment. The present study was undertaken to replicate the observations reported by Park *et al.*,[1] and to investigate the tick infestation status of wild deer under varying climatic conditions where different degrees of contact occurred with domestic livestock.

Materials and Methods

This study was conducted on St. Croix of the U.S. Virgin Islands. Although this island comprises only 80 square miles, the eastern portion is arid (20 inches annual rainfall), whereas the western portion receives high (80 inches) annual rainfall.

For the penned phase of this investigation, a 107' X 216' deerproof pen was constructed in the semi-arid region where the annual rainfall averaged 28-32 inches. A doe fawn was obtained, hand-reared, and placed in the pen on May 26, 1966. Repeated observations indicated that both the doe and pen remained free of fever-ticks for approximately five months.

On October 31, 1966, a wild fever-tick infested buck was captured and introduced into the pen. Two replete ticks were known to have dropped from the buck within the pen on November 15, 1966. The buck died from trauma on November 21, 1966, and ticks were collected from the carcass. A natural infestation of the deer pen therefore was established. During the following six months, the doe was examined weekly and drags were conducted within the pen at irregular intervals to assess the level of fever-tick infestation.

For studying the carrier status of wild deer, nine deer were shot and examined from four insular estates. Specific estates were selected within the low, medium, and high rainfall portions of the island. In addition to the criterion of climate, collection sites were chosen where varying degrees of contact occurred between wild deer and domestic livestock. These areas are described as follows:

(1) Eastern (Arid) Portion of Island

Jack Bay — Annual rainfall was approximately 20 inches. As far as could be determined, there had not been contact between the resident wild deer and domestic or feral cattle, sheep, goats, horses, mules, or asses for 20 years.

(2) Southeastern (Semi-Arid) Portion of Island

Lappy Valley of Cane Garden Farms — Annual rainfall was approximately 35 inches. Wild deer mingled freely with cattle. Cattle were dipped every two weeks in a tickcide. The dipping program was active and had been in effect for three years.

(3) Western (High Rainfall) Portion of Island

Annual rainfall was approximately 65 inches. Collection sites were located one and one-half miles apart.

(a) *Estate Orange Grove* — Fever-tick infested cattle were removed from this estate in October, 1966. Resident wild deer mingled freely with cattle on an adjacent estate where dipping of cattle was conducted at irregular intervals.

(b) *Estate Little La Grange* — Moderate wild deer populations were noted on this estate with no resident livestock. Fever-tick infested cattle from an estate located one mile away periodically invaded these premises.

Results

Within the penned study area, fever-ticks were first noted on the doe December 30, 1966, and on January 6, 1967, replete ticks were recovered. Although only the doe deer remained within the pen, a rapid increase in fever-ticks was demonstrated by weekly observations of the animal and by drag procedures. Four generations of ticks were perpetuated within the pen between November 15, 1966, and June 15, 1967.

The number of wild deer shot on each of the four insular estates and the results of examination of these animals for ticks are as follows:

(1) *Jack Bay* — Two six-month old deer collected during May, 1967, were moderately infested with *B. microplus.*

(2) *Lappy Valley of Cane Garden Farms* — Five adult deer collected during April and May, 1967, were tick free.

(3) Within the western or high rainfall area, one wild deer was collected from each estate.

(a) *Estate Orange Grove* — An adult buck deer collected during early June, 1967, was heavily infested with *B. microplus.*

(b) *Estate Little La Grange* — A six-month old deer collected during early June, 1967, was moderately infested with *B. microplus* and *Dermacentor nitens.*

Discussion and Conclusions

The findings of Park *et al.*[3] were corroborated by the results of this study. The rapid increase in fever-tick numbers even necessitated control measures, which involved periodic application of a tickcide to the doe. Tick populations thereby were maintained at moderate levels throughout the study. Weekly observations also revealed that each tick generation required approximately six weeks for completion of the life cycle. These observations closely paralleled those of Tate[6] in 1941, whereas the minimal period for completion of the life cycle of *B. microplus* on cattle in Puerto Rico was 41 days. Findings from this phase of the study therefore are strongly suggestive that deer blood is comparable to cattle blood for propagation of *B. microplus.*

The fact that the two deer collected from Jack Bay were tick infested is of considerable significance in that fever-ticks apparently had been maintained in this isolated area for 20 years without the presence of cattle or other livestock. Considerable effort was expended to determine if deer in this area traveled westwardly where they could have contacted tick infested cattle. There was no evidence that this had occurred. These observations therefore offer additional evidence that deer are a host species of *B. microplus.*

A total absence of fever-ticks on five deer randomly collected from Lappy Valley of Cane Garden Farms appeared to be integrally related to the close proximity of deer and cattle, where a vigorously active cattle dipping program was practiced. In 1941, Travis[6] noted the conspicuous absence of fever-ticks on wild deer that mingled freely with regularly dipped cattle.

The single buck deer collected from Estate Orange Grove represented the heaviest fever-tick infestation encountered, and it was speculated that two factors were responsible for this finding. First, cattle had been removed from Estate Orange Grove several months prior to the collection date, whereas only deer remained to concentrate fever-ticks. Second, the high rainfall and dense vegetation in this portion of the island created optimum conditions for survival of the non-parasitic stages of *B. microplus.*

Although deer on Estate Little La Grange were not in close proximity to livestock, the periodic invasion of these premises by relatively non-dipped cattle undoubtedly served as a source of ticks. Examination of the single fawn was further suggestive that deer are capable of perpetuating infestations of *B. microplus.*

From these studies, it was concluded that *O. virginianus* constitutes a host species for *B. microplus* and must be considered in fever tick eradication efforts. Collection of five fever-tick free deer in close association with regularly dipped cattle suggests however, that additional research should be conducted to determine if deer annihilation is a necessary prerequisite for successful fever tick eradication.

Acknowledgments

For tick identifications, appreciation is expressed to Mr. R. R. Gerrish and Dr. R. K. Strickland, ADE Regulatory Laboratories, Technical Services, Ectoparasite Unit, Agricultural Research Center (ARS, USDA), Beltsville, Maryland.

Literature Cited

1. HOURRIGAN, J. L. 1964. Cattle fever tick eradication. A review of Animal Health Division, ARS, USDA files in San Juan, Puerto Rico and Hyattsville, Maryland. Unpublished data.
2. KNAPP, J. V. 1940. Existence of tropical variety of cattle fever tick *(Boophilus annulatus* var. *australis)* complicates tick eradication in Florida. J.A.V.M.A. 96: 607-608.
3. PARK, R. L., O. SKOV, G. A. SEAMAN, and R. M. BOND. 1966. Deer and cattle fever ticks. J. Wildl. Mgmt. 30: 202.
4. SHILLINGER, J. E. 1938. Deer in relation to fever tick eradication in Florida. Trans. N. Amer. Wildl. Conf. 3: 882-885.
5. TATE, H. D. 1941. The biology of the tropical cattle tick and other species of ticks in Puerto Rico, with notes on the effects on ticks of arsenical dips. J. Agric. Univ. of Puerto Rico. 25: 24 pp.
6. TRAVIS, B. V. 1941. Examinations of wild animals for the cattle tick, *Boophilus annulatus microplus* (Canestrini) in Florida. J. Parasitol. 27: 465-467.