

FOREST GAME SESSION

A PRELIMINARY SURVEY OF THE INCIDENCE OF BRUCELLOSIS AND LEPTOSPIROSIS AMONG WHITE-TAILED DEER (*Odocoileus virginianus*) OF THE SOUTHEAST *

By EMMETT B. SHOTTS, M.S.; WILLIAM E. GREER, D.V.M.;
FRANK A. HAYES, D.V.M.
Athens, Georgia

In many ways the expansion of the domestic livestock industry of the southeastern United States is being paralleled by similar emphasis on conservation and game management. Since game animals are produced on lands used primarily for other purposes, and more than 85 percent of the potential hunting land today is in private ownership or control, the farmers and ranchers hold the key to successful wildlife production in the years ahead.¹

The propagation of fish and game is something which the private landowner can accept or reject. By his decision, he can effectively aid or hinder the increase of wildlife that sustains itself on the water and plants of his farm or ranch. Because the farmer or rancher must first look at his land for a livelihood, his land-use decisions may occasionally be adverse to wildlife increase. Because the conservation enthusiasts are primarily interested in maximum wildlife production, these two interests sometimes clash. For the preservation of this part of the nation's natural heritage, an effective understanding and cooperative arrangement must be maintained between the two groups.¹

To afford a mutual participation between the factions involved, the continued efforts of many individuals and organizations are going to be essential. For the most part, the farmer and rancher are sports-minded individuals themselves and are usually pleased to cooperate with any reasonable program for the promotion of wildlife. This interest exists, so long as it does not seriously encroach upon or jeopardize a business or means of livelihood. Subsequently, the wildlife profession can expect to receive an increasing number of questions pertaining to animal diseases. The livestock producer is rightly interested in any disease which can be transmitted between wild and domestic animals, and to what extent the former might serve as a carrier. Of these infectious entities, brucellosis and leptospirosis are currently at the forefront in question. This report represents the beginning of a cooperative effort to supply the information which is becoming increasingly essential for a better relationship between all concerned.

HISTORY

In 1941 significant blood titers for brucellosis were reported from bison and elk.² Evidence of this disease was later described from moose in 1942³ and 1953.⁴ Studies have been made in an effort to establish the presence of infection in white-tailed deer, and surveys conducted over several years in North Dakota

* Printed in October 1, 1958 issue *Journal of the AVMA*.

From the Southeastern Cooperative Deer Disease Study, Department of Pathology and Parasitology, School of Veterinary Medicine, University of Georgia. This cooperative organization is the first regional diagnostic and research service established in the United States, which is maintained for the specific purpose of investigating diseases of wild deer. The joint state project is supported by the Southeastern Association of Game and Fish Commissioners and the U. S. Fish and Wildlife Service (Region 4). The participating states include Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, South Carolina, Tennessee, and Virginia.

A discussion of this preliminary survey was presented before the 12th Annual Meeting of The Animal Disease Research Workers in the Southern States, Oklahoma State University, Stillwater (March 6-7, 1958).

¹ Editorial: Conservation Farming—The Key to Future Wildlife Corps. *Virginia Wildlife*, 18 (1957):20.

² Katz, J. S.: Brucellosis in Wildlife. *J.A.V.M.A.*, 99 (1941):24.

³ Fenstermacher, R. and Olsen, O. W.: Further Studies of Diseases Affecting Moose. *Cornell Veterinarian*, 32 (1942):241.

⁴ Jellison, W. L., Fishel, C. W. and Cheatum, E. L.: Brucellosis in a Moose, *Acles americanus*. *Jour. Wildl. Mgmt.*, 17 (1953):217.

showed the incidence of brucellosis to be only 0.22% in this state's deer herds.^{5, 6} From 50 blood specimens examined, recent studies in Delaware (1958) failed to disclose a single reactor to brucella antigens.⁷

It is known that serotypes of a variety of *Leptospira* spp. have been isolated from many wild mammals.⁸ Workers in Illinois have recently shown that the deer (*O. virginianus*) in this area may possibly serve as carriers of leptospiral agglutinins.⁹ Workers in Delaware failed to demonstrate any evidence of leptospirosis in this state's deer population.⁷

OBJECTIVE

In retrospect of the limited information on the prevalence of brucellosis and leptospirosis among wild deer of the Southeast, this annual survey has been inaugurated. The immediate purposes of this study are to determine the incidence of these diseases in the white-tailed deer and to locate any existing enzootic areas.

COLLECTION AND SEROLOGICAL PROCEDURES

Blood samples (5 ml.) were obtained from deer taken on either managed hunts or during various trapping programs. "Kill-specimens" were collected in a standard type bleeding tube after severing one of the major blood vessels. The specimens acquired during trapping or restocking procedures were obtained by jugular puncture (Fig. 1) After collection some samples were refrigerated as long as one week prior to being forwarded to the laboratory for examination. Approximately 5% of the samples were centrifuged shortly after collection and the serum sent to the laboratory.

On receipt the serum was separated from the formed elements by centrifugation (3,000 r.p.m. for 5 min.). Plate agglutination procedures were used to determine the presence of agglutinins for both brucellosis and leptospirosis.^{10, 11} Initial screening was performed at a concentration of 1:25 for brucellosis and 1:1 for leptospirosis. Postive reactions were quantitated by a twofold dilution for brucellosis and by a fourfold dilution for leptospirosis. The antigen used for the brucellosis examinations was a phenolized *Brucella abortus* antigen furnished by the Agricultural Research Service. A commercially prepared *Leptospira pomona* antigen (Fort Dodge Laboratories, Inc., Fort Dodge, Iowa) was used for the leptospiral determinations.

A total of 403 deer blood specimens (both sexes of ages between 6 mos. and 8 years) were examined for *Br. abortus* and *L. pomona* agglutinins. Standards established for the presence of these diseases in cattle were used to evaluate the data obtained. Titers of 1:100 or higher were considered indicative of brucellosis and titers of 1:160 or higher were indicative of leptospirosis.^{12, 13}

RESULTS

The information acquired from this preliminary survey has been presented in tabular form (Table 1). Of the 403 blood specimens processed, only one was considered a reactor to the brucella antigen; of the same specimens seven showed a significant titer to the leptospiral antigen. These data indicated an incidence

⁵ Bolin, F. M., Goldsby, A. I., Rheault, Pat and Eveleth, D. F.: Brucellosis in North Dakota Deer—A Survey. North Dakota Agricultural Experiment Station Bulletin (1949): 102.

⁶ Bolin, F. M. and Eveleth, D. F.: Where Deer and Antelope Play, North Dakota's big game animals are not reservoirs of brucellosis. North Dakota Agricultural Experiment Station Bulletin (1951):46-47.

⁷ Richardson, J. H.: Personal Communication, 1958.

⁸ Galton, M. M., Powers, O. K., McKeever, S. and Gorman, G. W.: The Identification of Two Leptospiral Serotypes New to the United States. Public Health Reports 72 (1957): 431.

⁹ Ferris, D. H.: Personal Interview, 1958.

¹⁰ Huddleson, I. F.: The Diagnosis of Brucella Infection in Animals and Man by Rapid Macroscopic Agglutination. Michigan Agricultural Experiment Station Bulletin (1932):123. Cited by Spink, W. W.: The Nature of Brucellosis. University of Minnesota Press, Minneapolis, Minnesota (1956).

¹¹ Stoenner, H. G.: Application of Serology to the Diagnosis of Leptospirosis. Proceeding Book, American Veterinary Medical Association, 82nd Annual Meeting (1955):172.

¹² Committee Report: Brucellosis. Proceeding Book, U. S. Livestock Sanitary Association, 60th Annual Meeting (1956):119.

¹³ Leptospirosis Diagnosis. Fort Dodge Journal, 26 (1956):6.

of 0.25% brucellosis and 1.73% leptospirosis among the deer herds of the south-eastern United States.

TABLE I
BLOOD SPECIMENS EXAMINED WITH SIGNIFICANT TITERS FOR BRUCELLOSIS AND LEPTOSPIROSIS *

State	Total Specimens	Significant Titers			
		Brucellosis		Leptospirosis	
		No.	%	No.	%
Alabama	68	—	—	2	2.9
Arkansas	—	—	—	—	—
Florida	9	—	—	—	—
Georgia	105	—	—	1	.9
Kentucky	53	—	—	1	1.9
Louisiana	69	1	1.4	3	4.3
Maryland	23	—	—	—	—
Mississippi	27	—	—	—	—
North Carolina	7	—	—	—	—
South Carolina	2	—	—	—	—
Tennessee	—	—	—	—	—
Virginia	40	—	—	—	—
TOTAL	403	1	0.25	7	1.73

* It has been shown that specimens were not received from Arkansas and Tennessee. This was not an oversight on the part of these participating states, but due to the late start of the project and subsequent request for blood samples. For each state there are many variations in the feasibility of collecting blood from deer, and these variables can be expected to be altered each year.

DISCUSSION

A limiting factor in this study has been the relatively small number of blood specimens processed. It should be emphasized, however, that this investigation was of a pilot-nature, and designed primarily to determine whether a regional undertaking of this kind is practical. The survey indicates that a large scale survey of these diseases is feasible in 1958 and 1959, during which time the collection of 10,000 blood samples is anticipated. This should yield adequate data for statistical evaluation.

In continuing this program an expansion of the leptospiral phase of the study must be incorporated to rule out the possibility of cross agglutination.¹⁴ The inclusion of additional antigens such as *L. grippothyposa*, *L. autumnalis*, *L. ballum* and other related serotypes would seem indicated for a more comprehensive study of this disease in wild deer.

SUMMARY

The need has been discussed for more information on those diseases transmissible from wildlife to domestic animals. In compliance with this necessity a preliminary survey of the incidence of brucellosis and leptospirosis among the white-tailed deer of the Southeast has been conducted. By plate agglutination techniques, the results of this investigation indicates a prevalence of only 0.25% brucellosis and 1.73% leptospirosis among the animals surveyed. Continued studies on these diseases are anticipated in 1958 and 1959.

ACKNOWLEDGMENTS

Appreciation is expressed to the sportsmen, game biologists, rangers (wardens) and P-R coordinators of the southeastern states for their invaluable assistance in this project. The authors also are indebted to Dr. C. J. Mikels, Veterinarian in Charge, Agricultural Research Service, Animal Disease Eradication Division, U. S. Department of Agriculture, Atlanta, Georgia.

¹⁴ Thiel, P. H. Van: The Leptospiroses. Universitaire Pers Lieden. Lieden, Netherlands (1948):9.