

## **SEROLOGIC EVIDENCE OF *Anaplasma marginale* INFECTION IN WHITE-TAILED DEER (*Odocoileus virginianus*) IN MISSOURI 1**

Authors: MAAS, J., and BUENING, G.M.

Source: Journal of Wildlife Diseases, 17(1) : 45-47

Published By: Wildlife Disease Association

URL: <https://doi.org/10.7589/0090-3558-17.1.45>

---

BioOne Complete ([complete.BioOne.org](https://complete.BioOne.org)) is a full-text database of 200 subscribed and open-access titles in the biological, ecological, and environmental sciences published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Complete website, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at [www.bioone.org/terms-of-use](https://www.bioone.org/terms-of-use).

Usage of BioOne Complete content is strictly limited to personal, educational, and non - commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

---

BioOne sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to critical research.

## SEROLOGIC EVIDENCE OF *Anaplasma marginale* INFECTION IN WHITE-TAILED DEER (*Odocoileus virginianus*) IN MISSOURI<sup>□</sup>

J. MAAS<sup>□</sup> and G.M. BUENING, Department of Veterinary Microbiology, School of Veterinary Medicine, University of Missouri, Columbia, Missouri 65211, USA.

W. PORATH, Missouri Department of Conservation, 1110 College Ave., Columbia, Missouri 65201, USA.

**Abstract:** Sera obtained from 616 (1.16%) of the 53,310 white-tailed deer (*Odocoileus virginianus*) harvested in Missouri in the fall of 1979 were analyzed by the modified rapid card agglutination (MRCA) test for antibodies against *Anaplasma marginale*. The results indicated a low prevalence (1.14%) of MRCA reactors in the white-tailed deer population sampled.

### INTRODUCTION

Columbian black-tailed deer (*Odocoileus hemionus columbianus*) are recognized carriers of *Anaplasma marginale*.<sup>1,2,3</sup> Blood from infected black-tailed deer,<sup>4,11</sup> mule deer<sup>1,3</sup> and elk<sup>9,14</sup> has been shown to be infective for cattle. In California and other areas of the Pacific Northwest, deer are considered to be important reservoirs of anaplasmosis. *Anaplasma marginale* is readily transmissible from deer to cattle in the Coast Range grazing areas of California.<sup>5</sup> White-tailed deer (*Odocoileus virginianus*) have been experimentally infected with *A. marginale*.<sup>7,16,17</sup>

The modified rapid card agglutination (MRCA) test for antibodies against *A. marginale* has been used in several species of wild ruminants: Columbian black-tailed deer,<sup>6</sup> elk,<sup>9,14</sup> mule deer<sup>1,3</sup> and axis and fallow deer.<sup>15</sup> The MRCA test was found to have a high degree of specificity and sensitivity in these studies.

The importance of white-tailed deer as reservoirs of anaplasmosis in Missouri has not been documented; therefore, the purpose of this study was to measure

serological evidence of anaplasmosis in the free-ranging deer population. The MRCA test was used to examine the serum from hunter-killed white-tailed deer for antibodies to *A. marginale*.

### MATERIALS AND METHODS

This survey was conducted in conjunction with the Missouri Department of Conservation's special deer hunts of 1979 and the statewide conventional firearm deer season of 1979.

#### Collection of Serum Samples

**Special Hunts.** All hunters were given a whirl-pack bag with attached instruction sheet. They were instructed to collect approximately 60 ml of blood from the external jugular vein of freshly killed deer or to collect blood clots from the heart. Successful hunters returned the blood sample to the official check station where data on sex, age, weight and other physical parameters were recorded. Blood samples were kept at 4 C until the serum was separated. Sodium azide (0.1M) was added to each serum sample to prevent microbial growth. The sera were processed according to the

<sup>□</sup> This study was supported in part by U.S. Department of Agriculture, Cooperative Agreement No. 12-14-1001-1221.

<sup>□</sup> Present address: Caldwell Veterinary Teaching Center, Route 8, Box 215, Caldwell, Idaho 83605, USA.

methods of Howarth, *et al.*<sup>6</sup> and Magonigle and Eckblad.<sup>9</sup>

**Regular Season Hunt.** Blood samples were obtained through the cooperation of wildlife biologists at the Department of Conservation deer check stations. Samples were stored at 4 C until arrival at the laboratory.

#### Analysis of Serum

Sera were tested for agglutinating antibodies against *A. marginale* by the modified rapid card agglutination (MRCA) test.<sup>6,9</sup> All sera were held at room temperature (20 C) for 72 h prior to the testing. The MRCA test was conducted in accordance with the manufacturer's directions.<sup>10</sup>

### RESULTS

A total of 616 serum samples suitable for testing was obtained from the special hunts and regular season surveys and 7 of the 616 (1.14%) samples were positive by the MRCA test. The combined deer kill during these hunts was 53,310 animals. (Porath, W. 1979. Pers. commun.) The 616 sera represent a sampling rate of approximately 1.16% of the harvested deer. The minimum estimate of the white-tailed deer population of Missouri is 350,000. (Porath, W. and N. Giessman. 1979. Pers. commun.) The 616 samples thus represent a sampling rate of approximately 0.18% of the entire deer population.

### DISCUSSION

The results of this study indicate that the prevalence (1.14%) of anaplasmosis

MRCA reactors in the white-tailed deer population sampled was low. Thus, the free-ranging deer population cannot be considered a significant reservoir of anaplasmosis in Missouri. The prevalence of anaplasmosis in cattle in Missouri has been established to be approximately 13%.<sup>10</sup> Probably the MRCA positive samples represent transmission of *A. marginale* from domestic cattle populations to free-ranging deer populations in Missouri.

White-tailed deer can be infected with *A. marginale*;<sup>16,17</sup> however, the disease is subclinical unless the animal previously has been splenectomized. Since the present study did not examine MRCA reactions of experimentally infected white-tailed deer, the MRCA positive reactions could be false positives.

The home range of white-tailed deer in Missouri is relatively small, usually 5 km<sup>2</sup> or less,<sup>18</sup> often limited to a few favored bedding and feeding sites. This would tend to limit contact between domestic cattle populations and wild deer populations to a fraction of the potential and may partially explain the low prevalence of MRCA reactors in the present study.

Horseflies are thought to be the primary vectors of anaplasmosis in the midwest. Highly efficient tick vectors, such as *Dermacentor occidentalis* and *Dermacentor andersoni*, are not found in Missouri. Horseflies are not considered to be as efficient as these ticks and this may offer another possible explanation for the low prevalence seen in Missouri deer.

### LITERATURE CITED

1. BOYNTON, W.H. 1932. Further observations on anaplasmosis. *Cornell Vet.* 22: 10-28.
2. ——— and G.M. WOODS. 1933. Deer as carriers of anaplasmosis. *Science* 78: 559-560.

<sup>10</sup> Hynson, Westcott and Dunning, Inc., Baltimore, Maryland 21201, USA.

3. ——— and ———. 1940. Anaplasmosis among deer in the natural state. *Science* 91: 168.
4. CHRISTENSEN, J.F. and D.W. McNEAL. 1967. *Anaplasma marginale* infection in deer in the Sierra Nevada foothill area of California. *Am. J. Vet. Res.* 28: 599-601.
5. HOWARTH, J.A. and D.W. McNEAL. 1973. The occurrence of bovine anaplasmosis following controlled natural exposure. Proc. 6th Nat'l Anaplasmosis Conf. Las Vegas, Nevada. pp. 123-126.
6. ———, Y. HOKAMA and T.E. AMERAULT. 1976. The modified card agglutination test: An accurate tool for detecting anaplasmosis in Columbian black-tailed deer. *J. Wildl. Dis.* 12: 427-434.
7. KREIER, J.P. and M. RISTIC. 1963. Anaplasmosis XII. The growth and survival in deer and sheep of the parasites present in the blood of calves infected with the Oregon strain of *Anaplasma marginale*. *Am. J. Vet. Res.* 24: 697-702.
8. LANCASTER, J.L., H. ROBERTS, L. LEWIS, L. DINKINS and J. DeVANCY. 1968. Review of anaplasmosis transmission trials with the white-tailed deer. Proc. 5th Nat'l Anaplasmosis Conf. Stillwater, Oklahoma. pp. 197-215.
9. MAGONIGLE, R.A. and W.P. ECKBLAD. 1979. Evaluation of the anaplasmosis rapid card agglutination test for detecting experimentally infected elk. *Cornell Vet.* 69: 402-410.
10. McCALLON, B.R. 1973. Prevalence and economic aspects of anaplasmosis. Proc. 6th Nat'l Anaplasmosis Conf. Las Vegas, Nevada. pp. 1-3.
11. OSEBOLD, J.W., J.F. CHRISTENSEN, W.M. LONGHURST and M.N. ROSEN. 1959. Latent *Anaplasma marginale* infection in wild deer demonstrated by calf inoculation. *Cornell Vet.* 49: 97-115.
12. PROGULSKI, D.R. and T.S. BASKETT. 1958. Mobility of Missouri deer and their harassment by dogs. *J. Wildl. Manage.* 22: 184-192.
13. RENSCHAW, H.W., H.W. VAUGHN, R.A. MAGONIGLE, W.C. DAVIS, E.H. STAUBER and F.W. FRANK. 1977. Evaluation of free-roaming mule deer as carriers of anaplasmosis in an area of Idaho where bovine anaplasmosis is enzootic. *J. Am. vet. med. Ass.* 170: 334-339.
14. ———, R.A. MAGONIGLE and H.A. VAUGHN. 1979. Evaluation of the anaplasmosis rapid card agglutination test for detecting experimentally infected elk. *J. Wildl. Dis.* 15: 379-386.
15. RIEMANN, H.P., R. RUPPANNER, P. WILLEBERG, C.E. FRANTI, W.H. ELLIOTT, R.A. FISHER, O.A. BRUNETTI, J.H. AHO, J.A. HOWARTH and D.E. DEHYMER. 1979. Serological profile of exotic deer at Point Reyes National Seashore. *J. Am. vet. med. Ass.* 175: 911-913.
16. RISTIC, M. and A.M. WATRACH. 1961. Studies in anaplasmosis. II. Electron microscopy of *Anaplasma marginale* in deer. *Am. J. Vet. Res.* 22: 109-116.
17. ROBERTS, H.H. and J.L. LANCASTER, Jr. 1963. Determining susceptibility of white-tailed deer to anaplasmosis. *Arkansas Farm Research. Arkansas Agric. Exp. Stn.* (Jan-Feb. 1963).
18. ZWANK, J.P. 1974. Refuges as population centers of deer in threatened habitat. M.S. Thesis. University of Missouri, Columbia, Missouri.

Received for publication 30 May 1980