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A SEROLOGIC SURVEY OF BRUCELLOSIS IN WHITE-TAILED DEER (*ODOCOILEUS VIRGINIANUS*) IN MISSOURI[1]

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ABSTRACT: During the hunting seasons of 1979 and 1980, sera were collected from 713 white-tailed deer in Missouri and tested for antibodies to *Brucella abortus* using the standard tube agglutination, standard plate agglutination, *Brucella* buffered antigen card agglutination and rivanol agglutination tests. Only one sample was considered to be positive for *Brucella* antibodies. This study demonstrated that white-tailed deer in Missouri were not an important reservoir host of brucellosis.

INTRODUCTION

Brucellosis has been diagnosed in several populations of nondomestic ruminants in the USA. Livestock producers are cognizant of the current *Brucella abortus* infection of elk (*Cervus elaphus nelsoni*) in Wyoming (Thorne et al., 1978) and various herds of bison (*Bison bison*). Some livestock producers in Missouri have expressed concerns about the possible role of white-tailed deer as reservoir hosts of brucellosis. Several serologic surveys of white-tailed deer in Missouri and other southeastern states were conducted in the 1950's (Steen et al., 1955; Shotts et al., 1958; Hayes et al., 1960). *Brucella* serologic reactions occurred at such a low frequency that white-tailed deer were considered to be free of the disease. Since that time, the population of white-tailed deer in Missouri has increased significantly (Giessman, 1982). The increased population may have altered the epidemiological significance of white-tailed deer as reservoir hosts of brucellosis. Therefore, a serologic survey of white-tailed deer in Missouri was designed to determine the prevalence of antibodies to *B. abortus*.

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MATERIALS AND METHODS

During the 1979 hunting season in Missouri, blood was collected in sterile plastic bags by hunters and wildlife biologists. The blood samples were kept at 4 C until the serum was separated. Sodium azide (0.1 M) was added to each serum to inhibit microbial growth and they were stored at −20 C until tested.

During October, 1980, deer blood collection kits were mailed to each of the 601 Missouri farms that had been under quarantine for bovine brucellosis at some time between October 1978 and September 1980. Each kit consisted of three plastic tubes containing merthiolate (1:10,000 final dilution when filled with blood) to inhibit microbial growth and instructions for collecting and returning the blood samples. All blood samples were received at the laboratory within 5 days of collection. The serum was separated from each sample and stored at −20 C until tested.

Standard procedures of the U.S. Department of Agriculture were followed for conducting the standared tube agglutination test (STT), standard plate agglutination test (SPT), rivanol agglutination test (Riv) and the *Brucella* buffered antigen card test (card).

RESULTS

Serologic survey of white-tailed deer, 1979: Sera were collected from 664 hunter-killed white-tailed deer. In either the STT or SPT, nine (1.4%) sera were positive at the 1:50 dilution. These sera were then evaluated in the Riv test and all were observed to be negative at the 1:25 dilution. All sera were negative in the card test.

Serologic survey of white-tailed deer, 1980: Sera were collected from 49 white-tailed deer killed by hunters on farms previously quarantined for bovine brucellosis or on contiguous farms. The serum from a buck that was killed in Platte County reacted at a 1:100 dilution in the STT, 1:50 dilution in the SPT, and 1:50 dilution in the Riv test. The sample was unsuitable for evaluation by the card test. The remaining sera were negative in the STT, SPT

and card tests. The reactive serum was tested against anti-bovine immunoglobulin serum in a double immunodiffusion assay which indicated that it was not bovine serum (data not shown).

DISCUSSION

The results of these field surveys indicated that white-tailed deer in Missouri were not an important reservoir host for brucellosis. However, serologic responses by white-tailed deer to *Brucella* have not been studied extensively and interpretation guidelines are not available. The STT (Youatt and Fay, 1959) and SPT (Baker et al., 1962) were used in controlled experimental studies where small numbers of white-tailed deer were exposed to *B. abortus* virulent strain 2308 or vaccine strain 19. Other serologic tests, including the card and Riv tests, are more sensitive and specific for the detection and diagnosis of brucellosis in cattle (Nicoletti, 1967, 1969; Pietz and Cowart, 1980). These additional tests have been used in serologic surveys of white-tailed deer (Boeer et al., 1980), but data are not available to substantiate the efficacy of these tests. Tamayo (1981) has shown that white-tailed deer immunized with *B. abortus* strain 19 can produce antibodies detectable in the card and Riv tests similar to the responses of vaccinated cattle. In the absence of data which would indicate the need for other interpretive criteria, the results of the panel of tests used in this study were interpreted as they would be for cattle. Nine white-tailed deer had low titers in the SPT or STT, but they were negative in the Riv and card test. Therefore, the 664 sera collected in the statewide survey in 1979 were classified as negative for brucellosis.

White-tailed deer in Missouri are known to remain in relatively small home ranges, usually 5 km^2 or less (Zwank, 1974). Therefore, in 1980 we concentrated on collecting serum from those white-tailed deer that had the greatest risk of contact with *Brucella*-infected domestic livestock. This was accomplished by sampling deer killed on farms which had been quarantined for bovine brucellosis or on contiguous farms. Only one of 49 sera was considered to be positive. Definitive diagnosis of *Brucella* infection by bacteriologic culture was not attempted.

The meager serologic evidence of *Brucella* exposure in white-tailed deer in Missouri indicated that they probably were only sporadically exposed to *Brucella*. *Brucella*-infected domestic livestock were the most likely source of exposure since there was no evidence found to indicate that white-tailed deer in Missouri were an important reservoir host of brucellosis.

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