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Increased Prevalence of *Brucella suis* and Pseudorabies Virus Antibodies in Adults of an Isolated Feral Swine Population in Coastal South Carolina

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ABSTRACT: Two hundred twenty seven adult (>8 mo) feral swine (*Sus scrofa*) trapped from April through July 1999 at three locations on a coastal South Carolina (USA) peninsula with restricted ingress and egress were tested for *Brucella suis* and pseudorabies virus (PRV) antibodies. Approximately 44% of the animals tested positive for *B. suis* antibodies and 61% tested positive for antibodies to PRV. Previous surveys (1976 and 1992) of feral swine at the same location with similar methods indicated lower seroprevalences (28% and 18% for *B. suis* and 0% and 19% for PRV). We also found 39% of feral swine seropositive (n=179) for *Trichinella spiralis* and 49% seropositive (n=181) for *Toxoplasma gondii.* Results of repeated sampling demonstrated that seroprevalence to pathogens can increase with time in an isolated, unhunted population of feral swine suggesting an increased risk to local domestic livestock and potentially to human health.

Key words: *Brucella suis,* feral swine, pseudorabies virus, serologic survey, *Sus scrofa, Toxoplasma gondii, Trichinella spiralis.*

Brucella suis and pseudorabies virus (PRV) are infectious pathogens of economic importance to domestic swine producers and are the focus of national eradication campaigns. Serologic evidence of infection with these pathogens has been reported in feral swine (*Sus scrofa*) populations in coastal South Carolina (USA) (Wood et al., 1976, 1992). We resampled these populations to determine if antibody prevalence had increased during a time of minimal population control activity.

Trichinella spiralis and *Toxoplasma gondii* are zoonotic parasites of public health significance, especially among hunters and other people who handle or consume meat products from feral swine. Serologic evidence of these parasites has been reported from feral swine populations in coastal Georgia (USA) (Babero et al., 1959) and South Carolina (Diderrich et al., 1996). Samples collected for this study provided an opportunity to determine if this population harbored *T. spiralis* and *T. gondii.*

During a population reduction project on the 7,085 ha Hobcaw Barony in eastern Georgetown County, South Carolina (33°20.5′N, 79°13.5′W), feral swine were trapped using portable box traps baited with shelled, fermented corn. Immediately after capture, adult swine (>8 mo as determined by size and dentition) were killed and blood was collected into vacuum tubes. Serum was separated by centrifugation and then frozen. The buffered *Brucella* antigen card test (U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Veterinary Services, Washington, D.C, USA) was used to test for *B. suis* antibodies (MacMillan, 1992; Van der Leek et al., 1993b). Latex agglutination (Pseudorabies Virus Antibody Test Kit, Viral Antigens Inc., Memphis, Tennessee, USA) was used to test for PRV antibodies because it is both sensitive and specific (Kluge et al., 1992; Van der Leek et al., 1993a). The presence of *T. spiralis* antibodies was determined by a sensitive microwell enzyme-linked immunosorbent assay procedure (SafePath Laboratories, St. Paul, Minnesota, USA) using excretory-secretory antigen (Corwin and Stewart, 1992). The modified agglutination test (MAT) which uses formalin fixed tachyzoites as antigen was used to detect *T. gondii*

specific IgG antibodies (Dubey et al., 1995).

Antibodies against the four pathogens were found in male and female adult animals. Seroprevalence for *B. suis* was 43% for males and 44% for females. Overall PRV seroprevalence was 61%; 59% for females and 63% for males. Tests for *T. spiralis* antibodies indicated a 33% seroprevalence in males, 45% seroprevalence in females, and an overall seroprevalence of 39%. Seroprevalence of *T. gondii* was 49% overall; 46% for males and 52% for females.

Comparison of these results to published data requires the same age and gender of animals in the sample and the same serologic test procedure. Most authors reported age and gender structure of sampled animals, but those studies that included several antibody test procedures did not indicate which procedure generated the reported data. The following comparisons are for adult animals tested using the same serologic procedure as ours, except as noted.

Our *B. suis* antibody prevalence (44%) was higher than reported for Hobcaw Barony feral swine. Wood et al. (1976) reported 28% seroprevalence in Hobcaw's feral swine sampled in 1974 and 1975. Wood et al. (1992) later reported 18% seroprevalence for adults of both genders sampled in 1987 and 1988.

Most published regional PRV antibody surveys indicate a lower seroprevalence than we report (Pirtle et al., 1989; Southeastern Cooperative Wildlife Disease Study, 1995). Surveys of swine from our study area did not identify animals with PRV antibodies in 1977 (Wood and Brenneman, 1977) but there was 19% seroprevalence by serum neutralization in 1987 and 1988 (Wood et al., 1992). Our finding of 61% antibody prevalence is due to persistence of PRV in the population and increased probability that susceptible animals will become infected.

Although many published *T. spiralis* surveys used digestion techniques most of these studies did not detect antibodies (Smith et al., 1982; Corn et al., 1986). Wood and Barrett (1979) reported that *T. spiralis* was present (no prevalence data reported) in feral swine in the US and Forrester et al. (1985) found *T. spiralis* larvae in one of 26 (4%) feral swine examined in Florida (USA). Our results of 39% *T. spiralis* seroprevalence was higher than previously reported.

Diderrich et al. (1996) reported 37% seroprevalence for *T. gondii* by the MAT procedure in feral hogs from South Carolina's Piedmont and Coastal Plain. Our results with a similar test procedure indicated 49% seroprevalence in the Hobcaw population.

Increased *B. suis* and PRV seroprevalence compared to previous feral swine testing in the same area (Wood and Brenneman, 1977; Wood et al., 1976, 1992) could have resulted from the following factors: 1) the diagnostic test procedures were different; 2) animals tested were of different ages; older animals have more possibility of exposure and more likelihood of being positive; 3) differences were simply stochastic variation from one time compared to another; and 4) differences indicated increased transmission of the pathogens within the population. In the earlier and present studies, adults of both genders were sampled and the same *B. suis* diagnostic procedure was used. *Brucella suis* antibody prevalence changed by 10% from 1975 to 1987 compared to the 26% change from 1987 to 1999. We used a PRV latex agglutination procedure that is 99% as sensitive and specific as the serum neutralization procedure (Viral Antigens, Inc., 1990) used by Wood et al. (1992). Pseudorabies antibody prevalence changed 20% from 1975 to 1987 compared to the 42% change from 1987 to 1999. We believe that increased antibody prevalences are a reflection of population age structure because older seropositive animals are not removed due to hunting. An important implication of this situation is that in a relatively stable unhunted pop-

ulation retention of older, infected animals increases the likelihood that susceptible animals will encounter an infected animal and transmission may occur.

Our data support the concept that feral swine constitute a reservoir of infectious agents transmissible to domestic swine and increased numbers of feral swine may threaten efforts to eradicate economically important pathogens from regions where they are endemic. The presence of *T. gondii* and *T. spiralis* in feral swine has zoonotic implications for people who hunt these animals for sport and consumption. These people are at risk for infection when they fail to use proper hygienic precautions during butchering and food preparation.

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