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Serologic Survey for Antibodies to Canine Distemper Virus in Collared Peccary (*Tayassu tajacu*) Populations in Arizona

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ABSTRACT: In 1989, a disease outbreak was observed among collared peccaries (javelina, *Tayassu tajacu*) in southern Arizona (USA) and canine distemper virus (CDV) was isolated from affected animals. Subsequently, 364 sera were collected from hunter-harvested javelina over a 4 yr period (1993–96) and were tested for antibody to CDV. Neutralizing antibody to CDV was detected in 58% of the serum samples suggesting that CDV infection is probably enzootic in the collared peccary populations of southern Arizona.

Key words: Canine distemper virus, collared peccary, javelina, morbillivirus, *Tayassu tajacu*.

Canine distemper (CD) is caused by a *Morbillivirus* in the family Paramyxoviridae (Budd, 1981; Bolt et al., 1997). The disease is acute and highly contagious in dogs and is transmitted via aerosol (Appel and Gillespie, 1972; Appel, 1987; Timoney et al., 1988). Canine distemper virus (CDV) infection is enzootic in many wild and domestic species throughout the world (Appel, 1987). All members of Canidae and Mustelidae are affected by CDV (Timoney et al., 1988). Some members of the Procyonidae, Hyaenidae, Ailuridae, Ailuropodidae, Viverridae, and Felidae families are also susceptible (Montali et al., 1983, 1987; Appel, 1987; Murphy et al., 1999). The pathogenicity of CDV varies from species to species, from inapparent infection to 100% mortality (Appel and Gillespie, 1972). In Arizona 25% prevalence of CDV antibody was reported in foxes (*Vulpes* spp.) and 27% in coyotes (*Canis latrans*) (Miller et al., 2000; Grinder and Krausman, 2001).

The collared peccary (*Tayassu tajacu*) is the smallest of the three peccary species in the family Tayassuidae, which are wild mammals similar in appearance to pigs of the Suidae family (Sowls, 1997). Commonly known as javelina in Arizona, New Mexico, and Texas (USA), the collared peccary is an important big game species with over 7,000 animals taken by Arizona hunters in 2000 (Arizona Game and Fish Department, 2001). The species ranges south through Mexico, Central America, and as far as Argentina (Sowls, 1997).

During 1989, an epizootic of a previously unknown disease occurred with apparent high mortality among javelina in the deserts of southern Arizona (Appel et al., 1991). Signs of encephalitis were observed and CDV was isolated from affected javelina (Appel et al., 1991). A preliminary survey conducted at that time of clinically normal, hunter-harvested javelina revealed that 20 of 33 javelina (61%) had CDV neutralizing antibody titers (Appel et al., 1991).

Sera separated from 364 blood samples from Arizona javelina were tested for virus neutralizing activity to CDV during the years 1993–96. Arizona Game and Fish Department (AGFD) Regions V and VI were selected because CDV-affected javelina were found in those areas during the 1989 epizootic. The javelina sampled were hunter-harvested from Region V during the hunting seasons of 1993–96, Region VI in 1993 and 1995, and Region III in 1993 (Fig. 1). The general javelina hunting seasons take place for 2 wk beginning in mid-February.

During the first year of the survey in 1993, blood-collection vials were hand-delivered by AGFD personnel to hunters in their camps. This proved to be an inefficient method and the following year 200 blood collection kits were sent by mail to

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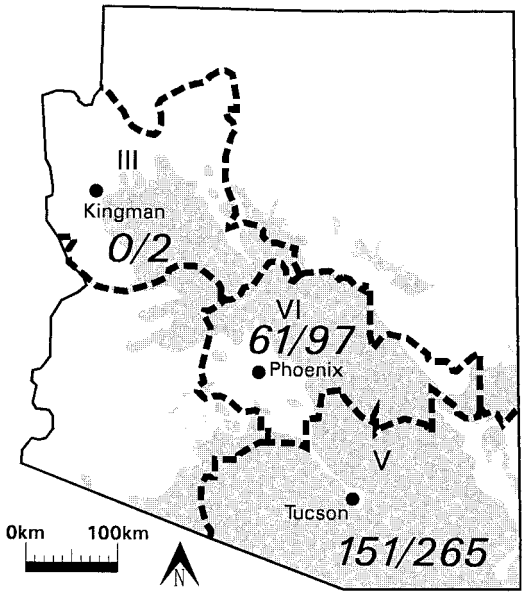


FIGURE 1. Arizona Game and Fish Department Regions III, VI, and V outlined by dashed lines (Kingman 35°12′N, 114°1′W; Phoenix 33°26′N, 112°1′W; and Tucson 32°7′N, 110°56′W). Grey-shaded area shows javelina distribution. Numerator shows number of sera positive for CDV antibody/denominator is total serum samples tested in each region. (Map by M. Alderson, AGFD).

hunters in the regions of interest. The kits included a 50 ml screw-capped plastic tube (Becton Dickinson Falcon, Franklin Lake, New Jersey, USA, or Corning Inc., Corning, New York, USA) and a flyer asking for the hunter's assistance in collecting a blood sample from their harvested javelina. Hunters were asked to collect the freshest, cleanest blood available (either from the heart or the chest cavity), to keep it on ice or in a cooler, and to drop it off at a collection station as soon as possible. Check stations were established throughout southern Arizona to facilitate sample collection and a map of their locations was included in the mail-out. The stations were staffed by student volunteers from wildlife classes at the University of Arizona (Tucson, Arizona) and by local sportsmen. The same protocol was followed in the subsequent 2 yr of the survey, 1995 and 1996, except the number of kits mailed out to hunters each year was increased to 1,000. After collection at the check stations, serum was separated and submitted to the Arizona Veterinary Diagnostic Laboratory (AZVDL; Tucson) for antibody testing.

The presence of antibodies to CDV was determined by serum neutralization (SN) using a modification of the microplate test as described by Appel and Robson (1973). The modifications were: 2-fold serial dilution of the sera; 100 median tissue culture infective doses (100 $TCID_{50}$) of CDV (Intervet Inc., Millsboro, Delaware, USA) were used per well; and incubation was at 37 C. Titers were expressed as the reciprocal of the maximum serum dilution showing complete neutralization of the virus. All sera with a titer of ≥1:4 were considered to have virus neutralizing activity.

Of 364 samples, 152 were negative for virus neutralizing activity. Virus neutralizing activity was detected in 212, resulting in 58% prevalence of CDV neutralizing

TABLE 1. Prevalence of seropositive animals and antibody titer ranges to canine distemper virus in 364 collared peccaries in Arizona by region and year from 1993–96.

	Region V		Region VI		Region III
Year	Number samples (%)	Titer range	Number samples (%)	Titer range	Number samples (%)
1993	16/18 (89)[a]	4–8,192[b]	4/8 (50)	8–16,384	0/2 (0)
1994	16/68 (24)	4–1,024	—	—	—
1995	75/93 (81)	4–4,096	57/89 (64)	4–≥4,096	—
1996	44/86 (51)	4–2,048	—	—	—
Region totals	151/265 (57)		61/97 (63)		0/2 (0)

[a] Number of positive samples/total serum samples tested (percent positive).
[b] Reciprocal of the maximum serum dilution showing complete neutralization.

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antibody overall for the 4-yr collection period (Table 1). The neutralizing antibody titers ranged from 1:4 to 1:16,384.

The data suggest that CDV is probably enzootic in free-ranging javelina populations of southern Arizona and that recovery from CDV infection commonly occurs. Based on field observations in Unit 36C in Region V, wildlife management personnel in Arizona suspect an interrelationship between a high population density of javelina resulting from several successive years of good reproduction and crowding around remaining water sources during drought as factors favoring disease epizootics. Further studies to substantiate these factors in javelina populations might be considered for the future as well as additional serosurvey work to delineate the extent of CDV infection in other javelina habitats. Management personnel could then use this information to assess the potential for epizootics of CDV infection to cause fluctuations in javelina populations.

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