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RESEARCH COMMUNICATION

PREVALENCE OF RUMINANT PESTIVIRUS INFECTIONS IN NAMIBIA

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ABSTRACT

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Following several clinical cases of suspected bovine virus diarrhoea (BVD) on three Namibian cattle farms, a serological survey was conducted on bovine, ovine, caprine and wild ruminant sera originating from different regions of the country. Neutralizing antibodies to BVD virus (BVDV) were detected in 58 % of 1 014 cattle sera, 14 % of 618 sheep sera and 4,6 % of 1 118 goat sera. Sera from seven of ten wildlife species were positive with kudu, eland and giraffe having prevalence rates greater than 40 %. BVDV was isolated from six clinically affected bovines and three healthy heifers persistently infected with BVDV. The survey demonstrated that pestivirus infections are widespread in Namibia in both domestic and wild ruminants.

INTRODUCTION

Four oxen, approximately two years old, out of a herd of 900 cattle of various breeds died after showing signs of growth retardation, profuse diarrhoea and erosion and inflammation of the gastrointestinal mucosae. Similar cases occurred on two other farms in Namibia and mucosal disease was suspected. This initiated attempts to isolate bovine virus diarrhoea virus (BVDV) and a serological survey designed to obtain informations on the prevalence of pestivirus infections in cattle, sheep, goats and wild ruminants in Namibia.

MATERIALS AND METHODS

For BVDV isolation, organ suspensions from six animals (four oxen from one farm and two heifers from two other farms) which had died of suspected mucosal disease were inoculated into bovine kidney monolayer cell cultures (Orban, Liess, Hafez, Frey, Blindow & Sasse-Patzer, 1983). In addition, all the sera submitted for diagnostic examination (group B) and the buffy coats of 42 heifers from the herd in which the oxen had died, were examined for BVDV. Viral antigens were detected in cell cultures by a direct peroxidase-linked antibody assay (Hyera, Dahle, Liess, Moennig & Frey, 1987).

A total of 1 014 cattle, 618 sheep, 1 118 goat and 556 sera from 10 different game species were examined. The wildlife sera originated either from game cropping operations in Southern Namibia or from the Etosha National Park. The bovine, ovine and caprine sera were derived from two groups:

Group A: Sera from 694 cattle, 524 sheep and 1 060 goats were random samples obtained from all parts of the country between 1987 and 1989 and were stored in the serum bank at the Central Veterinary Laboratory (CVL), Windhoek.

Group B: Sera from 320 cattle, 94 sheep and 58 goats were submitted to the CVL between October 1988 and September 1989 from premises on which clinical cases indicative of infection with BVDV had occurred. Forty two of 320 cattle sera were collected from heifers which were approximately two years old and belonged to the same herd where the oxen had died with signs of mucosal disease.

All the sera were stored at −20 °C prior to testing. In most cases the breed, age and sex of the donors sampled were unavailable.

A direct neutralizing perioxidase-linked antibody assay (Hyera, Liess & Frey, 1987) using the 0712/Han/80 strain of BVDV (Liess, Frey, Orban & Hafez, 1983) was performed on sera diluted 1:5. Neutralizing antibody titres greater than 1:5 were considered positive.

RESULTS

Cytopathogenic isolates of BVDV were cultured from the organs of each of the animals which died of suspected BVD. From the buffy coats and sera of three clinically healthy heifers non-cytopathogenic BVDV isolates were obtained. Subsequent consecutive examinations showed that these seronegative heifers were persistently infected with BVDV. The first isolate was designated "Paulinenhof/Win/89".

Neutralizing antibodies against BVD were detected in 338 (49 %) of the cattle, 46 (9 %) of the sheep and 52 (5 %) of the goat sera in group A. In contrast, 248 (77,5 %) of the bovine and 39 (41 %) of the sheep sera in group B were positive. No anti-

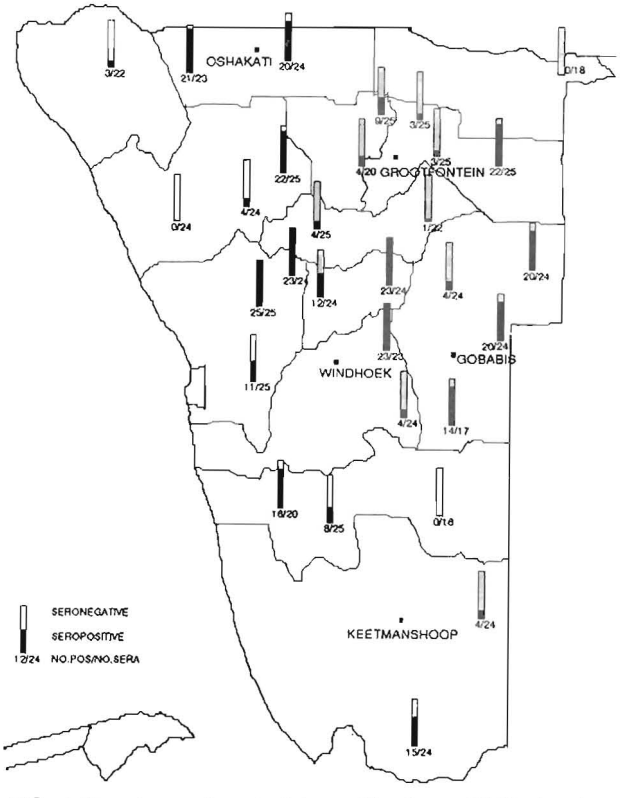

FIG. 1 Prevalence of neutralizing antibodies to BVD virus isolate 0712/Han/80 in bovine sera obtained randomly from all parts of Namibia (group A)

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TABLE 1 The prevalence of neutralizing antibodies to BVDV in sera from cattle, sheep and goats in Namibia

	Cattle		Sheep		Goats	
	No. tested	No. positive	No. tested	No. positive	No. tested	No. positive
Serum bank Sera (group B)	694	338 (49 %)	524	46 (9 %)	1 060	52 (5 %)
Diagnostic Sera (group A)	320	248 (77,5 %)	94	39 (41 %)	58	0
Total	1 014	586 (58 %)	618	85 (14 %)	1 118	52 (4,6 %)

TABLE 2 Prevalence of neutralizing antibodies to BVDV in 10 Namibian wildlife species

Species	No. tested	No. positive	% positive
Giraffe	170	79	46
Gemsbok	156	24	15
Roan	55	4	7
Red hartebeest	6	0	0
Black wildebeest	14	0	0
Blue wildebeest	11	2	18
Eland	7	4	57
Springbok	117	0	0
Kudu	9	6	6
Sable	11	1	9

bodies to BVDV were found in any of the goat sera in group B (Table 1).

Fig. 1 illustrates the regional distribution of seropositive cattle sera that originated from the serum bank (group A). Among game sera, neutralizing antibodies against BVDV were found in those from giraffe (*Giraffa camelopardalis*), gemsbok (*Oryx gazella*), roan (*Hippotragus equinus*), blue wildebeest (*Connachaetes taurinus*), eland (*Taurotragus oryx*), kudu (*Tragelaphus strepsiceros*) and sable (*Hippotragus niger*). Sera from red hartebeest (*Alcelaphus buselaphus*), black wildebeest (*Connochaetes gnou*) and springbok (*Antidorcas marsupialis*) contained no antibodies to BVDV (Table 2).

DISCUSSION

In southern and eastern Africa, BVDV has been isolated from cattle tissues in South Africa and Zimbabwe (Theodoridis & Boshoff, 1974) and from two cattle sera in Tanzania (Hyera, 1989). Outbreaks of mucosal disease have been reported from Zimbabwe, Botswana and Namibia, but have not been confirmed by virus isolation (Fleming, 1971; Hunter & Carmichael, 1975; Directorate of Veterinary Services SWA/Namibia, 1987). Serological surveys conducted in countries surrounding Namibia have provided evidence for the widespread prevalence of BVDV neutralizing antibodies in cattle. In South Africa 630 of a total 1 068 bovine sera had neutralizing antibody to BVDV, the percentage positive ranging between 51 % and 77 % in different regions (Theodoridis, Boshoff & Botha, 1973). According to the same report 43 % of 80 bovine sera tested in Zimbabwe and 88 % of 100 tested in Botswana were positive.

In this survey, 58 % of cattle sera from Namibia had neutralizing antibodies against BVDV. The number of seropositive cattle sera among those submitted for diagnostic purposes (group B) was higher (77,5 %) than among randomly sampled (group A) sera (49 %). The detection of clinically healthy animals persistently infected with BVDV explains the high percentage of seropositive cattle and the occurrence of clinical BVD within some herds. The reason for the uneven distribution of seropositive animals in the various districts of Namibia is unknown (Fig. 1).

The overall prevalence of antibody to BVDV in sheep and goats was 14 % and 4,6 %, respectively. Similar results were reported from Nigeria with 12,7 % of sheep and 4,5 % of goat sera being positive (Taylor, Okeke & Shidali, 1977). In Tanzania, 31,1 % of 471 sheep and 24,9 % of 1 093 goats had neutralizing antibody to BVDV (Hyera, 1989). In contrast, a seropositive rate of only 3,1 % in sheep and 1,2 % in goats was reported in the Djibouti Republic (Bohrmann, Frey & Liess, 1988). So far, naturally occurring clinical pestivirus infections in African sheep and goats have not been reported.

In wild ruminants, naturally occurring clinical BVD does not appear to be common. Cytopathogenic BVDV was isolated from a diseased giraffe in Kenya (Plowright, 1969), and Provost (1968, cited by Plowright, 1969) isolated BVDV from a diseased buffalo (*Syncerus caffer*) shot in the Central African Republic. Antibodies to BVDV were domonstrated in the sera of 17 of 45 wild animal species from various African territories (Hamblin & Hadger, 1979). Among these were sera from kudu, oryx, wildebeest, springbok and giraffe sampled in Namibia. In addition, we have demonstrated antibodies in sera from roan, eland and sable. Interestingly, from a total of 117 springbok sera none showed neutralizing titres to BVDV, whereas 11 of 40 springbok sera sampled formerly in Namibia were positive (Hamblin & Hedger, 1979). In this investigation the prevalence of antibodies was highest in giraffe, kudu and eland (> 40 %). The absence of antibodies in red hartebeest and black wildebeest may not be significant because of the small number of sera examined. The significance of neutralizing antibodies in wild animals requires further investigation. In cattle and sheep immune tolerance and persistence of BVDV is a prerequisite for the development of fatal disease (Liess, 1973; Liess, Frey, Kittsteiner, Baumann & Neumann, 1974; Terpstra, 1981). Whether this applies to wild ruminants also, is unknown.

In the present study the 0712/Han/80 strain of BVDV was used exclusively in the test procedure since a local strain was not initially available. For that reason low levels of antibodies might not have been detected (Hyera, 1989).

The data presented shows that BVDV cycles within Namibian ruminant populations. Therefore, BVDV should be taken into consideration as a possible cause of death, abortion, growth retardation or teratology, especially in cattle.

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REFERENCES

BOHRMANN, R., FREY, H.-R. & LIESS, B., 1988. Survey on the prevalence of neutralizing antibodies to bovine viral diarrhea (BVD) virus, bovine herpes virus type 1 (BHV-1) and parainfluenza virus type 3 (PI-3) in ruminants in the Djibouti Republic. *Deutsche tierärztliche Wochenschrift,* 95, 99–102.

DIRECTORATE OF VETERINARY SERVICES SWA/NAMIBIA, 1987. *Annual Report for 1987,* pp. 21–22.

FLEMING, J. M. P., 1971. An outbreak of mucosal disease. *Rhodesian Veterinary Journal,* 1, p. 79.

HAMBLIN, C. & HEDGER, R. S., 1979. The prevalence of antibodies to bovine viral diarrhoea/mucosal disease virus in African wildlife. *Compendium Immunity Microbiology Infectious Disease,* 2, 295–303.

HUNTER, A. G. & CARMICHAEL, I. H., 1975. Mucosal disease in Botswana. *Tropical Animal Health and Production,* 7, 41–44.

HYERA, J. M. K., DAHLE, LIESS, B., MOENNIG, V. & FREY, H.-R., 1987. Gewinnung hochtitriger Antiseren gegen BVD-Virus aus Schweinen und ihre Verwendung für direkte Immunofluoreszenz- und Immunoperoxidase Techniken. *Deutsche tierärztliche Wochenschrift,* 94, 576–580.

HYERA, J. M. K., LIESS, B & FREY, H.-R., 1987. A direct neutralizing peroxidase-linked antibody assay for detection and titration of antibodies to bovine viral diarrhoea virus. *Journal of Veterinary Medicine B,* 34, 227–239.

HYERA, L. M. K., 1989. Bovine viral diarrhoea (BVD) in domestic and wild ruminants in northern Tanzania. D.V.Sc. thesis, Veterinary School Hannover.

LIESS, B., 1973. Übersichtsreferat: Pathogenese virusbedingter Darminfektionen der Tiere. *Deutsche tierärztliche Wochenschrift,* 79, 360–364.

LIESS, B., FREY, H.-R., KITTSTEINER, H., BAUMANN, F. & NEUMANN, W., 1974. Beobachtungen und Untersuchungen über die "Mucosal Disease" des Rindes—einer immunbiologisch erklärbaren Spätform der BVD-MD- Virusinfektion mit Kriterien einer "slow virus infection"? *Deutsche tierärztliche Wochenschrift,* 81, 481–487.

LIESS, B. FREY, H.-R., ORBAN, S. & HAFEZ, S. M., 1983. Bovine Virusdiarrhoea (BVD)-"Mucosal Disease": Persistence BVD-Feldvirusinfektionen bei serologisch selektierten Rindern. *Deutsche tierärztliche Wochenschrift,* 90, 261–266.

ORBAN, S., LIESS, B., HAFEZ. S. M., FREY, H.-R., BLINDOW, H. & SASSE-PATZER, B., 1983. Studies on transplacental transmissibility of a bovine virus diarrhoea (BVD) vaccine virus. I. Inoculation of pregnant cows 15 to 90 days before parturition (190th to 265th day of gestation). *Journal of Veterinary Medicine B,* 30, 619–634.

PLOWRIGHT, W., 1969. Other diseases in relation to J.P. 15 Programme. *1st Annual Meeting, Joint Campaign against Rinderpest (J.P.15), Mogadiscuo, December 1969.*

TAYLOR, W. P., OKEKE, A. N. C. & SHIDALI, N. N., 1977. Prevalence of bovine virus diarrhoea and infectious bovine rhinotracheitis antibodies in Nigerian sheep and goats. *Tropical Animal Health and Production,* 9, 171–175.

TERPSTRA, C., 1981. Border disease: virus persistence, antibody response and transmission studies. *Research in Veterinary Science,* 30, 185–191.

THEODORIDIS, A., BOSHOFF, S. E. T. & BOTHA, M. J., 1973. Mucosal disease in southern Africa. *Journal of the South African Veterinary Association,* 44, 61–63.

THEODORIDIS, A. & BOSHOFF, S. E. T., 1974. Isolation of cytopathogenic strains of bovine viral diarrhoea virus in southern Africa. *Journal of the South African Veterinary Association,* 45, 203–205.