Acta vet. scand. 1982, *23*, 565—569.

From the National Veterinary Institute, Helsinki, Finland.

NEUTRALIZING ANTIBODIES TO BOVINE HERPESVIRUS 1 IN REINDEER

By

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EK-KOMMONEN, C., P. VEIJALAINEN, M. RANTALA and E. NEUVONEN: *Neutralizing antibodies to bovine herpesvirus 1 in reindeer.* Acta vet. scand. 1982, *23*, 565—569. — Serum samples from cattle and reindeer in Lapland were examined for neutralizing antibodies to the IBR/IPV virus. All the bovine sera tested were negative. The reindeer sera were tested using 2 different virus neutralization methods differing in the serum-virus incubation time prior to inoculation into tissue culture tubes. 12.6 % of the samples tested with a preincubation of 1 h at 37°C were positive, whereas 23 % of those tested with a preincubation time of 24 h at 37°C were positive. The fairly high prevalence of antibodies to IBR/IPV in the reindeer population in Finland indicates the occurrence of the IBR/IPV virus or a closely related cross-reacting herpesvirus.

neutralizing antibodies; bovine herpesvirus 1; Finnish reindeer.

Bovine herpesvirus 1 (BHV1) refers to all virus isolates which are serologically related to infectious bovine rhinotracheitis (IBR) virus and infectious pustular vulvovaginitis (IPV) virus (*McKercher* 1973).

The distribution of the virus is world-wide in bovines with exceptions in Europe such as Finland and Sweden. By definition the virus commonly causes respiratory and reproductive infections in cattle.

BHV1 has not been reported to cause naturally occurring disease in wildlife, but in 1971 the virus was isolated from the prepuces of 3 of 18 water buffalo after it had been observed that antibody to BHV1 was widely distributed in this species in Northern Australia (*St. Georg & Philpott* 1972).

BHV1 has been isolated from pronghorn antelope (*Hoff et al.* 1973) in North America and from recently captured wildbeest

in Africa (*Karstad et al.* 1974). Significant antibody levels have been commonly found in African buffalo, in hippopotami and in eland and, less commonly, in wildbeest, impala, Thomson's gazelle, topi, kob, reedbuck, waterbuck and warthog in Tanzania, Kenya, Uganda and Zambia (*Kaminjolo & Paulsen* 1970, *Rweyemamu* 1970, 1974, *Rampton & Jesset* 1976).

Antibody to BHV1 has also been detected in mule deer (*Chow & Davies* 1964), in white-tailed deer (*Friend & Halterman* 1967) and in pronghorn antelope (*Barret & Chalmers* 1975) in North America.

There are also reports on some serological studies in reindeer. In a reindeer herd brought to New York from Alaska in 1964 no neutralizing antibodies to BHV1 were detected (*Bolton & Murray* 1964).

In 1981, *Dieterich* reported the serologic evidence of past exposure to BHV1 in a small reindeer herd in the USA. Several reindeer from the Seward Peninsula and moose from the Kenai Peninsula were positive to IBR.

Serological evidence of IBR infection in wild caribou populations of northern Quebec was reported by *ElAzhary* in 1979. The imigrating caribou herd of 60,000 animals was known to have had no direct contact with ruminants since 1945.

A serological study was made of possible infections in reindeer (Rangifer tarandus tarandus) in Finland. This paper reports the occurrence of antibodies to the IBR virus.

MATERIALS AND METHODS

Sera

553 reindeer sera from both sexes and various ages were collected in 1974—1980 during the autumn round-up and slaughter in several parts of Finnish Lapland. 300 of these were collected in 1980, half of them from about 6-month old calves. For comparison, 300 sera from cattle were collected simultaneously at abattoirs in Lapland. The sera were stored at —20°C. All the sera were treated at 56°C for 30 min prior to testing for virus neutralization (SN).

Virus

The strain of BHV1 used was IBR/Colorado received from the American Type Culture Collection (ATCC) and cultured in low passage bovine kidney cell cultures.

Serum neutralization test

For the sera collected in 1974—1979 the test used was the conventional virus-serum neutralization tube test in which a virus suspension with 100 $TCID_{50}$/0.1 ml was mixed with an equal amount of serum dilution. The mixtures were preincubated at 37°C for 1 h prior to inoculation of bovine tissue cultures (P 37°C 1 h). A test modification was employed in 1980 which deviated from the conventional tube test in that the preincubation was prolonged to 24 h (P 37°C 24 h) (*Bitsch* 1973, 1978).

RESULTS

All the bovine sera tested with P 37°C 24 h showed an antibody titer < ¼ and were considered as negative.

The antibody titers of the reindeer sera are shown in Table 1. Thirty-two out of 253 sera (12.6 %) collected in 1974—1979 and tested with the P 37°C 1 h method had antibody titers ≧ 1:4, which was considered positive.

Of the 300 sera collected in 1980 and tested with the P 37°C 24 h method, 69 (23 %) showed positive antibody titers ≧ 1:4 (*Bitsch* 1978).

Table 1. Neutralizing antibodies to bovine herpesvirus 1 in reindeer sera.

Origin	Number of sera	Titers						% positive	
		<1:4	1:4	1:8	1:16	1:32	>1:32		
1974—79	253	221			32			12.6	
1980, adult	150	82	17	26	12	6	8	45	23
1980, calves	150	144	1	5	0	0	0	4	

DISCUSSION

The results reveal that the latter group had almost the double number of positive samples. The P 37°C 24 h method is known to be very sensitive in detecting small amounts of antibodies and it can therefore be assumed that among the sera tested with the earlier P 37°C 1 h method a greater number would have been positive. Collection of the sera at different times might also influence the results. It is interesting to note the prevalence of high antibody titers in adults which can be interpreted as a recent IBR/IPV infection or an infection with an antigenetically very closely related virus. The notably lower antibody prevalence

in calves also indicates an adult age infection. It is questionable whether other known herpesviruses than IBR/IPV play a part in the reaction because it is known that the IBR/IPV virus does not cross react in the neutralization test with other herpesviruses.

The blood samples collected in 1980 from the reindeer and cattle were from areas where the animals are in contact with each other. Therefore, one would expect to find IBR/IPV antibodies in the cattle if the reindeer were infected with IBR/IPV. On the other hand, a possible reason for the IBR/IPV infection of the reindeer is the fact that the animals cross the state borders to the neighbour countries Norway and the Soviet Union where the disease has been reported in cattle (*Saxegaard* 1968 and *Kryukov* 1970). In Sweden cattle are reported to be free from IBR/IPV. We have not been able to connect the observed serologic reactions with any disease because the animals have been seemingly healthy.

The antibody prevalence and some high titers show that the causative agent is fairly common in the reindeer population. The final explanation of the origin of the antibodies will be found once the virus has been isolated.

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SAMMANDRAG

Neutraliserande antikroppar mot Bovine Herpes Virus 1 hos renar.

Serum prov från nöt och renar har undersökts med avseende på neutraliserande antikroppar mot IBR/IPV virus. Alla testade nötserum var negativa. Renserumen testades med två olika virus neutralisationstest som skiljde sig beträffande serum-virusinkubationstiden före inokuleringen i cellkulturrör. 12,6 % av proven som testades med en preinkuberingstid om en timme vid 37°C (P 37°C 1 t) var positiva. Utav de sera som testades med en preinkuberingstid om 24 timmar (P 37°C 24 t) var 23 % positiva. Den rätt höga frekvensen av antikroppar mot IBR°IPV viruset kan tyda på att viruset eller ett närbesläktat korsreagerande herpes virus förekommer inom renpopulationen i Finland.

(Received September 14, 1982).

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