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SEROLOGICAL EVIDENCE OF SOME BOVINE VIRUSES IN THE CARIBOU *(Rangifer tarandus caribou)* IN QUEBEC

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Abstract: The prevalence of antibodies to some bovine viruses of the respiratory and digestive systems were investigated in two caribou herds in Northern Quebec, Canada, in autumn of 1978 in one herd, and 1979 in another herd. The serum neutralization and hemagglutination inhibition techniques were used. Antibody to bovine viral diarrhea was the most prevalent in the two years (69.3% in 1978 and 60.7% in 1979), followed by bovine adenovirus 3 (42.9% and 17.8%), infectious bovine rhinotracheitis virus (39.6% and 14.2%) and coronavirus (13.3% in 1978 only). Antibody to parainfluenzavirus 3 was not detected.

INTRODUCTION

Evidence of virus infection in different species of wild ruminants has commonly been demonstrated by serological surveys [1,3,4,6,10,11,13] or by virus isolation.[14] To our knowledge, there has been no report on the infection of caribou by viruses of the respiratory or digestive systems. During autumn of 1978 and 1979, blood was collected from adult caribou *(Rangifer tarandus caribou)* in Northern Quebec, Canada. The purpose of this study was to determine whether antibodies to viral diseases, common in domestic ruminants, were present in caribou.

MATERIALS AND METHODS

Blood was obtained from animals harvested during the hunting season in the area of Georges River in Northern Quebec. The animals were 1.5-10.5 years old, based on teeth. They were from two separate caribou herds that were known to have had no direct contact with domestic ruminants for the past 25 years. Blood samples were collected by laboratory technicians from the Quebec Ministry of Fisheries and Tourism from 30 animals in 1978 and 28 animals in 1979. Serum was separated within 48 h and shipped in refrigerated containers to the laboratory where it arrived within 5 days. The serum samples were centrifuged at 1000 g for 15 min to clarify, inactivated at 56 C for 3 min and stored at -20 C.

The viruses used were bovine adenovirus 3 (BAV3) (WBR-1 strain), infectious bovine rhinotracheitis (IBR) (Cooper strain), bovine viral diarrhea (BVD) (Oregon C24V strain) and bovine parainfluenza 3 (PI3) (strain 4644-9, from Dr. M. Savan, Ontario Veterinary College) adapted for growth in MDBK cells, and Nebraska strain of coronavirus adapted for growth in VERO cells.

Antibody titres to IBR, BVD and BAV3 were determined by neutralization test in microtitre plates. The samples were tested in triplicate using two-fold serum dilutions prepared in minimum essential medium (MEM). An equal volume of the virus containing 100 median tissue culture infective doses ($TCID_{50}$) was mixed with the serum and incubated for one hour at 37 C. These were then added to an equal volume of MDBK cell suspension containing 160,000 cells/ml in MEM with 10% fetal bovine serum. Antibody titre to coronavirus was similarly determined in VERO cell cultures. The cultures were incubated in a CO_2 incubator for 4 days

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at 37 C and examined for cytopathic effect (CPE). Antibody titres were expressed as the highest serum dilution showing activity.

Antibody to PI3 was determined by hemagglutination inhibition in microtitre plates using 0.5% suspension of bovine erythrocytes in saline and 4 hemagglutinating units of PI3 antigen.

RESULTS

The results of antibody titres in sera from the two herds are summarized in Figure 1. Antibody to IBR was detected

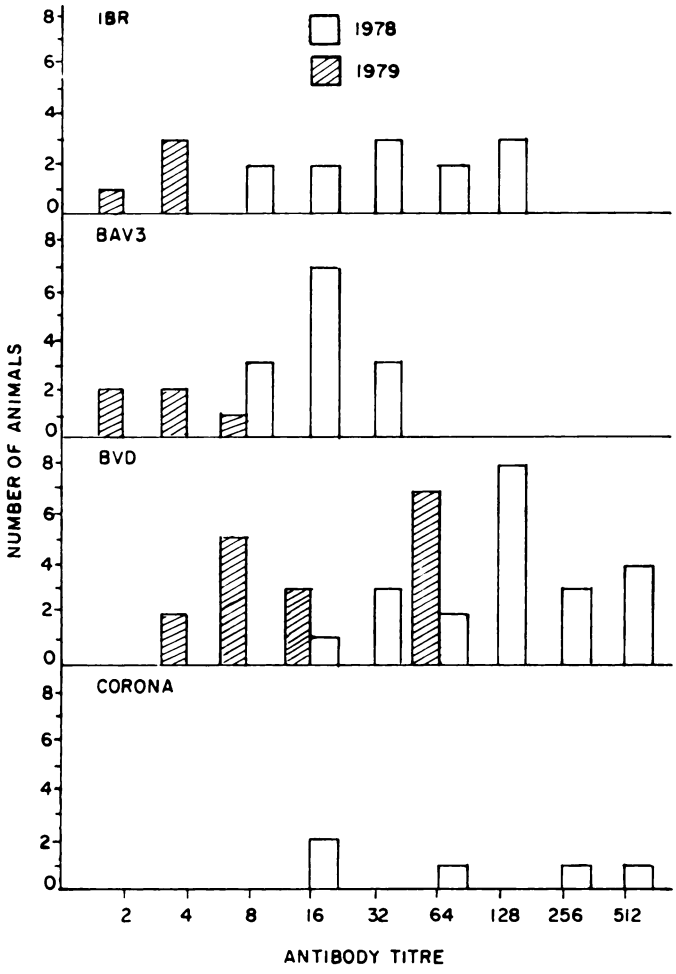


FIGURE 1. Prevalence of serum antibodies to infectious bovine rhinotracheitis virus (IBR), bovine adenovirus 3 (BAV3), bovine viral diarrhea (BVD) and bovine coronavirus in two caribou herds in autumn of 1978 and 1979. Titres are expressed as highest dilution showing activity.

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in 39.6% of the animals in 1978 and 14.2% in 1979. BAV3 antibody was prevalent in 42.9% of the animals in 1978 and 17.8% in 1979. Reactors to BVD were highly prevalent in both years with frequencies of 69.3% and 60.7%, respectively. In 1978 few animals were reactors to coronavirus (13.3%) and in 1979 the presence of this virus was not investigated. Antibody to PI3 was not detected.

DISCUSSION

Investigation of antibodies to IBR, BVD, PI3, BAV3, and coronavirus have not been reported for caribou although antibodies to these viruses occur in other wildlife species.[1,2,7,12,13] In this study, 86.7% of the animals examined in 1979 had antibodies to at least one of the viruses. Of interest is the absence of antibody to PI3 in caribou, although it is present in 83% of the cattle in Quebec (Elazhary, unpubl.). Antibody to this virus was also absent from the sera of several species of deer in Britain,[7] but it has been reported in pronghorns, bighorn sheep, deer and moose in North America.[1,4,5,10,12]

The origin of viral infections in the caribou is a subject of speculation. Because the herds have not been in direct contact with cattle or other domestic ruminants for at least the past 25 years, it seems likely that the viruses are maintained naturally in the caribou population. It is known that IBR and BVD infection in cattle frequently result in abortion and infertility.[8,9] Furthermore, infection of the lymphoid system in cattle by BVD may result in a decrease in the resistance of the animal to other infectious agents. The same is not known for caribou.

The objective of our study was limited to a serologic investigation; virus isolation was not attempted. The limitations of this approach are understood, nonetheless serologic evidence presented here shows a reasonable estimate of the infection of the caribou in Northern Quebec by these viruses. It would be interesting to investigate the role of these viruses in the pathogenesis of the disease in the caribou.

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