SURVEY FOR ANTIBODY TO INFECTIOUS BOVINE RHINOTRACHEITIS (IBR), BOVINE VIRUS DIARRHEA (BVD) AND PARAINFLUENZA 3 (PI3) IN MOOSE SERA

Authors: THORSEN, J., and HENDERSON, J. P.

Source: Journal of Wildlife Diseases, 7(2) : 93-95

Published By: Wildlife Disease Association

URL: https://doi.org/10.7589/0090-3558-7.2.93

SURVEY FOR ANTIBODY TO INFECTIOUS BOVINE RHINOTRACHEITIS (IBR), BOVINE VIRUS DIARRHEA (BVD) AND PARAINFLUENZA 3 (PI3) IN MOOSE SERA

J. THORSEN and J. P. HENDERSON, Department of Veterinary Microbiology and Immunology, Ontario Veterinary College, University of Guelph, Guelph, Ontario, Canada.

Abstract: Sera of 22 moose *(Alces alces)*, collected in the Cypress Hills Park in Alberta, were tested for Infectious Bovine Rhinotracheitis (IBR), Bovine Virus Diarrhea (BVD) and Parainfluenza 3 (PI3) antibodies. Neutralizing antibodies to BVD were detected in four of the 22 sera and hemagglutination-inhibiting antibodies to PI3 were detected in three of the 22 sera. No neutralizing antibody to IBR was found in any of the sera.

INTRODUCTION

As part of a study of possible infections of moose by various bovine microbial pathogens, a number of moose sera were tested for antibodies to IBR, BVD and PI3. The moose sera were collected in Cypress Hills Provincial Park of southeastern Alberta. In most areas, the Cypress Hills Park borders on ranching and grazing areas. In addition, cattle are allowed to graze within the park during the summer.

MATERIALS AND METHODS

Sera: The 22 moose sera tested were collected from moose shot in the Cypress Hills Park in February, 1970.

Viruses: The strain of bovine virus diarrhea (BVD) was Oregon C24V,[4] adapated to growth in embryonic bovine spleen cell cultures (EBS). The parainfluenza 3 virus (PI3) and the infectious bovine rhinotracheitis virus (IBR) were field isolates from cattle, propagated in EBS culture.

Serological methods: All sera were heated at 56 C for 30 minutes prior to testing for virus neutralization. Initially, all sera were tested at a 1:5 dilution for neutralizing activity against 100 TCD_{50} of IBR and BVD viruses. Samples which neutralized either virus at the 1:5 dilution were tested at higher dilutions, using a varying serum-constant virus method. The serum-virus mixtures were incubated at room temperature for one hour prior to inoculation into cell cultures.

Sera were further treated with M/90 potassium periodate followed by 1% glycerol-saline for testing hemagglutination-inhibiting (HI) activity. The initial screening dilution for HI activity against four agglutinating doses of PI3 was 1:8. A microtiter HI technique was used with bovine red blood cells as the indicator system. Those sera which inhibited hemagglutination by PI3 at the 1:8 dilution were tested for HI activity at higher dilutions.

The antibody titers recorded are the reciprocals of the highest serum dilutions showing virus-neutralizing or hemagglutination-inhibiting activity.

Of the 22 sera tested, four were found to have virus neutralizing activity against BVD. Three sera were positive for HI activity against PI3. Two of these three sera were among those showing VN activity against BVD. None of the sera tested had demonstrable neutralizing antibody against IBR. The results are tabulated in Table 1.

Table 1. Moose sera with antibody to BVD and PI3. Titers are expressed as the reciprocal of the highest dilution showing activity.

Serum Number	Titer against BVD (VN)
W30-70 (CHPM2)	5
W39-70 (CHPM14)	40
W46-70 (CHPM24)	5
W87-70 (CHPM5)	100
	Titer against PI3 (HI)
W32-70 (CHPM4)	8
W39-70 (CHPM14)	8
W87-70 (CHPM5)	16

DISCUSSION

While investigations of antibodies to IR, BVD and PI3 in moose sera have not been reported, their occurrence in the sera of other species has been the subject of several studies.

Neutralizing antibody to IBR has been detected in the sera of four of 198 white-tailed deer,[3] and 18 of 50 mule deer.[2] In other studies, no IBR antibody was demonstrated in the sera of white-tailed deer,[5] fallow deer[7] or reindeer.[1]

Neutralizing antibody to BVD virus was detected in some of the same serological studies cited above[3,5,7] as well as in the sera of roe deer in Hungary.[8] No BVD antibody was detected in reindeer sera.[1]

Hemagglutination - inhibiting antibody to PI3 was found in a high percentage of Indian deer but in a very low percentage of U.S. deer.[9] In other studies no PI3 antibody was detected is white-tailed deer[5] or reindeer.[1]

Although the number of moose sera tested was small, the observation that 4/22 samples were positive for antibodies to BVD and 3/22 for antibodies to PI3 suggests that moose are capable of being infected by BVD and PI3. The positive sera were collected from moose in ranching and grazing areas on the southwest edge of Cypress Hills Park. Moose in these areas would have a good chance for contact with cattle.

There was no correlation between the serological results and any evidence of clinical disease and necropsy findings in the moose. In some of the moose in this study, superficial erosions of the esophageal mucosa were found at necropsy. On histological examination, these erosions appeared to be associated with plant particles embedded in the mucosa, and the lesions were presumed to be traumatic.[6] The moose in which these lesions occurred did not have antibody against BVD virus. Whether those moose with antibody to BVD and PI3 may have undergone clinical disease prior to the time they were shot is open to speculation. Whether moose are capable of transmitting these viruses to cattle, and thus acting as a reservoir of infection for cattle, also remains to be determined.

Acknowledgements

The authors gratefully acknowledge the assistance of M. W. Barrett, Alberta Department of Lands and Forests, Fish and Wildlife Division, and L. H. Karstad, Department of Pathology, Ontario Veterinary College, University of Guelph, in supplying the sera for testing.

LITERATURE CITED

1. BOLTON, W. D. and R. W. MURRAY. 1964. An immunity study on a reindeer herd. Am. J. Vet. Res. *25:* 1783-1784.
2. CHOW, T. L. and R. W. DAVIS. 1964. The susceptibility of mule deer to infectious bovine rhinotracheitis. Am. J. Vet. Res. *25:* 518-519.
3. FRIEND, M. and L. G. HALTERMAN. 1967. Serologic survey of two deer herds in New York State. Bull. Wildl. Disease Assoc. *3:* 32-34.
4. GILLESPIE, J. H., J. A. BAKER and K. McENTEE. 1960. A cytopathogenic strain of virus diarrhea virus. Cornell Vet. *50:* 73-79.
5. KAHRS, R., G. ATKINSON, J. A. BAKER, L. CARMICHAEL, L. COGGINS, J. GILLESPIE, R. LANGER, V. MARSHALL, D. ROBSON and B. SHEFFY. 1964. Serological studies on the incidence of bovine virus diarrhea, infectious bovine rhinotracheitis, bovine myxovirus parainfluenza 3 and *Leptospira pomona* in New York State. Cornell Vet. *54:* 360-369.
6. KARSTAD, L. H. 1970. Personal communication.
7. MUNDAY, B. L. 1966. Diseases of Tasmania's free-living animals. Res. Bull. #5, Tasmania Department of Agriculture.
8. ROMVARY, J. 1965. Incidence of virus diarrhoea among roes. Acta. Vet. Hung. *15:* 451-455.
9. SHAH, K. V. and G. B. SCHALLER. 1965. Antibodies to Myxovirus Parainfluenza 3 in sera of wild deer. Bull. Wildl. Disease Assoc. *1:* 31-32.

Received for publication August 31, 1970