

ANTIBODIES TO BOVINE BACTERIAL AND VIRAL PATHOGENS IN PRONGHORNS IN ALBERTA, 1983

Authors: Kingscote, B. F., and Bohac, J. G.

Source: Journal of Wildlife Diseases, 22(4) : 511-514

Published By: Wildlife Disease Association

URL: <https://doi.org/10.7589/0090-3558-22.4.511>

The BioOne Digital Library (<https://bioone.org/>) provides worldwide distribution for more than 580 journals and eBooks from BioOne's community of over 150 nonprofit societies, research institutions, and university presses in the biological, ecological, and environmental sciences. The BioOne Digital Library encompasses the flagship aggregation BioOne Complete (<https://bioone.org/subscribe>), the BioOne Complete Archive (<https://bioone.org/archive>), and the BioOne eBooks program offerings ESA eBook Collection (<https://bioone.org/esa-ebooks>) and CSIRO Publishing BioSelect Collection (<https://bioone.org/csiro-ebooks>).

Your use of this PDF, the BioOne Digital Library, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at www.bioone.org/terms-of-use.

Usage of BioOne Digital Library content is strictly limited to personal, educational, and non-commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

BioOne is an innovative nonprofit that sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to critical research.

ANTIBODIES TO BOVINE BACTERIAL AND VIRAL PATHOGENS IN PRONGHORNS IN ALBERTA, 1983

B. F. Kingscote¹ and J. G. Bohac

Agriculture Canada, Animal Diseases Research Institute,
P.O. Box 640, Lethbridge, Alberta T1J 3Z4, Canada

ABSTRACT: Sera from 210 pronghorns (*Antilocapra americana*) ranging in southeastern Alberta were tested for antibodies to disease agents present in indigenous cattle. No antibodies to *Brucella abortus*, *Leptospira interrogans* serovars *pomona*, *hardjo*, or *grippotyphosa*, or infectious bovine rhinotracheitis virus were found. Antibodies at prevalences of 43.8% and 49.2% were detected to bovine virus diarrhea (BVD) and parainfluenza type 3 (PI-3) viruses, respectively. The much higher prevalence of BVD virus antibodies in cattle than in pronghorns, and the occurrence of clinical bovine PI-3 infection in the study area, suggest that cattle may be a source of infection to the pronghorns.

INTRODUCTION

Pronghorns share cattle range over the short grass prairie region of southern Alberta. Bovine diseases which are of clinical importance in the region include infectious bovine rhinotracheitis (IBR) (Anonymous, 1983), parainfluenza type 3 (PI-3) (Bohac, unpubl. data), bovine virus diarrhea (BVD) (Stone et al., 1984), and leptospirosis (Kingscote, 1985). Bovine brucellosis was still indigenous to Alberta in 1983 when this study was conducted.

Antibodies to IBR virus and PI-3 virus were detected by Barrett and Chalmers (1975) at prevalences of 88% and 100%, respectively, in a herd of 33 pronghorns tested in 1970 in southwestern Saskatchewan. None of 78 animals from a herd in southeastern Alberta, which they tested in the following 2 yr (1971-1972), had antibodies to either virus. Thorsen et al. (1977) failed to isolate IBR virus from six captive pronghorns treated with dexamethasone, and from 50 free-ranging pronghorns in Alberta, although they isolated PI-3 virus from the nares of four of these animals. BVD antibodies were found at a prevalence of 3-4% in sera tested from

pronghorns in Saskatchewan and Alberta (Barrett and Chalmers, 1975).

Antibody to *Leptospira interrogans* serovar *hardjo* was found in 3.6% of 544 sera from pronghorns in Colorado, the reactor prevalence varying with the antibody prevalence in contact cattle (Collins et al., 1981). Experimental exposure of six pronghorns to serovar *hardjo* proved the capability of these animals to shed leptospires in urine for more than a year (Hoffman, pers. comm.). Brucellosis appears to be very rare in pronghorns in the United States (Ray, 1979).

The study reported here was designed primarily to identify possible reservoir hosts for the widespread bovine pathogen, *Leptospira interrogans* serovar *hardjo*. It was also extended to the viral diseases of cattle mentioned above which are causing increasing concern in Alberta. Brucellosis testing was included because the last diagnosed cases in Alberta occurred in the vicinity of the antelope range where the study was conducted.

MATERIALS AND METHODS

The survey was conducted in Alberta Fish and Wildlife Hunting Area B (Fig. 1) in the fall of 1983. A total of 225 blood samples were collected from pronghorns by hunters and submitted to depots at strategic access routes to the hunting area. The samples were refrigerated until they were tested. A field kit supplied to

Received for publication 26 December 1985.

¹ Present address: Box 1468, Innisfail, Alberta T0M 1A0, Canada.

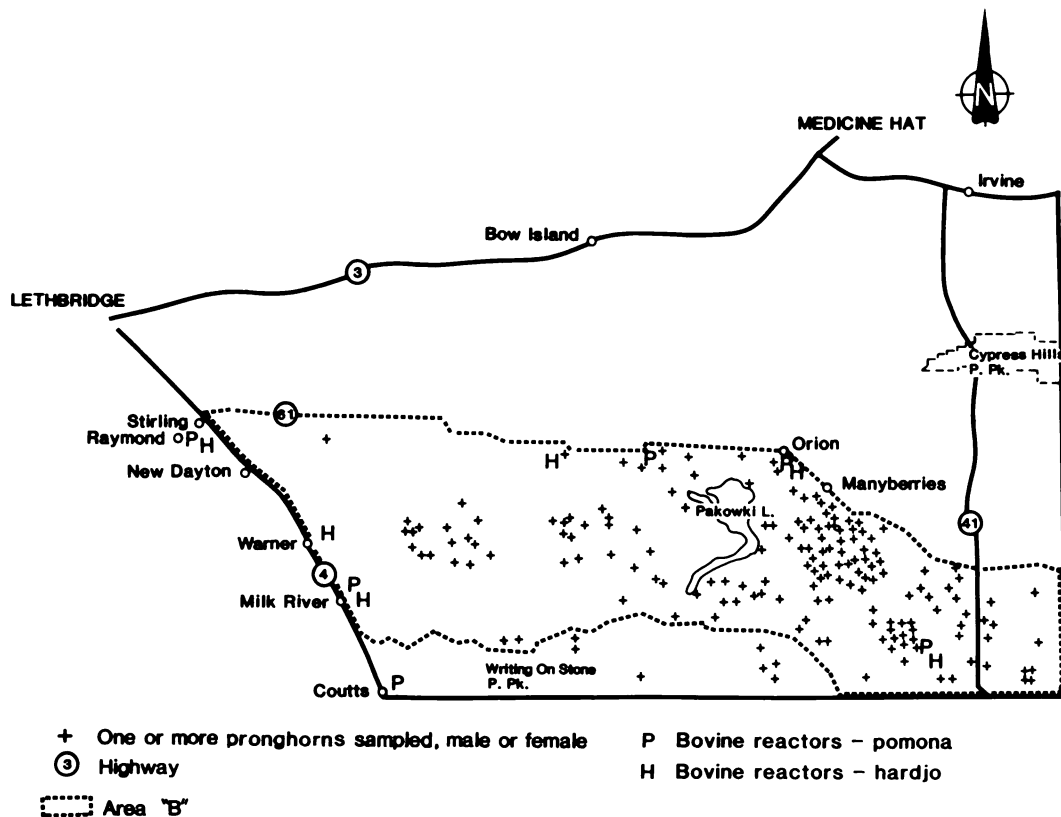


FIGURE 1. Distribution of pronghorn sampling in relation to bovine leptospirosis in southeastern Alberta, 1983.

each hunter contained an information and question sheet which enabled the investigator to map the kills. At the laboratory, serum was separated from clots, filtered to remove contaminants, and stored frozen. Thus, 192 samples were fit for *Brucella* tests, 201 for viral tests, and 210 for leptospiral tests.

Serum neutralization (SN) tests for antibodies to IBR and BVD viruses were performed in a microtiter system. The IBR modified SN test was conducted as described by Cho and Bohac (1985), using the Colorado strain of IBR virus. For the BVD SN test, the NADL strain of BVD virus was used. In the IBR SN test, serum-virus mixtures were incubated for 24 hr at 37 C, then cultivated with bovine fetal kidney cells for 3 days and evaluated for cytopathic effect. In the BVD SN test, serum and virus were incubated for 1 hr at room temperature, and the presence of infective virus was assayed on secondary bovine fetal spleen cells after an incubation period of 7 days. PI-3 inhibiting antibody was detected by the hemagglutination-inhibition microtest

(HI) procedure of Hierholzer et al. (1969). Heated test sera were pretreated with kaolin to remove non-specific inhibitors. Four hemagglutinating units of SF strain of PI-3 and 0.4% of bovine red blood cell suspension were added to the test. Results were evaluated after 2 hr incubation at room temperature and again after overnight storage at 4 C.

Leptospiral antibodies to serovars *pomona*, *hardjo*, and *grippityphosa* were assayed by the microscopic agglutination (MA) test using a serum dilution of 1/50 to give a final screening dilution of 1/100 in the test. Agglutination of 50% of the antigen was the criterion for a reaction. *Brucella abortus* antibodies were assayed by the standard buffered antigen plate test at serum dilution of 1/1.75.

RESULTS

Pronghorns were sampled from all parts of the study area where they occurred (Fig. 1).

TABLE 1. Prevalence and titers of antibodies in pronghorn serum against three viral pathogens.

Virus	Num- ber tested	Negative		Positive		Titer range and prevalence (%)			
		No.	%	No.	%				
IBR	201	201	100	0	0	—	—	—	—
BVD	201	113	56.2	88*	43.8	1:3–9 46	1:27–81 32	1:243–729 8	1:2,187–6,561 2
PI-3	201	102	50.8	99*	49.2	1:10–20 69	1:40–80 19	1:160–320 6	1:≥640 5

* Dual reactions to BVD and PI-3 viruses occurred in 52 (25.9%) of sera.

The results of serological tests for viral antibodies are summarized in Table 1. None of the sera had antibodies to IBR virus. Antibodies to BVD and PI-3 viruses were demonstrated in 88 (43.8%) and 99 (49.2%), respectively, of the sera tested. Thirty-six (17.9%) had BVD virus antibody only and 47 (23.4%) had PI-3 virus antibody only. Dual reactions were detected in 52 (25.9%) of the sera. Sixty-six (32.8%) animals were free of any antibody under test. High titers to BVD virus (greater than 1:81) were found in sera that reacted to this virus only. High titers to PI-3 virus (greater than 1:80) were distributed evenly between sera reacting to PI-3 virus alone and sera reacting to both PI-3 and BVD viruses. No antibodies to leptospiral or brucella antigens were found in any of the sera tested.

DISCUSSION

Comparison of prevalences of viral antibodies in the pronghorns surveyed in 1983 and in 1971–1972 indicated that exposure to IBR virus had either not occurred or not evoked a measurable response. IBR virus occurs in cattle throughout the province, especially in feedlots north of the study area. PI-3 antibodies have appeared in the pronghorn population, and BVD antibodies have increased 10-fold in prevalence. Stone et al. (1984) reported that the prevalence of BVD virus antibodies in cattle in Alberta reached a peak of 94.9% in the south. The

prevalence of PI-3 virus antibodies in cattle in Alberta is not known.

Results of the 1971–1972 and 1983 pronghorn surveys, as well as studies on bighorn sheep (*Ovis canadensis*) (Howe et al., 1966; Parks et al., 1972) do not incriminate either species as a source of IBR virus for cattle. DeArment (1968) reported similarly that IBR virus infection was extremely rare in pronghorns in Texas. The presence of BVD and PI-3 virus antibodies in pronghorns indicates only the response of the host to exposure. The prevalence of BVD antibodies in the study area is much higher in cattle than in pronghorns. In 1983, PI-3 virus was found by Bohac (unpubl. data) to be the etiologic agent in an outbreak of bovine respiratory disease on a farm in the pronghorn range. Cattle with clinical PI-3 or BVD virus infection could have served as a source of viral exposure for the pronghorns.

Considering the known occurrence of infections by *Leptospira interrogans* serovars *pomona* and *hardjo* in cattle on ranches and grazing leases around Orion, One Four, and Pakowki Lake (Fig. 1), the absence of antibodies to *Leptospira* in all pronghorns tested was remarkable. It is consistent with the findings of Barrett and Chalmers (1975), and it suggests the existence of a transmission barrier between cattle and pronghorns. Such a barrier might be due to the aridity of the range and the lack of intimate contact between the species, leaving transmission more de-

pendent on sexually related contact, as Kiktenko (1985) suggests.

ACKNOWLEDGMENTS

The authors acknowledge with thanks the editorial comments of Dr. J. A. Bradley and the technical assistance of Mr. D. L. Sanderson, Mr. W. A. Pickering, Mrs. N. Dow, Mrs. I. Harding, and Mrs. H. Grisack. Thanks are expressed also to Alberta Fish and Wildlife Division, the hunters, and the volunteer depot operators at One Four, Manyberries, and Elkwater, whose co-operation made the collection of samples possible.

LITERATURE CITED

- ANONYMOUS. 1983. Animal Health Division Annual Report. Alberta Agriculture, Edmonton, Alberta, Canada, 171 pp.
- BARRETT, M. W., AND G. A. CHALMERS. 1975. A serologic survey of pronghorns in Alberta and Saskatchewan, 1970-1972. *J. Wildl. Dis.* 11: 157-163.
- CHO, H. J., AND J. G. BOHAC. 1985. Sensitivity and specificity of an enzyme-linked immunosorbent assay for the detection of infectious bovine rhinotracheitis viral antibody in cattle. *Can. J. Comp. Med.* 49: 189-194.
- COLLINS, M. T., T. A. GALLEGOS, J. S. REIF, AND W. T. ADRIAN. 1981. Seroepidemiology of *Leptospira interrogans* serovar *hardjo* in Colorado antelope and cattle. *J. Am. Vet. Med. Assoc.* 179: 1136-1139.
- DEARMENT, R. 1968. Antelope herd population dynamics versus disease in the Texas Panhandle. *Proc. Antelope States Workshop. Wyoming Fish and Game Commission* 3: 48-52.
- HIERHOLZER, J. C., M. T. SUGGS, AND E. C. HALL. 1969. Standardized viral hemagglutination and hemagglutination-inhibition tests. *Appl. Microbiol.* 18: 824-833.
- HOWE, D. L., G. T. WOODS, AND G. MARQUIS. 1966. Infection of bighorn sheep (*Ovis canadensis*) with myxovirus parainfluenza-3 and other respiratory viruses. Results of serologic tests and culture of nasal swabs and lung tissue. *Bull. Wildl. Dis. Assoc.* 2: 34-37.
- KIKTENKO, V. S. 1985. Influence of the mechanism of transmission of the infective agent on the aetiological structure of leptospiral foci. *J. Hyg. Epidemiol. Microbiol. Immunol. (Prague)* 29: 77-82.
- KINGSCOTE, B. F. 1985. Leptospirosis in livestock. *Can. Vet. J.* 26: 235-236.
- PARKS, J. B., G. POST, T. THORNE, AND P. NASH. 1972. Parainfluenza-3 virus infection in Rocky Mountain bighorn sheep. *J. Am. Vet. Med. Assoc.* 161: 669-672.
- RAY, W. C. 1979. Brucellosis (due to *Brucella abortus* and *B. suis*). In *CRC Handbook Series in Zoonoses*, J. H. Steele (ed.). CRC Press, Inc., Boca Raton, Florida, pp. 99-223.
- STONE, M. W., T. L. CHURCH, AND G. PAPP-VIDD. 1984. Bovine virus diarrhea survey for antibody prevalence. *An. Health Div. News, Alberta Agriculture*, May, pp. 8-11.
- THORSEN, J., L. KARSTAD, M. W. BARRETT, AND G. A. CHALMERS. 1977. Viruses isolated from captive and free-ranging wild ruminants in Alberta. *J. Wildl. Dis.* 13: 74-79.