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Source: Journal of Wildlife Diseases, 14(3) : 329-332

Published By: Wildlife Disease Association

URL: https://doi.org/10.7589/0090-3558-14.3.329

PARASITES AND DISEASES OF BISON IN CANADA IV. SEROLOGIC SURVEY FOR BRUCELLOSIS IN BISON IN NORTHERN CANADA.

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Abstract: Serum samples collected from 2,365 free-roaming hybrid bison *(Bison bison bison x Bison bison athabascae)* in Wood Buffalo National Park and adjacent areas in the Northwest Territories were tested for brucellosis during the period 1959 to 1974. A positive reaction was obtained in 739 (31.2%) of the animals tested. The overall effect of brucellosis on this free-roaming bison population is unknown. The authors also dealt with some of the actual and possible consequences of the disease in this population.

INTRODUCTION

The majority of the bison in Canada are in Wood Buffalo National Park, a 44,980 km area straddling the Alberta-Northwest Territories border, and in areas adjacent to the Park boundary. This is mostly a hybrid population as a result of cross breeding between local wood bison *(Bison bison athabascae)* and plains bison *(Bison bison bison)* introduced into the Park between 1925 and 1928. Over the years, a small hybrid bison population became established on the east side of the Slave River, in the vicinity of Hook Lake, in the Northwest Territories.

Brucellosis is a well-recognized problem among bison herds in North America. Rush[8] reported that 58 of 110 (53%) bison serum samples obtained at slaughter in Yellowstone National Park were considered brucellosis positive. Measurement of foetuses obtained at the slaughter demonstrated a great variation in size indicating a prolonged rut period. This extended rut may have been an effect of brucellosis, resulting in frequent returns to service.

Corner and Connell[2] reported that 111 of 343 (32%) serum samples obtained during bison slaughters at Elk Island National Park from 1951 to 1956 were positive for brucellosis. In comparing the conception rate of mature animals at slaughter, with the estimated calf crop, the difference observed possibly could be attributable to the effect of brucellosis in the Elk Island National Park bison herd.

Fuller[3] compared slaughter conception rates in bison herds in Elk Island National Park, National Bison Range, Yellowstone National Park and Wood Buffalo National Park. The conception rates in Elk Island National Park and the National Bison Range were very similar, 85 and 86%, respectively. In Wood Buffalo National Park and Yellowstone National Park, both with unknown total populations, the conception rate was 65%. Brucellosis is present in the bison populations of these latter two parks and may explain the relatively low conception rate. The anticipated calf crop in Wood Buffalo National Park is 35 to 40%, whereas the observed calf crop is from 20 to 25%. The difference may be due to abortion in late pregnancy from March to May.

Testing for brucellosis in bison in northern Canada was first conducted on

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animals slaughtered during the winter of 1955. Of 11 sera tested, 3 were positive.[2] Subsequently, the *Brucella* plate test conducted on 200 and 640 bison slaughtered in 1957 and 1958 yielded reactor rates of 39 and 49.8%, respectively.[5,6]

The object of this note is to report on the results of brucellosis tests conducted on free-roaming bison in Wood Buffalo National Park and in adjacent areas in the Northwest Territories from 1959 to 1974.

MATERIALS AND METHODS

Blood samples were collected at slaughters in Wood Buffalo National Park and at roundups at Hook Lake in the Northwest Territories. At slaughters the blood was collected from the heart during processing in the abattoir or from the jugular vein at field kills. At roundups the blood was obtained by incision of one of the coccygeal veins. Precautions were taken to prevent hemolysis of the blood samples through exposure to low or high temperatures. Following clotting, the serum was removed, transferred to a clean tube and kept under refrigeration until examination. From 1959 to 1974, 2,365 bison serum samples were collected.

Sera were examined by the tube serum agglutination test, using a *Brucella abortus* antigen prepared by the Animal Diseases Research Institute, Animal Pathology Division, Agriculture Canada. Sera were tested at serum dilutions of 1:25, 1:50, 1:100 and 1:200.

RESULTS AND DISCUSSION

The results, with the reactor rate varying from a low in 1965 of 6.1% to a high in 1974 of 62%, are presented in Table 1.

The gregarious nature of bison probably aids the dissemination of this disease. Presumably, like the bovine, infected bison shed *Brucella* in infected uterine discharges and in the placentas, contaminating water and feed supplies. Animals such as the wolf, coyote and fox may act as mechanical carriers of the disease by shedding the organism in their excreta after ingesting aborted

TABLE 1. Result of tube agglutination test for brucellosis in bison in northern Canada.

Wood Buffalo National Park	Year	Total tested	Negative	Suspicious	Positive	Percentage positive
	1959	311	163	32	116	37.3%
	1960	76	29	9	38	50.0%
	1961	378	195	22	161	42.6%
	1962	63	41	9	13	20.6%
	1963	143	118	6	19	13.3%
	1964	193	149	10	34	17.6%
	1965	131	112	11	8	6.1%
	1966	161	121	13	27	16.8%
	1967	333	240	19	74	22.2%
	1971	164	97	2	65	39.6%
	1974	113	35	8	70	62.0%
Hook Lake, N.W.T.						
	1970	27	19	1	7	25.9%
	1974	272	150	15	107	39.3%
		2365	1469	157	739	31.2%

foetuses or placentas. Neiland *et al.*[4] have suggested that dogs play a role in the epidemiology of brucellosis in Eskimos in Alaska. However, McCaughey reported that in Argentina it has not been possible to determine to what extent, if any, serologically positive foxes contribute to the dissemination of *Brucella*.

The disease may be inapparent in cattle, or may be evidenced by abortion, with placental retention, frequent return to service, metritis and sterility being common sequelae. Orchitis and epididymitis occur occasionally. Arthritis is a clinical feature also occasionally associated with the disease.

Corner and Connell[2] reported abortions and enlarged testicles in the Elk Island National Park herd. Abortion has been reported only once, but enlarged testicles frequently have been observed in older bulls in the northern free-roaming herds. However, in the period 1959 to 1974 few of these aged bulls were captured during roundups or field slaughters. As a result the testicular pathology was recorded primarily from young males. Testicular enlargement was found in 22 of 496 males slaughtered over a period of 4 years. All abnormal testicles were collected. Serum from 17 of these animals was tested for brucellosis and 13 gave a positive reaction. Bacteriological examination of 7 abnormal testicles failed to detect any *Brucella* organisms.[1]

Presently, brucellosis has almost been eradicated from herds of plains bison in Canada's western national parks, where the animals are kept in relative confinement under fence. The disease is still prevalent in the free-roaming bison populations in northern Canada. While it poses no threat to the survival of the population, brucellosis likely would jeopardize any attempt to raise cattle on ranges utilized by the bison. Moreover, it is a public health threat in areas where the animals might be hunted.

Acknowledgements

Thanks are extended to Dr. Paul Boulanger, Animal Diseases Research Institute, Health of Animals Branch, Agriculture Canada, for the results of the brucella tests performed on 311 bison sera collected in 1959.

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Received for publication 15 November 1977

ERRATUM

Parasites and diseases of bison in Canada. IV. Serologic survey for brucellosis in bison in northern Canada.

Journal of Wildlife Diseases Vol. 14 (329-332), July 1978.

Under RESULTS and DISCUSSION p. 330

after "are presented in Table 1" (1st paragraph) add a second paragraph reading as follows:

"To interpret these results it is necessary to explain the mechanics of obtaining bison for slaughter and or test. In these instances those animals in the vicinity of the facilities are herded into the corrals with no selection of animals based on age or sex. This can result in the capture of animal groups which do not necessarily reflect a cross sectional make up of the bison population at large. This in turn may yield brucellosis serological test results that indicate a trend which is not truly reflective of the population."