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SEPTICEMIC PASTEURELLOSIS (HEMORRHAGIC SEPTICEMIA) IN THE AMERICAN BISON: A SEROLOGIC SURVEY

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In December 1911, 22 of 171 American bison (commonly called buffalo) in the Yellowstone National Park died of hemorrhagic septicemia (U.S. Department of Interior, 1911-12, Administrative Report, *1:* 645-646; Mohler, J. and A. Eichhorn, 1912-13, Am. Vet. Rev., *42* and *43:* 409-418). Although the disease is common in ruminants in Asia and Africa, it has been confirmed in only 3 epizootics in the United States since 1911, twice in buffalo (Gochenour, W. S., 1924, J.A.V.M.A., *65:* 433-441; Heddleston, K. L. *et al.*, 1967, Am. J. Vet. Res., *28:* 1003-1012), and once in young dairy cattle (Kradel, D. C. *et al.*, 1969, Vet. Med., *64:* 145-147).

The purpose of this study was to determine the presence of antibody against *Pasteurella multocida* in serum samples from 5 buffalo herds. We used as an antigen a strain of *P. multocida* that was isolated from a buffalo in 1922.

Materials and Methods

Serums were tested from the following herds: 1) National Bison Range, Montana (20 samples); 2) Custer State Park, South Dakota (120 samples); 3) Wichita Wildlife Refuge, Oklahoma (76 samples); 4) Roosevelt National Park, North Dakota (36 samples); and 5) private herd, Banner County, Nebraska (55 samples). All serum samples were collected in November and December 1967, except those from herd 4 which were collected in October 1966. The serum was packaged at point of origin and shipped to the National Animal Disease Laboratory where 0.01% thimersol and 0.06% phenol were added before cold room storage. Not all tests were performed with each serum sample.

Pasteurella multocida strain M-1404 (Heddleston, K. L. *et al.*, 1967, *ibid.*) was used for preparing antigens and as a challenge organism in the passive immunity test. Passive immunity in mice and serum-plate tests (Heddleston, K. L. *et al.*, 1967, *ibid.*), double diffusion precipitin test (Heddleston, K. L. and L. P. Watko, 1965, Avian Diseases *9:* 367-376), and the indirect hemagglutination test (Carter, G. R., 1955, Am. J. Vet. Res., *16:* 481-484) using the Microtiter system (Cooke Engineering Co., Alexandria, Va.) were performed as previously described. Serum from bovine calves were used as positive and negative control serum in each test.

Results and Discussion

Results are presented in Table 1. The data show that serums from buffalo in 4 of the 5 herds had significant levels of antibody indicating exposure to this organism. Results of the different serologic tests did not always agree. Results selected to show differences are presented in Table 2. In herd 1 in which an epizootic occurred (Heddleston, K. L. *et al.*, 1967, *ibid.*), all 9 serum samples contained protective antibodies. In some instances, questionable results were obtained with 0.1 ml of serum, but when the serum dose was increased to 0.2 ml, all mice were immune.

The results of the indirect hemagglutination test agreed more often with the passive immunity test than did the results of the serum-plate or double diffusion test. On a herd basis, therefore, the most practical test would be the indirect hemagglutination. On an individual animal basis, the passive immunity test is the most reliable.

TABLE 1. *Summary of results of serologic studies*

Buffalo herd No.	Test			
	Passive immunity	Indirect hemagglutination	Plate agglutination	Double diffusion precipitin
1	9/9*	10/15	7/17	1/17
2	9/16	19/116	13/120	6/115
3	4/8	12/51	10/67	4/64
4	12/35	9/34	3/33	2/29
5	0/9	4/45	5/33	0/52

* = No. of serum positive/No. serum tested.

TABLE 2. *Comparison of results of serologic tests using selected serum samples*

Serums	Passive immunity		Indirect hemagglutination	Plate agglutination	Double diffusion precipitin
	0.1 ml[a]	0.2 ml			
			Herd 1		
934	3[b]	0	80[c]	—	—
937	2	....[d]	40	+	—
939	3	0	—	+	+
940	4	0	40	—	—
942	3	0	80	+	—
948	1	....	80	—	—
949	2	....	40	+	—
950	4	0	20	+	—
951	2	....	80	....	—
			Herd 4		
1	1	....	80	—	—
3	4	....	—	—	—
5	5	....	—	—	—
7	0	....	—	—	—
8	5	....	—	—	—
9	2	....	—	—	—
12	2	....	320	+	—
25	0	....	20	+	—
27	1	....	80	+	—
33	0	....	40	—	—

[a] = amount of serum injected intraperitoneally; [b] = No. of mice out of 5 that died (10 of 10 controls died); [c] = reciprocal of highest final positive serum dilution; [d] = no test.

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