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SOME HEMATOLOGIC AND BLOOD CHEMISTRY VALUES IN TWO HERDS OF AMERICAN BISON IN KANSAS¹

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Abstract: The data presented are compiled from two herds of American bison (*Bison bison*) in Kansas. In this study there were differences in the mean values of white blood cell count, neutrophil percentage, lymphocyte percentage and cholestrol, alkaline phosphatase, specific glutamic-oxalacetic transaminase concentrations between the age groups of animals under 2 years of age and bison over 2 years old. Differences in the two age groups paralleled those found in Jersey and Hereford cattle. Packed cell volume and hemoglobin concentration was considerably higher than found in domestic Bovidae. More data is needed from other bison herds in this country to better describe the range of normal variation in individuals, population and age groups of *B. bison*.

INTRODUCTION

As herds of bison are becoming increasingly popular, the need for standards upon which to evaluate both hematology and blood chemistry samples from these animals has become important.

MATERIALS AND METHODS

Values presented were taken from two populations of American bison (*B. bison*) in the state of Kansas. Sixty-one samples were drawn from various age groups from a random sampling of a herd approximately 300 bison which are allowed to roam freely on Maxwell Game Refuge in south central Kansas and 24 samples were obtained from a heard of government-owned bison kept at Ft. Riley, Kansas; 18 animals kept on 70 ha of a fenced-in tract of range land and a group of six animals kept on 2 ha for public viewing.

In October of 1973, blood samples were drawn from the jugular and tail

veins of 77 bison which were restrained in a chute without tranquilization. Due to the amount of blood required to complete both hematology and blood chemistry determinations, not all bison had both sets of tests run.

Seven milliliter volumes of blood were placed in tubes containing premeasured amounts of K-EDTA anticoagulant. These samples were cooled and tested within 12 hours. Packed cell determinations were performed by the microhematocrit method. Hemoglobin values were obtained by using the standard procedure for cyanmethemoglobin determination on a Coleman Junior II photometer.² White blood counts were made on a Coulter ZBI Electronic Cell Counter³ and differential counts were made from Wright-stained blood smears examined under oil immersion using standard counting techniques.

The samples drawn for blood chemistry were placed in test tubes, stoppered, cooled and allowed to clot before centrifugation. After centrifugation 3-4 ml of

¹ The opinion or assertions contained herein are the private views of the author and are not to be construed as official or as reflecting the views of the Department of the Army or the Department of Defense.

² Coleman Instrument Corporation, 42 Madison Street, Maywood, Ill. 60153.

³ Coulter Diagnostics, 740 W. 83rd, Hialeah, Florida 33014.

serum was removed, frozen, shipped to the U.S. Army Medical Laboratory at Ft. Sam Houston, Texas, and tested during the next 4 month on a SMA 12/60.⁴

RESULTS

Results of both the hematology and blood chemistry are presented for two age groups, bison 9 months to 2 years old and those animals 2 years and older. No significant differences were related to sex in the two groups; however, there

were several significant differences ($P < .05$) in blood values between the two age groups. The hematology mean values, range and standard deviation for 29 bison 2 years of age and under are presented in Table 1. The blood chemistry values for 12 bison 2 years of age and under are presented in Table 2. Mean, range, and standard deviations on blood chemistry values were calculated on 25 adult bison (Table 4) and hematology determinations were made on 47 adult male bison samples (Table 3).

TABLE 1. Hematological values of bison under 2 years of age (29 samples).

		Mean	Range	Standard Deviation
PCV	%	49.8	12.5-19.0	1.3
HGB	g/100ml ⁵	16.6	12.5-19.0	1.3
WBC	cells/mm ³ ⁶	8000	4000-14200	2400
PMN	%	34	7-55	10
Lymph.	%	56	31-93	5
Eos.	%	7	1-22	5
Mono.	%	2	1-4	2
Baso.	(Only an occasional cell noted)			

TABLE 2. Blood chemistry values of bison under 2 years of age (12 samples).

		Mean	Range	Standard Deviation
Total Protein	g/100ml ⁷	7.9	6.9-9.1	0.7
Albumin	g/100ml	2.1	1.6-2.5	0.2
Calcium	mg/100ml ⁸	11.0	9.0-11.8	0.8
Uric Acid	mg/100ml	1.8	1.2-2.5	0.3
Creatinine	mg/100ml	3.1	2.7-4.0	0.4
Inor. Phos.	mg/100ml ⁹	3.5	2.5-5.3	0.8
Cholesterol	mg/100ml	132	82-233	54
Total Bilirubin	mg/100ml	0.4	.3-.6	0.2
Direct Bilirubin	mg/100ml	0.2	.1-.2	0.1
Alk. Phos.	mU/ml ¹⁰	73	40-135	28
SGOT/340	mU/ml	128	95-190	31

⁴ Technicon Corp., Tarrytown, N.Y. 10591.

⁵ Grams per 100 milliliters.

⁶ Cells per cubic milliliter.

⁷ grams per 100 milliliters.

⁸ milligrams per 100 milliliters.

⁹ milligrams per 100 milliliters of phosphorus

¹⁰ milliunits per milliliter.

TABLE 3. Hematological values adult bison (47 samples).

		Mean	Range	Standard Deviation
PCV	%	50	42.6-61.1	4.5
HGB	g/100ml ¹¹	17.2	14.2-21.0	1.5
WBC	cells/mm ³ ¹²	6985	4200-13100	2082
PMN	%	46	22-74	13
Lymph.	%	42	12-65	12
Eos.	%	10	2-23	5
Mono.	%	1	0-3	1
Baso. (Only an occasional cell noted)				

TABLE 4. Blood chemistry values adult bison (25 samples).

		Mean	Range	Standard Deviation
Total Protein	g/100ml ¹³	8.6	7.8-9.9	0.6
Albumin	g/100ml	2.0	1.6-2.4	0.2
Calcium	mg/100ml ¹⁴	10.6	9.5-11.8	0.6
Uric Acid	mg/100ml	1.6	1.2-2.2	0.3
Creatinine	mg/100ml	3.0	2.7-3.4	0.2
Inor. Phos.	mg/100ml ¹⁵	2.8	1.1-4.7	0.8
Cholesterol	mg/100ml	97	79-128	11
Total Bilirubin	mg/100ml	0.3	.2-.5	0.08
Direct Bilirubin	mg/100ml	0.1	.1-.2	0.06
Alk. Phos.	mU/ml ¹⁶	48	33-75	10
SGOT/340	mU/ml	99	73-144	18

DISCUSSION

There were several significant ($P < .05$) differences between the mature and immature bison. Ranges on these animals may reflect a few diseased individuals in the sample. The mean values obtained should, however, characterize blood values typical of the two herds tested.

Most noticeable, perhaps, are the differences between the mean values of the

white blood cell count, neutrophil percentage and lymphocyte percentage in the two groups. These age group values are comparable to domestic Bovidae, especially those of the Jersey and Hereford breeds of cattle.⁴

Significantly higher values in packed cell volumes and hemoglobin concentrations were found for bison, as compared to other breeds of domestic cattle in this country.⁴ These values in bison may be

¹¹ Grams per 100 milliliters

¹² Cells per cubic milliliter.

¹³ grams per 100 milliliters.

¹⁴ milligrams per 100 milliliters

¹⁵ milligrams per 100 milliliters of phosphorus.

¹⁶ milliunits per milliliter.

of use in interpreting clinical signs in the diseased animal.

Blood chemistry values in the two age groups show significant differences in cholesterol, alkaline phosphatase and specific glutamic-oxalacetic transaminase (SGOT) concentrations. These values in both groups, as compared to other Bovidae, indicate that the bison results fall well into the range of those values accepted as normal for domestic cattle.^{2,3}

Not considered in this study are the effects of handling the animals prior to collecting the samples. It is known that excessive stress and fright can cause marked changes in many of the hema-

tological and blood chemistry values in domestic species.¹ It would be assumed, therefore, that differences might be expected between non-stressed animals and the bison from which we collected samples.

Blood composition with regards to both hematology and blood chemistry values is of extreme importance in diagnosing and monitoring disease conditions in American bison. As these herds are becoming larger, means to detect epizootic disease are needed. More data are needed to describe the range of normal variation in individuals, populations and age groups of *B. bison*.

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