

## BLOOD AND SERUM CHEMISTRY VALUES OF A POUDRE RIVER BIGHORN SHEEP HERD

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### INTRODUCTION

Adequate baseline data on blood and serum chemistry values are of immense value when attempting to determine or compare the health of an animal population. Previous publications, some with large sample sizes, have provided baseline blood data on bighorn sheep in captivity (Franzmann and Thorne 1970, Franzmann 1971, and Woolf and Kradel 1969) and in the wild (Franzmann and Thorne 1970, Franzmann 1971). Franzmann (1972) discussed sources of variation in physiologic values of bighorn sheep and rectal temperatures (Franzmann and Hebert 1971). Blood values have been used to determine the overall health of a herd, and blood urea nitrogen values have been used to infer the protein intake (Preston et al. 1965). There are no reports of blood values of Colorado bighorn sheep nor are there any reports which cover the variety of values which will be presented in this paper.

### MATERIALS AND METHODS

On 21 January 1975, 48 bighorn sheep (Ovis canadensis) were trapped by personnel of the Colorado Division of Wildlife utilizing a 70x70-foot drop net. Twenty-four of these sheep were transplanted 18 miles in an attempt to increase the current range of the sheep. Of the 48 sheep captured, blood samples of 50 cc were taken from 24 of the animals. Five ml were placed in a tube containing Dipotassium Ethylenediamine Tetraacetate (EDTA). This blood was used for whole blood values and white cell differential. Ten ml of blood was placed in an equal amount of Oxalate Phenol Glycerol (OPG) media for isolation of bluetongue virus. The remaining blood was placed in a clean tube and allowed to coagulate. The clotted blood was kept at room temperature (37 C) for 24 hours. As much sera as possible was then removed from each tube and placed in a clean tube. Antibody titers for bluetongue virus, Parainfluenza-3 virus (PI<sub>3</sub>), Leptospira and Brucella were completed. Serum chemistry values were obtained by running each sample through a hy-cel 17 (Hycel Inc., Houston, Texas).

### RESULTS

Blood values are shown in Table 1. Both the hemoglobin and packed cell volumes are higher in these animals than any previously reported. All

Table 1 BLOOD VALUES OF POUDDRE CANYON BIGHORN SHEEP

Collar Color and Number	Sex	Age in Years	PCV %	Hemoglobin gr/100ml	Total Protein gr/100ml	Fibrinogen mg/100ml	White Blood Cells per ml	Differential (%)		Eosin.	Baso.
								Neutrophils	Lympho.		
Blue 1	Ewe	4.5	62	22.2	8.1	300	4700	54	30	10	1
Blue 2	Ewe	5.5	55.5	19.4	7.1	200	2600	55	39	3	-
Blue 4	Ewe	5.5	54	18.6	7.1	100	3400	43	39	10	-
Blue 5	Ewe	6.5	50	17.6	6.5	300	3700	73	21	3	1
Blue 6	Ewe	5.5	51	18.1	7.5	300	4600	58	33	7	-
Blue 7	Ewe	3.5	59	20.0	6.6	300	5100	43	40	13	1
Blue 9	Ewe	6.5	57	19.8	7.4	100	3200	72	24	2	-
Blue 10	Ewe	2.5	50	17.8	5.9	100	5000	75	21	2	-
Blue 11	Ewe	6.5	53	18.6	6.5	300	1600	71	24	3	-
Blue 12	Ewe	4.5	50	18.0	6.0	200	4200	87	10	3	-
Blue 13	Ewe	2.5	48	16.8	5.7	200	4400	86	11	2	-
Blue 14	Ewe	4.5	49	21.1	7.3	200	7700	69	27	2	-
Blue 17	Ewe	3.5	54	19.1	6.6	300	5200	29	54	4	1
Blue 18	Ram	1.5	45	15.8	5.7	200	3900	76	20	1	1
Blue 19	Ewe	2.5	57	26.4	6.6	600	5300	21	71	2	1
Blue no #	Ram	1.5	53	18.4	7.0	300	9900	63	33	2	1
Red 1	Ewe	4.5	53	19.3	6.1	300	3700	85	13	1	-
Red 3	Ewe	3.5	50	17.6	7.2	500	9100	81	10	3	1
Red 4	Ewe	2.5	54	20.0	6.0	200	4700	78	18	2	-
Red 5	Ewe	8.5	50	17.8	6.5	200	4700	76	21	1	-
Yellow 1	Ewe	6.5	57	20.2	6.6	100	4300	61	35	1	3
Yellow 2	Ewe	3.5 or 4.5*	49	17.6	6.3	100	7600	53	40	-	7
Yellow 4	Ewe	3.5	56	19.4	6.7	200	6100	56	41	2	-
Yellow 5	Ewe	5.5	56	19.7	6.9	200	4200	63	29	-	8
Mean		4.5	53.02	19.14	6.66	241.67	4954.17	63.67	29.33	2.46	.33
Range		1.5-8.5	45-59	15.8-26.4	5.7-8.1	100-600	1600-9900	21-87	10-71	0-8	0-1
Standard Deviation			3.97	2.09	0.6	121.285	1938.619	17.362	14.435	1.61	.48

\* 4.5 Years used in calculations

samples were negative for bluetongue virus, bluetongue antibody titers, Bru-  
cella and Leptospira titers. Titers for PI<sub>3</sub> virus ranged from 1:2 to 1:32  
( $\bar{x} = 1:6.6$ ). All serum chemistry values are presented in Table 2.

## DISCUSSION

As little previous work has been done with bighorn sheep blood values, the previous data is presented as baseline data which leaves little for comparison or discussion. Blood samples taken from sick bighorn sheep indicate high fibrinogen levels are a reflection of the presence of ongoing illness. From these data there is no indication that an eosinophilia reflects low lungworm levels but perhaps a high eosinophilia may indicate an active effective response against lungworm larvae. High hemoglobin and PCV values are believed to reflect overall health of the animal and if this is true, the Poudre sheep are in excellent health, however, one must take into account the altitude the respective animals are found at and the possibility of dehydration. SGOT and CPK are valuable indicators of muscle myopathy due to capture.

### Literature Cited

- Franzmann, A. W. 1971. Comparative physiologic values in captive and wild bighorn sheep. *J. Wildl. Dis.* 7(2):105-108.
- \_\_\_\_\_. 1972. Environmental sources of variation of bighorn sheep physiologic values. *J. Wildl. Manage.* 36(3):924-932.
- \_\_\_\_\_, and D. M. Hebert. 1971. Variation of rectal temperature in bighorn sheep. *J. Wildl. Manage.* 35(3):488-494.
- \_\_\_\_\_, and E. T. Thorne. 1970. Physiologic values in wild bighorn sheep (Ovis canadensis canadensis) at capture, after handling and after captivity. *J. Am. Vet. Med. Assoc.* 57(5):647-649.
- Preston, R. L., D. D. Schnakenberg, and W. H. Pfander. 1965. Protein utilization in ruminants. I. Blood urea nitrogen as affected by protein intake. *J. Nutr.* 86(3):281-288.
- Wolf, A., and D. C. Kradel. 1969. Hematological values of captive Rocky Mountain bighorns. *J. Wildl. Dis.* 6(1):67-68.

Table 2. Serum Chemistry Values

Please see key on attached page for numbers 1-17.

Collar Color and Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Blue 1	176	14	3	6.1	1.4	73	4.95	142	.5	95	330	105	172	5.3	350	10.6	2.3
Blue 2	85	10.5	3.5	7.1	1.4	85	5.35	143	.5	45.5	300	75	133	7.4	345	11	2.3
Blue 4	75	11.5	3.1	7	1.6	80	4.45	144	.6	50	235	118	120	6.8	300	11.6	2.5
Blue 5	95	10	3	6.3	1.75	80	4.95	142	.6	37	167	125	115	6.6	250	11.9	2.5
Blue 6	125	15	3.8	7.2	1.75	65	4.1	142	.8	43	195	130	149	7.1	375	11.6	2.8
Blue 7	109	12	2.45	6.4	1.45	75	5.4	144	.7	95	142	89	127	6.9	275	10.6	2.7
Blue 9	78	11	3.7	7.1	2.45	65	5.4	143	.5	61.5	175	80	49	6.2	375	10.7	2.4
Blue 10	202	11	2.25	5.8	1.50	70	6.65	142	.5	122.5	212	99	121	4.7	425	11.6	2.1
Blue 11	80	19	3.45	7.7	1.65	82	6.4	147	.6	68	145	95	130	8.4	275	11.9	2.2
Blue 12	176	14	2.6	6.0	1.6	62	3.65	142	.5	85	165	130	54	2.9	300	10.9	2.9
Blue 13	182	15	2.15	5.7	1.75	59	4.12	142	.5	115	208	118	95	3.2	340	11.1	2.8
Blue 14	65	17	3.25	7.2	1.8	79	5.98	148	.7	59	115	105	121	7.9	250	14	3.1
Blue 17	117	12	2.4	6.3	1.1	68	5.32	144	.4	95	195	105	130	6.7	200	10.7	2.5
Blue 18	142	13	2.3	5.6	1.49	58	4.25	142	.5	185	150	95	93	4.9	360	11.4	2.4
Blue 19	118	18	2.8	6.3	1.6	55	4.9	145	.5	135	178	135	190	8.1	335	11	3
Blue Ram	130	16	3.3	6.7	2.0	61	5.2	142	.7	115	128	89	89	6.1	325	11.7	2.7
Red 1	182	11.5	2.5	5.8	1.4	65	3.75	142	.5	51	195	100	119	3.6	360	10.7	2.3
Red 3	186	11	3.4	6.5	1.8	51	5.5	141	.5	117	525	112	385	4.9	555	12	2.6
Red 4	208	13	2.4	5.7	1.55	70	4.5	142	.5	105	325	135	234	4.5	475	11.1	3
Red 5	240	17	3.2	6.3	1.5	69	4.32	142	.5	35.5	325	115	229	5.4	530	11	3
Yellow 1	160	15	2.6	6.3	1.45	80	4.58	142	.4	335	160	112	88	4.8	275	10.2	3
Yellow 2	137	19	2.55	6.3	1.6	72	5.42	144	.5	82.5	195	95	96	6.2	275	10.9	2.3
Yellow 4	157	18	2.8	6.7	1.45	68	4.8	142	.5	95	195	145	120	6	345	16	2.4
Yellow 5	127	12	2.75	6.7	1.75	80	4.65	142	.5	32.5	128	105	85	5.9	370	11.6	2.7
Mean	139.67	13.98	2.89	6.45	1.62	69.67	4.94	143.17	.54	81.60	212.00	110.21	135.17	5.85	344.38	11.49	2.61
Range	65-240	10-19	3.8	3.9 - 7.7	1.1 - 2.65	51-85	3.65 - 6.65	141 - 148	.4 - .8	32.5 - 185	115 - 525	75-145	49-385	2.9 - 8.2	200-555	10.2 - 14	2.1 - 3.1
Standard Deviation	47.65	2.9	.48	.56	1.02	9.2	2.40	3.13	.388	38.82	91.69	50.14	70.10	1.48	85.41	3.55	2.23

Key for Attached Table

1. Glucose mg/100 ml
2. Blood Urea Nitrogen mg/100 ml
3. Globulin gr./100 ml
4. Total Serum Protein gr/100 ml
5. Uric Acid mg/100 ml
6. Cholesterol mg/100 ml
7. Potassium mg/L
8. Sodium mg/L
9. Total Bilirubin mg/100 ml
10. Alkaline Phosphatase IU/L<sup>a</sup>
11. S.G.O.T.<sup>b</sup> IU/L
12. S.G.P.T.<sup>c</sup> IU/L
13. C.P.K.<sup>d</sup> IU/L
14. Inorganic Phosphorus mg/100 ml
15. LDH<sup>e</sup> IU/L
16. Calcium mg/100 ml
17. Creatinine mg/100 ml

- a. International Units/Liter
- b. Serum Glutamic Oxaloacetic Transaminase
- c. Serum Glutamic Pyruvic Transaminase
- d. Creatine Phosphokinase
- e. Lactic Dehydrogenase