

## COMPARISON OF BIGHORN RAM HORN GROWTH BETWEEN ORIGINAL SUN RIVER POPULATION AND THREE TRANSPLANTED POPULATIONS: HEREDITY OR ENVIRONMENT?

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*Abstract:* A comparison is made of horn growth (average length and base circumference) by age class for 703 bighorn (*Ovis canadensis*) rams harvested between 1978-1997. Data from the original Sun River herd is compared to three transplant populations in Lost Creek, Upper Rock Creek and the Missouri River Breaks. The transplant herds are well known for producing the "giant" rams of Montana. All three transplant herds showed greater horn growth than the parent population, particularly in younger age classes. Data on frequency composition of the harvested rams are presented, along with life expectancy data.

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### INTRODUCTION

Montana currently has 42 bighorn sheep populations. Thirty of these populations are transplants. The Sun River population is a native herd and has been used extensively as a source for transplants. Several of the transplanted herds have become nationally known for producing 195-200 Boone and Crockett heads. Three of these transplant populations are Lost Creek (HD 213), Upper Rock Creek (HD 216) and the Missouri Breaks (HD 680). One popular opinion is that "Sun River genetics" are responsible for the horn mass observed in these transplanted populations. Public pressure on management to augment populations with Sun River rams to improve the genetics is frequently encountered. A comparison was made of horn size for harvested rams between the native Sun River population and these 3 transplanted herds.

### METHODS

Data were collected from the hunter harvest permits on horn length, base circumference and age. A total of 703 rams were compared with ages from 2.5 to 12.5 years of age. Data was available for 376 rams from the Sun River for 1981-1995. A total of 151 rams were available for the Lost Creek herd for 1978-1997. Rock Creek had 150 rams for 1979-1997. Only 26 rams were harvested in the Missouri Breaks for 1990-1995. Horn size was averaged by 1 year age classes for total length and base circumference for left and right horns for each population.

### RESULTS

All 3 transplant populations showed greater average horn length and base circumference by age class than the native population (Table 1). Lost Creek rams were for all age classes an average of 3.1 inches longer and .5 inches greater base circumference than the Sun River rams. Rock Creek rams averaged 4 inches longer and 1 inch greater base circumference for all age classes. The Missouri River Breaks population averaged 3.4 inches in greater length than the Sun River and .9 inches greater circumference.

Table 1									
	LENGTH	LENGTH	LENGTH	LENGTH			DIFF	DIFF	DIFF
AGE	SUN R.	213	216	BREAKS		AGE	213/SUN	216/SUN	680/SUN
2.5	21.8	25	25.6			2.5	3.2	3.8	
3.5	21.7	31.3	33.5	30.2		3.5	9.6	11.8	8.5
4.5	31.2	34.5	34.4			4.5	3.3	3.2	
5.5	34.5	34.9	37.4	36.2		5.5	0.4	2.9	1.7
6.5	35.5	37.3	37.7	38.4		6.5	1.9	2.2	2.9
7.5	35.6	37.6	38	36.8		7.5	2	2.2	1.2
8.5	36.2	38.2	40.2	39.1		8.5	2	4	
9.5	36.6	39.1	40	40		9.5	2	3.4	2.9
10.5	36.5	40.4	39.1			10.5	3.9	2.6	3.4
						<b>AVER</b>	<b>3.1</b>	<b>4.0</b>	<b>3.4</b>
	BASE	BASE	BASE	BASE			DIFF	DIFF	
AGE	SUN R.	213	216	BREAKS		AGE	213/SUN	216/SUN	680/SUN
2.5	12.7	13.4	14			2.5	0.7	1.3	
3.5	14.1	14.8	15.7	16		3.5	0.7	1.6	1.9
4.5	14.9	15.3	15.7			4.5	0.4	0.8	
5.5	15.4	15.5	16.1	16.1		5.5	0.1	0.7	0.7
6.5	15.2	15.6	16.1	16.4		6.5	0.4	0.9	1.2
7.5	15.2	15.5	16.1	15.8		7.5	0.3	0.9	0.6
8.5	15.1	15.6	16	15.3		8.5	0.5	0.9	0.2
9.5	15	15.6	16	15.7		9.5	0.6	1	0.7
10.5	15	15.5	16.1			10.5	0.5	1.1	
						<b>AVER</b>	<b>0.5</b>	<b>1.0</b>	<b>0.9</b>

All 3 transplanted populations showed greater horn length and base circumference than the native population for each year class. The 3.5 year old rams demonstrated the most significant difference in horn growth between the Sun River and transplant populations (Figure 1 & 2).

The 3.5 year old rams from the transplant populations average 10 inches in greater length and 1.4 inches in greater base circumference than the 3.5 year old rams from the Sun River.

The frequency distribution of the ram harvest by age class was also reviewed. Table 2 presents the number of rams and frequency distribution by age class and population. The typical bell shaped curve is seen in Figure 3. The 4.5 to 8.5 age classes accounted for 82% of the harvest for all 4 populations. Eleven per cent of the harvested rams were 9.5 years or older and only 3% were 10.5 years or older (Figure 4). The Lost Creek and Rock Creek populations demonstrated a greater survival of 9.5 year old or older rams compared to the Sun River or Missouri Breaks (Figure 5). The Lost Creek herd had 14% of the rams at 9.5 years old or older and Rock Creek was 13%. The Sun River herd had 9% of the rams at 9.5 years old or older and 8% of the Breaks herd was.

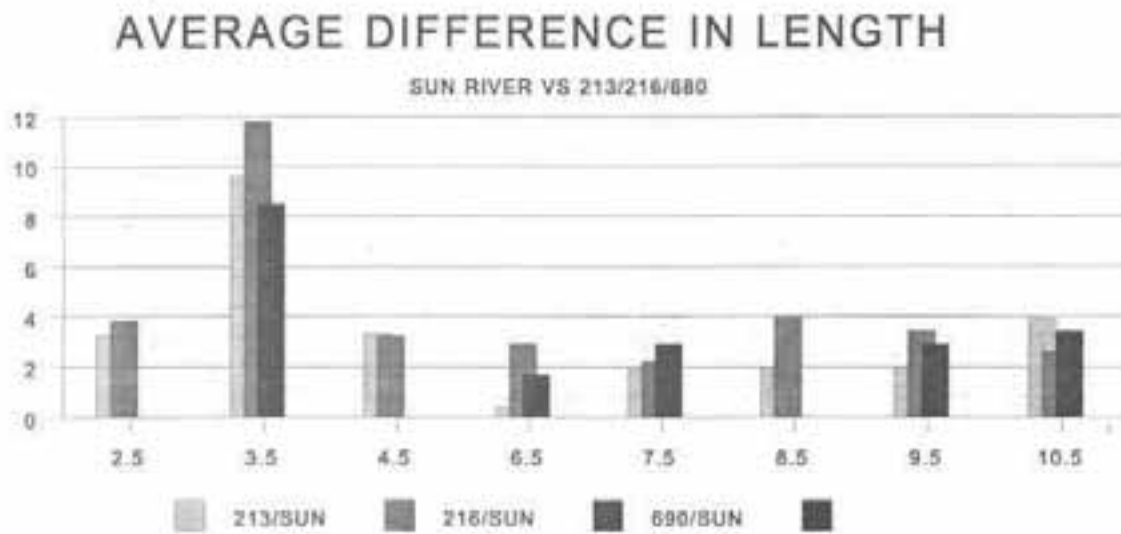


Figure 1.

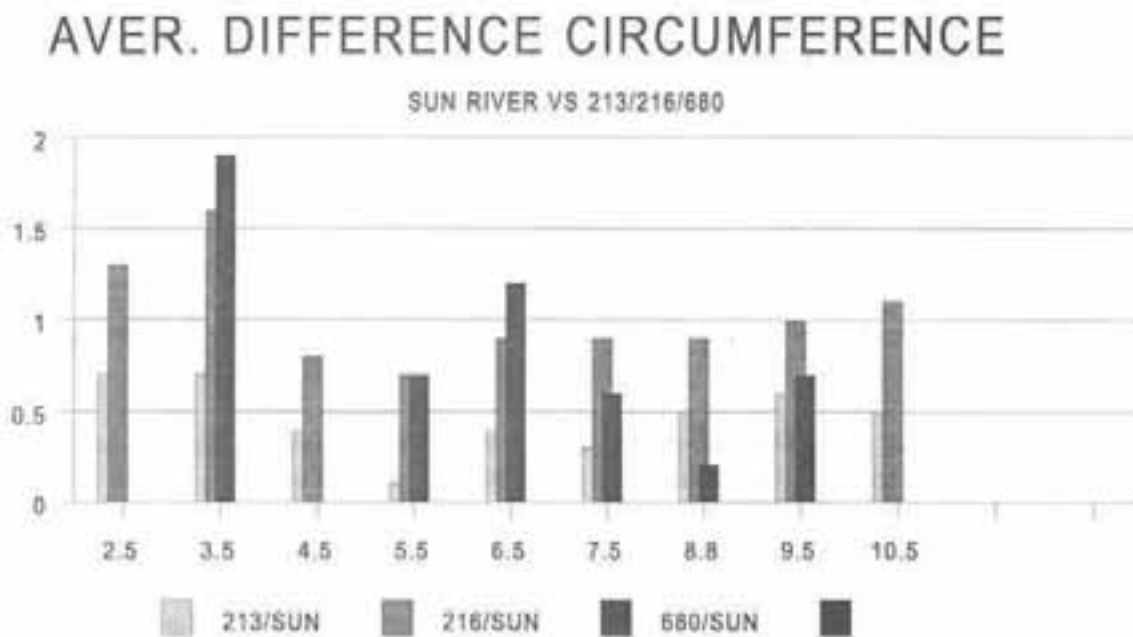


Figure 2.

## Frequency Distribution of Ram Harvest

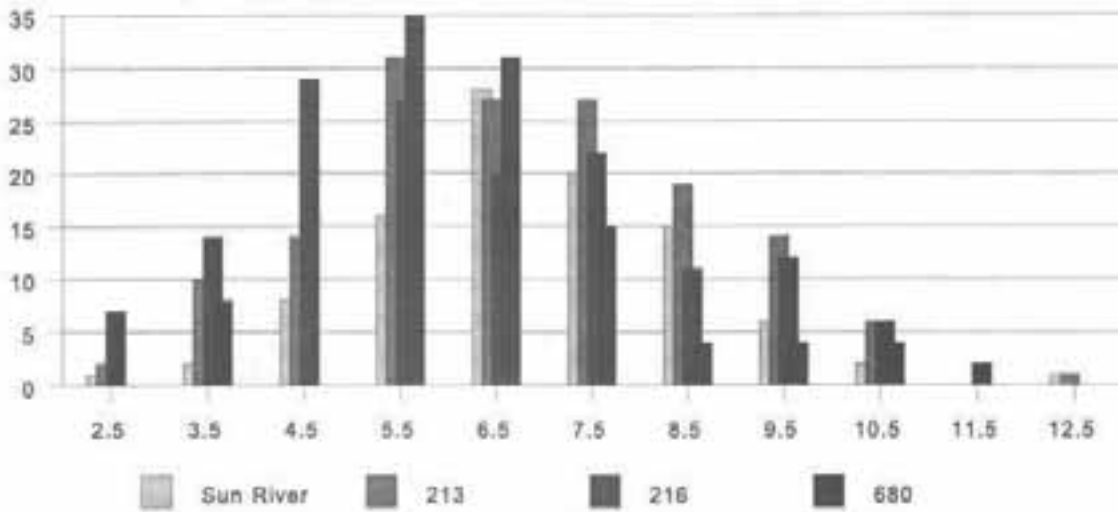


Figure 3.

Table 2 Age and Frequency Distribution of Ram Harvest by Age Class and Population

No. Rams

AGE	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5
Sun River	5	7	31	61	106	76	56	24	9		1
213	2	10	14	31	27	27	19	14	6		1
216	7	14	29	27	20	22	11	12	6	2	
680		2		9	8	4	1	1	1		

Frequency

Age	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5
Sun River	1	2	8	16	28	20	15	6	2		1
213	2	10	14	31	27	27	19	14	6		1
216	7	14	29	27	20	22	11	12	6	2	
680		8		35	31	15	4	4	4		

## **DISCUSSION**

The significance of "genetics" in bighorn management is a popular concept and undoubtedly has some general relevance. This paper reviewed ram harvest data for 703 bighorns over a 20 year period comparing the native Sun River herd with three transplanted herds (Lost Creek/213, Rock Creek/216, and Missouri River Breaks/680) from Sun River stock. Several basic factors appeared from this review. The transplant herds averaged, for all age classes, 3.5 inches greater horn length and 0.8 inches greater base circumference over the native herd. The 3.5 year old rams from the transplant herds showed the greatest difference in horn growth averaging 10 inches in greater length and 1.4 inches in greater base circumference than the Sun River 3.5 year olds. The Lost Creek (213) and Rock Creek (216) herds demonstrated increased survival in the older age classes (9.5 year old plus). The oldest rams recorded (11.5-12.5 years old) showed smaller than average horn growth.

Based on these findings it appears environment and habitats are playing a greater role in ram horn growth than just genetics. The significant difference in horn growth of the younger age classes (3.5 year olds) between the Sun River and the transplant herds and the increased survivorship of the 9.5+ year old rams in Lost Creek and Rock Creek would indicate better environmental conditions.