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H. L. Miller

*South Dakota State University*

G. H. Deutscher

L. C. Blome

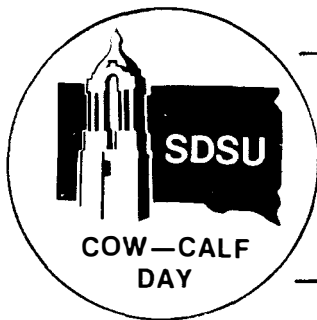
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## MATING AND MANAGEMENT SYSTEMS FOR COMMERCIAL BEEF PRODUCTION

H. L. Miller, G. H. Deutscher and L. C. Blome

Department of Animal and Range Sciences

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### Summary

A 5-year study was initiated to compare Simmental-Angus (S x A) and Hereford-Angus (H x A) cows under range conditions regarding reproductive performance of the cow and calf performance. Simmental-Angus heifers had larger yearling weights, 2-year-old weights, yearling pelvic area and 2-year-old pelvic area than H x A cows. Over the 5-year period, S x A cows were heavier than H x A cows. There was little difference over the 5 years in calving difficulty between the two cow breeds, but a tendency existed for H x A cows to have more calving difficulty the first 2 years and S x A more difficulty the last 2 years. During the 3 years milk production was measured, the S x A cows consistently produced more milk than the H x A cows. The S x A cows had calves with larger birth weights than H x A cows each of the 5 years. Calf productivity including pounds of calf weaned per cow, calf weaning weight and calf gain to weaning was greater for S x A than H x A cows. Nutrition level of the cows (high vs regular) had little effect on calf production. Feedlot performance and carcass results favored calves from S x A cows. The H x A cows produced more calves grading choice than S x A, but most carcass data favored calves from S x A cows.

### Introduction

Recently there has been increased utilization of exotic cattle to increase production in beef herds. Larger calves at weaning and slaughter have resulted due to increased mothering ability and frame size. Hereford-Angus cows have been used extensively in South Dakota and have performed well under local conditions.

This study was designed to compare reproductive performance and calf production of S x A and H x A crossbred cows under range conditions. Feedlot performance and carcass beef production have also been evaluated.

### Procedures

One hundred eighty crossbred (S x A and H x A) heifer calves were purchased in 1974. The next spring the heifers were bred AI to an Angus bull. In subsequent years, the cows were bred AI to a Charolais bull in a terminal crossbreeding program. Semen from the same Charolais bull was used for the second and third calf crops with a different Charolais bull used for the fourth and fifth years. The breeding season was initiated the middle of May with approximately a 40-day AI period and a 3-week clean-up period. Cows were palpated in October to determine conception rate.

Cows were trucked to the Cottonwood Range and Livestock Research Station, Philip, in November where each breed group was maintained on a high or regular winter supplementation program as follows:

High - 5 lb alfalfa per head per day  
4 lb grain cake 30 days prebreeding and 20 days postbreeding

Regular - 2 lb 20% protein cake per head per day.

Both groups were fed equal amounts of grass hay and had access to winter grazing. In May, the cows were moved to Fort Meade near Sturgis for summer pasture and breeding.

Calf weights and calving difficulty scores were taken at birth. Scoring was a numerical system from 1 to 5 with 1 being no difficulty and 5 a Caesarean birth.

Milk production estimates were taken by the weigh-suckle-weigh method in April, June, July and October the first 3 years of the study. Cows were weighed four times each year.

Calves were weaned in mid-October. All calves were placed in a feedlot and fed out to slaughter. Feedlot performance and carcass data were collected and evaluated.

### Results

There was no difference within breed groups for weight gain or pelvic area when heifers were fed at the regular or high levels of nutrition. However, the S x A heifers were heavier than H x A heifers and had larger pelvic areas both as yearlings and 2-year-olds (table 1). Yearling weights were 610 and 550 lb and 2-year-old weights were 981 and 893 lb for S x A and H x A, respectively. Similar results were obtained regarding pelvic area with yearling measurements of 152 vs 143 cm<sup>2</sup> and 2-year-old pelvic area of 235 and 217 cm<sup>2</sup> for S x A and H x A heifers, respectively. Both breed groups had similar condition scores as yearlings and 2-year-old heifers.

Over the 5-year period, S x A cows weighed more ( $P < .01$ ) at each of the four weights taken each year than H x A cows (table 2). Considerable variation within each breed also existed during the year, depending on stage of production when the weights were taken.

Table 3 shows the calving difficulty scores and the percentage of cows assisted each of the 5 years. Calving difficulty was similar for the two groups the first year. During the second and third calving seasons, H x A cows had more difficulty than S x A cows. However, in the fourth and fifth years, the S x A had more difficulty than the H x A. As will be discussed later, the S x A cows had considerably heavier calves than H x A cows the last 2 years of the study but similar weights the first 3 years. There was no difference ( $P > .05$ ) in calving difficulty due to cow nutrition level.

In each of the 3 years milk production measurements were obtained, S x A cows produced more milk ( $P < .05$ ) than H x A cows (table 4). There was no difference ( $P > .05$ ) in nutrition level and the amount of milk produced.

Table 1. Least Squares Means of Variables  
in Calving Difficulty

	S x A	H x A
Yearling wt, lb	610 <sup>a</sup>	550
Yearling condition score <sup>b</sup>	5.0	4.9
2-year-old weight, lb	981 <sup>a</sup>	893
2-year-old condition score	5.4	5.5
Yearling pelvic area, cm <sup>2</sup>	152 <sup>a</sup>	143
2-year-old pelvic area, cm <sup>2</sup>	235 <sup>a</sup>	217

<sup>a</sup> Values different within trial (P<.05).

<sup>b</sup> Condition score range is 1 to 9 with 1, very thin, and 9, very fat, and 5 being a good thrifty condition.

Table 2. Least Squares Means of Cow Weights

Year	Cow breed	Month			
		December lb	February lb	June lb	October lb
1976	S x A	888	958	882	1041
	H x A	814	875	802	957
1977	S x A	1035	1155	992	1108
	H x A	962	1062	911	1044
1978	S x A	1100	1087	1032	1113
	H x A	1026	1011	954	1056
1979	S x A	1218	1088		1154
	H x A	1132	998		1082
1980	S x A	1153	1199	1228	1187
	H x A	1087	1119	1126	1100

Table 3. Calving Difficulty Scores and Percentage of Cows Assisted

Year	Average score <sup>a</sup>		Percentage assisted	
	S x A	H x A	S x A	H x A
1976	1.8	1.7	25	26
1977	1.6	2.0	22	32
1978	1.1	1.3	5	8
1979	1.7	1.3	17	5
1980	1.5	1.4	7	5

<sup>a</sup> Range of 1 to 5, with 1 being no difficulty and 5 a Caesarean birth.

Table 4. Least Squares Means for Milk Production from S x A and H x A Cows

Year	Breed of dam and nutrition level			
	S x A		H x A	
	Regular lb	High lb	Regular lb	High lb
1975	17.69 ± .88	16.63 ± .88	14.28 ± .88	14.22 ± .88
1976	16.20 ± .88	16.60 ± .88	14.05 ± .88	12.55 ± .88
1977	19.80 ± .88	19.90 ± .88	17.13 ± .88	17.80 ± .88

Birth weights were heavier ( $P < .05$ ) for calves from S x A than calves from H x A dams each of the 5 years (table 5). Average birth weight over the 5 years for calves from S x A cows was 88.3 lb compared to 83.9 lb for calves from H x A cows. Greater differences in birth weight were observed the last 2 years of the study. Simmental-Angus cows had calves weighing 7.2 and 8.1 lb heavier in 1979 and 1980 than H x A cows. This may account for the increased calving difficulty and percentage of cows assisted for the S x A cows the last 2 years of the study.

Table 5. Least Squares Means of Birth Weights for Crossbred Calves

Year	Breed of dam		Average lb
	S x A lb	H x A lb	
1976	67.6 ± 1.3	63.9 ± 1.3	65.8 ± .9
1977	83.6 ± 1.5	81.7 ± 1.5	82.6 ± 1.1
1978	77.8 ± 1.3	76.8 ± 1.3	77.3 ± .9
1979	104.5 ± 1.4	97.3 ± 1.6	100.9 ± 1.1
1980	107.7 ± 1.7	99.6 ± 1.5	103.6 ± 1.2
Average	88.3 ± .7	83.9 ± .7	

Reproductive performance expressed as percentage calves born and weaned is presented in table 6. There was no difference ( $P>.05$ ) in percentage of calves born or weaned or in nutrition level between the two cow herds. Lower than expected calving rate was achieved the first year. This was probably due to insufficient cow weight gain before the breeding season. A 93.3% calving rate occurred the last 4 years of the study in each of the two cow herds. Weaning percentage was similar to calving percentage due to minimal calf loss after calving each of the 5 years. During the first, third and fourth years, H x A cows had a slight advantage in calving rate with S x A having a slight advantage the second and fifth years. These differences were not statistically different ( $P>.05$ ).

Table 6. Percentage Calves Born and Weaned Per Cow Exposed for S x A and H x A Cows

Year	Born		Weaned	
	S x A	H x A	S x A	H x A
	%	%	%	%
1976	61.6	63.3	59.6	61.1
1977	94.7	90.5	90.7	82.4
1978	97.0	95.2	97.0	95.2
1979	92.3	93.3	89.2	93.3
1980	88.3	94.6	88.3	93.0

More total pounds of calf were weaned from S x A than H x A dams, 488 vs 436 lb, respectively. Weaning weights for heifers, steers and bulls were greater each of the 5 years for calves from S x A cows (table 7). Weaning weight was less in 1980 than the three previous years due to weaning the calves early and drought conditions. There was a consistent advantage each of the 5 years in calf weaning weight for calves from cows on the regular nutrition level.

Table 7. Least Squares Means of Weaning Weights for Crossbred Calves

Year	Breed of dam					
	S x A			H x A		
	Heifer	Steer	Bull	Heifer	Steer	Bull
	lb	lb	lb	lb	lb	lb
1976	469.1±11.5	485.6±13.5	489.8±12.1	420.9±10.5	424.1±12.5	432.3±12.9
1977	589.8±10.2	621.0±15.8	596.7±16.1	520.9±10.5	534.6±16.1	544.2±17.2
1978	573.3± 9.4	619.0±12.6	622.9±12.1	544.9± 9.6	576.5±12.9	585.0±13.5
1979	621.4± 9.8	669.3±12.9	664.7±16.6	591.6± 9.5	600.3±18.2	596.4±15.0
1980	555.1±11.2	570.6±21.6	582.6±16.7	521.7±12.1	508.4±12.9	532.8±15.6

Feedlot performance and carcass data are presented in table 8. Initial weight, final weight and average daily gain were higher for calves from the S x A cows. Most of the carcass parameters measured (dressing percent, carcass weight, fat thickness, rib eye area and yield grade) showed an advantage for calves from S x A cows. In three of the 5 years, calves from H x A dams had a higher percentage of carcasses grading choice than calves from S x A dams.

Table 8. Feedlot and Carcass Results for Steers  
From Crossbred Cows

Year	Calf breed <sup>a</sup>	Feedlot			Carcass					
		Init. wt, lb	Final shrunk wt, lb	Daily gain, lb	Hot carc. wt, lb	Dress- ing per- cent	Grad- ing choice, %	Fat thick- ness, in.	Rib eye area, sq. in.	Yield grade
1976	A x SA	493	944	3.01	597	63.3	92	.50	11.2	3.2
	A x HA	444	850	2.71	521	61.3	80	.50	10.2	3.2
1977	C x SA	665	1076	2.49	709	65.9	60	.25	14.0	1.9
	C x HA	594	989	2.39	622	62.9	70	.33	12.7	2.1
1978	C x SA	615	1154	2.98	749	64.9	19	.29	15.4	1.7
	C x HA	584	1116	2.94	714	64.0	40	.31	14.6	1.9
1979	C x SA	723	1284	3.14	815	63.5	87	.20	14.7	1.9
	C x HA	684	1193	2.77	755	63.3	100	.24	13.7	2.1
1980	C x SA	676	1193	3.10	779	65.3	83	.27	13.3	2.4
	C x HA	636	1145	3.05	736	64.3	69	.29	13.2	2.4

<sup>a</sup> First letter denotes sire breed (Angus or Charolais), the other two letters the dam breed (Simmental-Angus or Hereford-Angus).