Comparisons of Lactational Performance Among Various Four-Year-Old Crossbred Cow Groups

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Story in Brief

Milk yield and composition were estimated monthly from April through September of 1978 for 71 four-year-old cows of eight crossbred groups (Hereford x Angus (HA), Angus x Hereford (AH), Simmental x Angus (SA), Simmental x Hereford (SH), Brown Swiss x Angus (BA), Brown Swiss x Hereford (BH), Jersey x Angus (JA) and Jersey x Hereford (JH)).

Milk yields were estimated by machine milkout preceded by a 1.5 mg injection of a synthetic oxytocin. Calves were separated from their dams for six hrs, allowed to suckle, then separated again for six, nine or 12 hrs before milking.

Overall cows produced 16.29 lb/day of milk testing 4.9 percent butterfat, 3.30 percent protein and 13.30 percent total solids. JA and BA cows produced the most milk (17.95 lb/day), followed by JH, BH, SA and SH crosses (averaged 16.20 lb/day). The HA and AH cows produced the least milk (14.38 lb/day). Differences among crossbred cow groups for lbs of butterfat produced per day and butterfat percent were not significant. Milk butterfat content ranged from 5.1 percent for JA cows to 4.6 percent for BA cows. Milk protein content varied from 3.44 percent for Jersey crosses to 3.21 percent for Brown Swiss crosses. Milk from Jersey crosses, AH and HA cows had the highest total solids (13.28 percent) followed by JA, SH and BH cows (averaged 12.92 percent) while BA cows produced milk lowest in total solids (12.49 percent).

Introduction

Yield and composition of milk produced by beef cows under range conditions is a major factor influencing calf growth rate and weaning weights. Consequently, estimating the yield and composition of milk produced by various breed types involved in beef production is important to characterize biological differences that exist among breeds and crossbreds. Such information will aid producers in selecting breeds for crossbreeding programs that will optimize production efficiency for a given feed supply and management system.

The objectives of this study were (1) to compare milk yield and composition of various crossbred cow groups and (2) to compare the effect of six, nine and 12-hr time intervals of cow-calf separation prior to milking on the estimates of 24-hr milk yield and composition. This study is a portion of an extensive research program presently in progress at the Oklahoma Agricultural Experiment Station comparing lifetime productivity of various two-breed cross cows mated to a bull of a third breed.

Experimental Procedures

The data used in this study were obtained from 71 four-year-old crossbred cows and their calves. In the spring of 1978, a random sample of four-year-old crossbred cows (nine from each of eight crossbred cow groups with the exception of Simmental x Hereford which only had eight cows available) were identified for estimating lactational performance. The eight crossbred cow groups involved were Hereford x Angus

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(HA), Angus x Hereford (AH), Simmental x Angus (SA), Simmental x Hereford (SH), Brown Swiss x Angus (BA), Brown Swiss x Hereford (BH), Jersey x Angus (JA) and Jersey x Hereford (JH). Half of the calves produced by each cow group was sired by Charolais bulls and the other half by Limousin bulls.

Calves were born mostly in February and March with a few born in late January or early April. The calves remained with their dams on native and bermuda grass pasture until weaning at an average age of 205 days.

Lactational performance was determined monthly from April through September by machine milkout. In order to determine the effect of cow-calf separation time on 24-hr milk yield estimates, three cows of each crossbred group were allocated to one of three cow-calf separation time periods: six, nine or 12 hrs. Thus, there were a total of 24 cows assigned to each time group with the exception of the nine-hr separation period which had only 23 cows.

Because of time and labor requirements for milking range cows by machine it was necessary to divide the herd and do the milking on two different days. One group of 36 cows (balanced as nearly as possible by calf separation time and crossbred cow group) were milked one day per month and the other group of 35 cows milked the following week. Cows were milked out during the last two week of each month from April through September.

Prior to milking, calves were separated from the cows six hrs, placed with their dams to suckle and separated again for six, nine or 12 hrs, depending on the respective calf separation time group. Approximately 15 minutes prior to milking, cows were given an intramuscular injection of 10 to 30 mg of the tranquillizer ace promazine. Immediately prior to milking, cows were injected with 1.5 mg of syntocin, a synthetic oxytocin, in the jugular for milk letdown. Cows were milked out by a portable vacuum pump milking unit. Milking time per cow varied from five to 10 minutes. Each cow's udder was stripped out by hand to assure a complete milkout. The milk was weighed and two samples taken for milk composition analysis.

Samples for butterfat content were transfered to the DHIA laboratory at Oklahoma State University for analysis by a milk-o-tester. Protein content was determined by the UDY method and total solid analysis was done by over-drying samples in a 100° C oven for four hours. All milk composition estimates were completed within four days of each milking.

Results and Discussion

Table 1 presents adjusted means for milk traits averaged over the six months for each crossbred cow group. Twenty-four hr milk production was highest for JA (18.2 lb/day) and BA (17.7 lb/day) cows followed by JH, BH, SA and SH cows (averaged 16.2 lb/day). The AH and HA cows were lowest in milk yield and averaged 14.4 lb/day.

Differences between crossbred cow groups for lb of butterfat per day and percent butterfat were not significant. Overall the cows produced .79 lb/day of butterfat and ranged from .88 lb/day for Jersey crosses to .71 lb/day for HA cows. Butterfat percent varied from 5.1 percent for JH to 4.6 percent for BA cows.

Milk protein content was highest for Jersey crosses (3.44 percent), intermediate for SA, SH, AH and HA cows (averaged 3.28 percent) and lowest for Brown Swiss crosses (3.21 percent). Milk from JH cows had the highest percent of total solids (14.3 percent) followed by milk from JA, HA and AH cows (averaged 13.6 percent) and was lowest for Simmental and Brown Swiss crosses (averaged 12.8 percent).

Table 2 presents adjusted means for milk traits by cow-calf separation time. As time of cow-calf separation increased, estimates of 24-hr milk yield decreased. Milk yield estimates for a 24-hr period were 2.27 lb higher for cows in the six-hr separation group than from cows in the 12-hr cow-calf separation group. The estimated daily milk

Table 1. Adjusted means for milk traits for each crossbred cow group.

Crossbred cow groups[1]	No. of cows	Milk yield (lb/day)	Butterfat (lb/day)[2]	Butterfat (%)[2]	Total solids (%)	Protein (%)
HA	9	13.96^{c}	.71	4.97	13.68^{ab}	3.29^{bc}
AH	9	14.79^{bc}	.75	5.01	13.56^{bc}	3.26^{bc}
SA	9	16.18^{abc}	.82	4.97	12.90^{cd}	3.28^{bc}
SH	8	15.30^{abc}	.73	4.73	12.95^{cd}	3.28^{bc}
BA	9	17.68^{a}	.82	4.62	12.49^{d}	3.19^{c}
BH	9	16.45^{abc}	.79	4.83	12.91^{cd}	3.22^{c}
JA	9	18.21^{a}	.88	4.83	13.57^{bc}	3.37^{ab}
JH	9	16.87^{ab}	.88	5.10	14.30^{a}	3.51^{a}
Overall	71	16.29	.79	4.88	13.30	3.30

^{a,b,c,d} Means in the same column that do not share at least one superscript in common are significantly different ($P<.05$).

[1] A=Angus, H=Hereford, S=Simmental, B=Brown Swiss and J=Jersey.

[2] Overall F-test not significant ($P<.05$).

Table 2. Adjusted means for milk traits by cow-calf separation time prior to milking.

Separation time	No. of cows	Milk yield (lb/day)	Butterfat (lb/day)	Butterfat (%)	Total solids (%)	Protein (%)[1]
6 hours	24	17.33[a]	.87[a]	4.98[a]	13.57[a]	3.31
9 hours	23	16.16[ab]	.81[a]	4.96[a]	13.31[ab]	3.30
12 hours	24	15.06[b]	.71[b]	4.70[b]	13.00[b]	3.27

[1] Overall F-test not significant ($P<.05$).
[a,b] Means in the same column that do not share at least one superscript in common are significantly different ($P<.05$).

Table 3. Phenotypic correlations between milk traits and calf performance.

Milk trait	Calf ADG (birth to weaning)	205-day weaning
24 hour milk yield	.291*	.165
24 hour butterfat yield	.205+	.192
Butterfat percent	−.045	.206+
Total solids	−.089	.046
Protein	−.335**	−.119

+,*,** Correlations significantly different from zero at the .10, .05 and .01 probability levels, respectively.

yield from the nine-hr separation group was intermediate between the six- and 12-hr separation groups. These data suggest that more milk is produced in the first six hr of separation time than the latter six hours.

Butterfat and total solid content of the milk also exhibited a decreasing pattern from the six-hr to 12-hr separation groups. Milk obtained from cows in the six-hr separation group was higher in lb of butterfat (+.16 lb/day), butterfat percent (+.28 percent) and total solids percent (+.57 percent) than estimates from milk of cows in the 12-hr separation group. Nine-hr group estimates were intermediate. Time of cow-calf separation did not significantly affect protein content of the milk in this study. These data suggest that it may be important to consider time of cow-calf separation when estimating milk yields and milk composition of beef cattle.

Table 3 relates lactational performance of the cow to her calf's growth performance by phenotypic correlations. A moderate correlation was observed between 24-hr milk yield and calf average daily gains (.29) while a negative correlation (−.34) was estimated between protein percent of the milk and calf average daily gain. Other correlations between milk traits and calf performance were small and not significant.

These data suggests some relatively large differences between crossbred cow groups in milk yield and milk composition. It also suggests some differences in estimated milk yield and composition due to the time period of cow-calf separation allowed before milking. Consequently the length of the calf separation period should be considered in designing studies to determine lactational performance of range cows.

Factors Affecting Calving Difficulty and the Influence of Pelvic Measurements on Calving Difficulty in Percentage Limousin Heifers

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Story in Brief

Pelvic measurements were taken on 1,426 half (1/2) and three-quarter (3/4) Limousin heifers ranging from 354 to 481 days of age and a calving difficulty score was determined for 918 heifers observed during calving.

Factors significantly affecting calving difficulty were sex of calf, sire of calf, calf birth weight, age of heifer at first calving and pelvic size. Male calves from 1/2 Limousin heifers were 2.4 lb heavier, gestated .62 days longer and resulted in 18 percent more births requiring assistance than female calves. Male calves from 3/4 heifers were 5.4 lb heavier, gestated 1.45 days longer and resulted in 28 percent more births requiring assistance than female calves. Calves born unassisted were 6.7 lb lighter than those that required assistance. Heifers that calved unassisted had 7.4 sq cm larger pelvic areas and were 5.7 days older at calving than heifers requiring assistance.

Of the 1/2 Limousin heifers with small pelvic areas (121 to 164 sq cm), 15 percent calved unassisted compared to 69 percent for heifers with large pelvises (208 sq cm or larger). Heifers with small pelvises required more than 85 percent assistance when calves weighed more than 65 lb. Heifers of intermediate pelvic size (165 to 207 sq cm) required limited calving assistance when calves weighed less than 85 lb. Only heifers with large pelvises (208 to 250 sq cm) appeared capable of having calves weighing more