Table 4. Additive age of dam correction factors for postweaning ADG and yearling weights

Trait	Age of dam	OSU data			
		Angus		Hereford	
		Bulls[a]	Heifers	Bulls[a]	Heifers
Postweaning ADG(lb/day)	2	0	−.09	0	−.11
	3	0	−.05	0	−.04
	4	0	−.02	0	−.02
	5	0	0	0	0
Yearling wt (lb)[b]	2	+71	+34	+81	+44
	3	+44	+21	+49	+24
	4	+16	+7	+1	+5
	5				

[a]Overall F test for age of dam not significant (P< .25).
[b]365-day adjusted weights for bulls and 425-day adjusted weights for heifers.

Table 5. Multiplicative correction factors to correct heifer weights to a bull basis

	OSU data		BIF
	Angus	Hereford	
Birth weight	1.06	1.06	1.07
205-day weaning weight	1.07	1.06	NA[a]

[a]Not available; no BIF recommendation for sex correction of weaning weights.

However, this study suggests that when considering adjustments for long yearling weights of heifer calves managed at a lower nutritional level after weaning, other calculations should be used. Yearling weight correction factors for Angus heifers are +34, +21 and +7 lb for 2-, 3- and 4-year-old dams, respectively, while Hereford heifer adjustments are +44, +24 and +5 lb, respectively (Table 4). The postweaning ADG age-of-dam adjustments suggest a compensatory gain of heifers raised to weaning by younger cows in both Hereford and Angus breeds. Also, the magnitude of age-of-dam correction factors for heifers at weaning is larger than for those used to adjust 425-day weight. Therefore, this study indicates heifer weights adjusted to 425 days of age should be directly adjusted for age-of-dam effects rather than adding the postweaning gain to age-of-dam adjusted weaning weights as recommended for bulls.

Reproductive Performance of Various Two-Breed Cross Cow Groups

D. M. Marshall, R. R. Frahm and C. G. Chenette

Story in Brief

Eight crossbred cow groups (Hereford-Angus, Angus-Hereford, Simmental-Angus, Simmental-Hereford, Brown Swiss-Angus, Brown Swiss-Hereford, Jersey-Angus and Jersey-Hereford) were mated to Charolais and Limousin bulls to produce three-breed cross calves over a 2-year period. A total of 404 and 390 crossbred cows were exposed to breeding for the 1978 and 1979 calf crops, respectively.

The percentage of cows exposed to breeding that weaned a calf was similar for Brown Swiss-Angus, Jersey cross and Hereford-Angus cows (averaged 77.8 percent). Angus-Hereford, Brown Swiss-Hereford and Simmental cross cows were similar and weaned a lower percentage of calves (averaged 68.4 percent).

Birth weights were heaviest for calves from Brown Swiss cross and Simmental cross cows (82.3 lb) followed by reciprocal Hereford-Angus cross cows (77.3 lb) and Jersey cross cows (72.8 lb).

Simmental cross and Hereford-Angus cows required the most calving assistance (13.5 percent) followed by Angus-Hereford, Brown Swiss cross and Jersey-Hereford cows (6.7 percent) and Jersey-Angus cows (3.7 percent).

Introduction

Reproductive efficiency must be maximized to achieve economic success in a commercial cow-calf operation. Research has shown that planned crossbreeding systems can effectively increase the percent calf crop weaned and pounds of calf weaned per cow exposed to breeding.

A large portion of this increased productivity through crossbreeding is due to using a crossbred cow. An extensive study is thus in progress at the Oklahoma Agricultural Experiment Station to evaluate the lifetime productivity of various two-breed cross cows when mated to bulls of a third breed. The purpose of this study was to compare the reproductive performance of various two-breed cross cow groups over two calving seasons.

Experimental Procedure

Angus and Hereford cows were mated to Angus, Hereford, Simmental, Brown Swiss and Jersey bulls to produce two-breed cross calves in 1973, 1974 and 1975. Four different sires of each breed were used each year. All heifer calves (a total of 434) produced by these matings were kept in the herd for evaluation of lifetime productivity as cows. Productivity as 2- and 3-year-olds has been reported by Belcher *et al.* (1978) and Frahm *et al.* (1979). Two-breed cross cows were mated to Charolais and Limousin bulls to produce three-breed cross calves in the spring of 1978 and 1979. A total of 404, 3-, 4- and 5-year-old cows were exposed to breeding to produce the 1978 calves, with 390 of these cows being exposed to breeding the following year as 4-, 5- and 6-year-olds. Eight different Limousin bulls were used each year, while a total of thirteen Charolais sires were used over the 2 years (three of the Charolais bulls were used both years).

The cow herd was managed on native and bermudagrass pasture at the Lake Carl Blackwell Research Range west of Stillwater. However, 35 cows produced and reared their 1978 calves in drylot at the Southwestern Livestock and Forage Research Station at El Reno. Calves were born primarily in February and March of each year and remained with their dams until weaning at an average age of 205 days.

Results and Discussion

Reproductive performances are summarized in Table 1. Overall, 82.1 percent of all cows exposed to breeding calved and 73.1 percent weaned a calf. There was a 4.9 percent calf mortality rate at or within one day of birth and an additional 4.1 percent death loss to weaning. The 73.1 percent calf crop weaned is lower than expected primarily due to the fact that half of the cow herd was artificially inseminated without benefit of clean-up bulls.

The percentage of cows exposed to breeding that weaned a calf was similar for Brown Swiss-Angus, Jersey cross and Hereford-Angus cows, averaging 77.8 percent.

Table 1. Reproductive performance of two-breed cross cows

Crossbred cow group	No. cows exposed	% calving[2]	% live calves born[2]	% calves weaned[2]
Hereford-Angus	87	86.2	83.9	78.2
Angus-Hereford	101	81.4	76.4	69.6
Simmental-Angus	121	77.7	72.0	67.0
Simmental-Hereford	84	77.2	69.9	67.6
Brown Swiss-Angus	90	81.1	81.1	78.9
Brown Swiss-Hereford	86	75.4	69.5	69.5
Jersey-Angus	111	91.0	84.7	78.5
Jersey-Hereford	114	86.9	79.8	75.5
Overall	794[1]	82.1	77.2	73.1

[1]In 1977, 404 cows were exposed to breeding to produce calves in 1978; 390 of these cows were exposed to breeding the following year.
[2]Based on number of cows exposed to breeding.

Table 2. Calving difficulty and birth weight from two-breed cross cows

Crossbred cow group	No. calves born	Birth wt (lb)	Calving difficulty score[2]	Calving difficulty, % 1978	1979	Average
Hereford-Angus	75	78.5^{cd}	1.38^{a}	12.8	11.3	12.1
Angus-Hereford	82	76.1^{de}	1.23^{abc}	12.4	2.3	7.4
Simmental-Angus	94	80.9^{bc}	1.33^{ab}	16.6	10.0	13.3
Simmental-Hereford	65	81.6^{abc}	1.26^{abc}	18.4	11.9	15.2
Brown Swiss-Angus	73	82.1^{ab}	1.18^{abc}	11.9	2.7	7.3
Brown Swiss-Hereford	65	84.7^{a}	1.13^{bc}	7.7	4.2	6.0
Jersey-Angus	101	72.2^{f}	1.05^{c}	5.4	1.9	3.7
Jersey-Hereford	99	73.5^{ef}	1.10^{c}	5.4	6.6	6.0
Total or average	654	78.7	1.21	11.3	6.4	8.9

[1]Percent calving difficulty is based on cows calving and is the percentage of births receiving a calving difficulty score of 3, 4 or 5.
[2]Calving difficulty scores: 1= no difficulty, 2= little difficulty, 3= moderate difficulty, 4= major difficulty and 5= caesarian.
^{abcdef}Means in the same column that do not share at least one superscript are significantly different at the .05 probability level.

On the average, 9.4 percent fewer Angus-Hereford, Brown Swiss-Hereford and Simmental cross cows weaned calves, averaging 68.4 percent.

Table 2 presents calf birth weight, calving difficulty score and percent cows requiring calving assistance for each crossbred cow group. Calf birth weights were heaviest from Brown Swiss cross and Simmental cross cows (averaged 82.3 lb) followed by reciprocal Hereford-Angus cows (averaged 77.3 lb). Jersey cross cows produced calves with the lightest birth weights, averaging 72.8 lb.

A calving difficulty score was assigned by the herdsman for each birth. Overall, calving score averaged 1.21, ranging from 1.38 for Hereford-Angus cows to 1.08 for Jersey crosses. The lower incidence of calving difficulty in Jersey crosses is probably due in part to the lower average birth weight (72.9 lb) of their calves as compared to the other crossbred groups. However, while calves from Brown Swiss cross cows had the highest average birth weight (83.4 lb), they did not experience as much difficulty in calving as the Simmental cross or Hereford-Angus reciprocal cross cows. Calving

difficulty is probably more closely related to calf birth weight in relation to dam weight than to calf birth weight alone. Percent calving difficulty is the percentage of births requiring assistance from the herdsman. Calving scores of 3 or higher were classified as difficult births based on a scoring system ranging from 1 = no assistance to 5 = caesarian birth or abnormal presentation. Due to the substantially higher incidence of calving difficulty in 1978 over 1979 (11.3 percent vs. 6.4 percent), means are presented separately for the two years. The cows being a year older in 1979 likely accounted for the decrease in percentage of difficult births from the previous year. The means for the 2 years are averaged for comparison purposes. Calving difficulty averaged 8.9 percent across all crossbred cow groups. Simmental cross and Hereford-Angus cows required the most calving assistance (13.5 percent) followed by Angus-Hereford, Brown Swiss cross and Jersey-Hereford cows (6.7 percent). Only 3.7 percent of the Jersey-Angus cows required assistance calving.

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Productivity Comparisons Among Various Two-Breed Cross Cow Groups

R. R. Frahm, D. M. Marshall and C. G. Chenette

Story in Brief

Productivity was measured on eight different two-breed cross cow groups (Hereford-Angus, Angus-Hereford, Simmental-Angus, Simmental-Hereford, Brown Swiss-Angus, Brown Swiss-Hereford, Jersey-Angus and Jersey-Hereford) when mated to Charolais and Limousin bulls. Preweaning performance was analyzed on the three-breed cross calves produced by 404 cows in 1978 and 390 cows in 1979.

Brown Swiss cross and Simmental-Angus cows produced calves that were 67 lb (12.3 percent) heavier and Simmental-Hereford and Jersey cross cows produced calves 34 lb (7.2 percent) heavier at weaning than reciprocal Hereford-Angus cows. Conformation scores were average choice or higher for calves from all crossbred cow groups.

Herd productivity, measured as pounds of calf weaned per cow exposed to breeding, was similar for Simmental cross and reciprocal Hereford-Angus cows. Productivity was highest for Brown Swiss-Angus cows, exceeding that of reciprocal Hereford-Angus cows by 20.9 percent. Jersey cross and Brown Swiss-Hereford cows were more productive than reciprocal Hereford-Angus cows by 10.9 and 4.9 percent, respectively.

Cow efficiency, measured as the ratio of calf weaning weight to cow metabolic size, favored Jersey cross cows over reciprocal Hereford-Angus cows by 16.7 percent. Brown