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A Comparison of Mating Systems for Beef Cattle Production

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Findings

- First-cross Charolais x Brahman calves and Gelbvieh- and Simmental-sired calves from Brahman x Charolais cows and from Charolais-Brahman-Hereford three-breed rotation cows were heavier at birth and required more assistance at calving than other calves.
- Gelbvieh- and Simmental-sired calves from Brahman first-cross cows and from Brahman-sired two-breed rotation cows were heavier at weaning than calves from other mating systems.
- Because females produced in a rotational crossbreeding system will be by different sire breeds each generation, it is likely that variation in maternal ability will result and follow that inherent in that breed. Therefore, even though Brahman first-cross cows must be produced externally to the system, they may provide a more consistent production pattern over time.

Introduction

Commercial cow-calf production is the primary beef cattle enterprise in Louisiana. The current inventory of about 575,000 beef cows is located in about 15,000 herds. The weaned calf is the primary product produced in these herds. It is estimated that crossbred cows are used in at least 80 percent of the commercial cow-calf herds in Louisiana. Most of these cows contain some degree of Brahman inheritance. Many Louisiana producers prefer the Brahman first-cross cow (Angus x Brahman or Hereford x Brahman) because of her relatively high fertility, maternal ability and longevity in our subtropical environment.

The primary disadvantage of using Brahman first-cross cows in a commercial cow-calf operation is that they do not reproduce themselves. Replacement females must be produced in auxiliary herds or purchased from other producers. One way to overcome this problem is to use rotational crossbreeding. The primary advantage of this mating system is that replacement females are produced within the herd and a reasonable level of hybrid vigor is maintained over generations.

The purpose of this research was to compare two-, three- and four-breed rotational crossbred females produced in generation 4 of a long-term crossbreeding study to Brahman first-cross cows for calf performance in a commercial cow-calf setting in South Louisiana.

Experimental Approach

Rotational crossbreeding has been studied in the Louisiana Agricultural Experiment Station at the Ben Hur Farm in Baton Rouge since 1970. A summary of calf performance over four generations from two-, three- and four-breed rotational crossbreeding systems was presented in the 1997 Louisiana Beef Cattle Research Report. In that report, it was clear that three- and four-breed rotation systems produced heavier calves at weaning than two-breed

rotation systems over four generations. Lacking was a comparison of rotational crossbreeding systems to a terminal three-breed mating system using Brahman first-cross cows.

Beginning in the 4th generation of the rotational crossbreeding study at the Ben Hur Farm, a portion of the straightbred Angus, Brahman, Charolais and Hereford cows that were maintained as controls were mated to produce Brahman first-cross calves. Heifers produced from these matings were saved for replacements and developed along with rotational crossbred heifers for replacements for generation 5.

Beginning with the 5th generation, straightbred Angus, Brahman, Charolais and Hereford cows, Brahman first-cross cows and rotation females produced in generation 4 were mated so that the following mating systems could be compared for calf birth and weaning traits:

1. Straightbred cows were mated to produce first-cross calves (Angus x Brahman, Brahman x Angus, Angus x Hereford, Hereford x Angus, Charolais x Brahman, Brahman x Charolais, Hereford x Brahman and Brahman x Hereford).

2. Brahman first-cross females (Angus-Brahman, Charolais-Brahman and Hereford-Brahman) were mated to Gelbvieh and Simmental bulls to produce terminal three-breed cross calves.

3. Two-breed rotation cows were mated to Angus, Charolais and Hereford bulls to produce two-breed rotation calves, and to Gelbvieh and Simmental bulls to produce terminal-two-breed rotation calves.

4. Three-breed rotation cows were mated to Angus and Hereford bulls to produce three-breed rotation calves, and to Gelbvieh and Simmental bulls to produce terminal-three-breed rotation calves.

5. Four-breed rotation cows were mated to Hereford bulls to produce four-breed rotation calves, and to Gelbvieh and Simmental bulls to produce terminal-four-breed rotation calves.

Breed composition of rotational crossbred cows in generation 5 varied, and this is important in understanding the results reported here. Two-breed rotation cows were Brahman-sired. Their breed composition was approximately 2/3 Brahman-1/3 Angus, 2/3 Brahman-1/3 Charolais or 2/3 Brahman-1/3 Hereford. Three-breed rotation cows were approximately 4/7 Charolais-2/7 Brahman-1/7 Angus, 4/7 Angus-2/7 Brahman-1/7 Hereford or 4/7 Charolais-2/7 Brahman-1/7 Hereford. Four-breed rotation cows were about 8/15 Angus-4/15 Brahman-2/15 Charolais-1/15 Hereford.

Cows were mated by AI following estrus synchronization and then by natural service so as to sample as many bulls as possible. A 75-day breeding season started April 15. Calves were born between Jan. 10 and April 15. Calves were identified and weighed within 24 hours after birth. All male calves were castrated in July at an average age of about 5 months. Calves were weaned the first week of October at an average age of 227 days. Calf weight and hip height were taken at weaning.

Birth weight, weaning weight adjusted to 205 days, and hip height were adjusted to a constant birth date and to a mature cow age (5 to 10 years).

Results and Discussion

A total of 1,180 calves were weaned in the 5th generation. Means for calf birth weight, calf 205-day weaning weight, and calf hip height at weaning due to mating system and breed combination within mating system are given in Table 1. The overall means for birth weight, adjusted 205-day weaning weight and hip height at weaning

Table 1. Adjusted means for calf birth weight, weaning weight and hip height due to mating system and breed composition within mating system

Mating system and breed type[b]	No. of calves	Birth weight, lb	Weaning weight[a], lb	Hip height in
Overall mean	1,180	83	558	45
First-cross calves	213	85	536	44
1/2A1/2B	62	83	566	45
1/2A1/2H	60	83	491	42
1/2B1/2C	50	90	545	46
1/2B1/2H	41	85	541	44
Three-breed terminal	270	85	585	45
S&G x 1/2A1/2B	126	83	579	45
S&G x 1/2C1/2B	68	89	602	46
S&G x 1/2H1/2B	76	84	574	45
Two-breed rotation (2BR)	159	81	562	44
A x 2/3B1/3A	47	79	560	44
C x 2/3B1/3C	58	83	567	45
H x 2/3B1/3H	54	80	559	44
Terminal x 2BR	113	82	590	46
S&G x 2/3B1/3A	36	79	592	45
S&G x 2/3B1/3C	34	84	593	46
S&G x 2/3B1/3H	43	82	585	46
Three-breed rotation (3BR)	163	82	555	44
H x 4/7A2/7B1/7H	51	79	545	43
A x 4/7C2/7B1/7A	51	85	556	44
H x 4/7C2/7B1/7H	61	83	563	44
Terminal x 3BR	168	85	557	45
S&G x 4/7A2/7B1/7H	63	81	527	44
S&G x 4/7C2/7B1/7A	43	84	567	45
S&G x 4/7C2/7B1/7H	62	90	577	46
Four-breed rotation (4BR)				
H x 8/15A4/15B2/15C1/15H	42	83	537	43
Terminal x 4BR				
S&G x 8/15A4/15B2/15C1/15H	52	82	538	45

[a] Adjusted to 205 days of age. [b] Breed codes are A=Angus, B=Brahman, C=Charolais, G=Gelbvieh, H=Hereford, S=Simmental.

were 83 pounds, 536 pounds and 45 inches, respectively.

First-cross calves, Gelbvieh- and Simmental-sired terminal cross calves from Brahman first-cross cows, and Gelbvieh- and Simmental-sired calves from three-breed rotation cows were heavier at birth than calves from other mating systems (P<.01). Within mating systems, Charolais x Brahman first-cross calves, Gelbvieh- and Simmental-sired calves from Charolais x Brahman first-cross cows, and Gelbvieh- and Simmental-sired calves from Brahman-Charolais-Hereford three-breed rotation cows were heavier at birth than other breed combinations (P<.05). Two-breed rotation cows that were 2/3B-1/3(Angus, Charolais or Hereford) had intermediate birth weight calves, most likely because the high percentage of Brahman inheritance depressed birth weight. Cows that gave birth to calves weighing over 95 pounds usually had greater calving difficulty.

Weaning weights were heaviest for Gelbvieh- and Simmental-sired calves from Brahman first-cross cows and from two-breed rotation cows (P<.01). Weaning weights of first-cross calves and for four-breed rotation cows were smaller than the remainder of the mating systems (P<.05).

The average hip height at weaning was 44 inches. This corresponds to a frame score of 5 for 7-month-old calves when using the bull frame score chart. Keep in mind that the hip heights reported here are for both steer and heifer calves, and they represent an average hip height. Therefore, using the bull frame score chart for these calves gives conservative frame scores. Gelbvieh- and Simmental-sired calves and Charolais-sired calves had slightly higher frame scores than calves sired by Angus or Hereford bulls. A hip height measurement of 42 inches gives a frame score of 4 at 7 months of age, and a hip height measurement of 46 inches gives a frame score of 6 at 7 months. These data and muscle thickness scores taken at the time the calves were weaned indicate that most of these calves would be assigned medium to large frame feeder calf grades with a muscle thickness score of 1 or 2.