A study was conducted to compare Brangus, Beefmaster, Gelbray, and Simbrah breed influences for economically important traits. Brangus (9), Beefmaster (12), Gelbray (10), and Simbrah (7) sires were used in purebred and crossbred (Brahman × Hereford F1 cows) matings to generate calves (326) in eight breed groups. Beefmaster cows were of similar size (448 kg), Brangus and Gelbray cows were 11% heavier (501 and 503 kg), and Simbrah cows were 21% heavier (548 kg) compared to Brahman × Hereford F1 cows (452 kg). Calves sired by Brangus and Beefmaster bulls had lower birth weights (35 vs 38 kg; \(P < 0.05\)), preweaning growth rates (0.87 vs 0.91 kg/d; \(P < 0.01\)), and weaning weights (206 vs 219 kg; \(P < 0.01\)) than Gelbray- and Simbrah-sired calves. Birth weights, preweaning ADG, and weaning weight and hip heights were similar between Brangus- and Beefmaster-sired calves. Simbrah-sired calves had greater preweaning growth rates (0.94 vs 0.88 kg/d; \(P < 0.05\)), weaning weights (227 vs 211 kg; \(P < 0.01\)), and adjusted 205-d hip heights (126 vs 122 cm; \(P < 0.05\)) than Gelbray-sired calves. Straightbred Angus steers were introduced in the postweaning portion of the study. Steer calves were placed on feed at an average age of 14.5 mo. Steers were removed from the feedlot upon attaining a targeted 10 mm of backfat. Feedlot ADG did not differ among sire breeds. Brahman-derivative sired steers required an additional 54 d on feed (\(P < 0.01\)) and were 86 kg heavier (\(P < 0.01\)) at harvest than Angus steers. Continental-Brahman steers spent an additional 25 d on feed (\(P < 0.05\)) and were 35 kg heavier (\(P < 0.01\)) at harvest than British-Brahman steers. Simbrah-sired steers were 52 kg heavier (\(P < 0.01\)) at harvest than Gelbray-sired steers when fed for a similar number of days (211 vs 203 d). However, straightbred Simbrah steers required an additional 12 d on feed (\(P < 0.01\)) and weighed 47 kg more (\(P < 0.01\)) than Simbrah-sired crossbred steers. The economic value of the heavier calf weaning weights may be offset by the attendant larger cow size of the Continental-Brahman compared to the British-Brahman breeds. Similarly, the heavier weights of Continental-Brahman compared to British-Brahman steers, when harvested at a prescribed level of fatness may be viewed as a benefit, but the increased number of requisite days in the feedlot is a disadvantage.
The objectives of this study were to 1) compare preweaning and weaning performances of “British” (Brangus and Beefmaster) and “Continental” (Gelbray and Simbrah) Brahman-derivative sired calves resulting from straightbred and crossbred (Brahman-Hereford F₁ cows) matings, and 2) compare steer postweaning and feedlot performances of these breed types and those of straightbred Angus steers.

Materials and Methods

Brangus, Beefmaster, Gelbray, Simbrah, and Brahman-Hereford F₁ (B₁H₁) heifers (12 to 30 mo of age, although eight Gelbray heifers were approximately 8 mo of age) and young cows (1 Brangus and 5 Beefmaster females were 4 to 6 yr of age) were purchased in 1986 and 1987 from purebred and commercial breeders in Louisiana and adjacent states. The 20 Beefmaster cows were all advanced-generation purebreds, were from nine herds, and were sired by 13 bulls. The 20 Brangus cows were all at least third-generation cows except for 1 first-generation cow, were from 5 herds, and were sired by 5 sires. Attempts were made to purchase females from several herds for each breed but, because of a lack of availability, all Gelbray females were purchased from one herd. The 18 Gelbray cows were all first-generation purebreds and were daughters of 5 sires. Likewise, the 35 B₁H₁ females were also purchased from a single herd. The 20 Simbrah cows (15 first-generation and 5 second-generation) were from 3 herds and were sired by 9 bulls. Brangus (9), Beefmaster (12), Gelbray (10), and Simbrah (7) sires (i.e., those producing calves) were used in matings to dams of a like breed and in crossbred matings to B₁H₁ dams to generate eight progeny breed groups. The 1987–1991 breeding seasons began in mid-April and ended in mid-July (approximately 90 d) of each year. Matings for the first 60 d of the breeding season were by AI. Cleanup bulls were used for the remainder of the breeding season.

Cows were managed as a single herd throughout the year, except during the latter 30 d of the 90-d spring breeding season. At that time, cows were assigned to single-sire breeding pastures for natural service mating. During the summer and fall, cows grazed bermudagrass (Cynodon dactylon [L.] Pers.) and bahiagrass (Paspalum notatum Fluegge) pastures. In the late fall and winter, cows were fed warm-season, perennial grass hay and molasses-based protein supplements on an ad libitum basis. In late winter, and dependent upon forage availability, cows were allowed to limit-graze annual ryegrass (Lolium multiflorum) pastures for approximately 2 h each day. Following spring calving, cows with calves were removed from the calving herd and placed on a ryegrass pasture, remaining there until bermudagrass-bahiagrass pastures were available for grazing.

A total of 326 male and female calves were born in the 1988–1992 spring calf crops. Calf identification, sex, and birth weights were recorded within 24 h after birth. Male calves were castrated in April of each year. Following standard management procedures, the calves were weaned in late September or early October of each year. At this time, calves were weighed and measured for hip height. Adjusted 205-d weight and hip height (adjusted for cow age and calf age and gender) were calculated for each calf (BIF, 1996). Also at weaning, cows rearing a calf to weaning were weighed and measured for hip height. Cows were also palpated for pregnancy.

Following fall weaning, steer calves (209) were annually transported approximately 80 km to the St. Gabriel Research Station. Steer calves were fed hay and supplement (maintenance level) on a preconditioning program until forage growth was sufficient for stocking on ryegrass pastures. Following the preconditioning period, all steers were implanted with zeranol (Ralgrō, Schering-Plough Animal Health Corp., Union, NJ) and grazed ryegrass pastures as a single group from early winter through spring of the following year. Steers were rotated among available pastures as needed. Heifer calves were not evaluated for postweaning growth.

Straightbred Angus (AN) (12 sires) bull calves were born each spring of 1988–1992 and were weaned and castrated in the fall of their birth year at the Iberia Research Station. Angus steers from the 1988 calf crop were included in a winter-spring stocker study conducted at the Iberia Research Station. Following termination of the stocker study (May, 1989), twelve Angus steers were randomly selected for inclusion in the feedlot study. Angus steers from the 1989, 1990, 1991, and 1992 calf crops were randomly selected at weaning (a respective 10, 10, 9, and 7 steers) and transported (approximately 145 km) to the St. Gabriel Research Station. They were then combined with steer calves from the remaining breed groups for a common stocker phase.

A total of 209 steers were available over the 5-yr period for feedlot comparisons. Steers were vaccinated for protection against infectious bovine rhinotracheitis virus, bovine virus diarrhea, parainfluenza type 3, bovine respiratory syncytial virus, Clostridia, and Haemophilus somnus; administered a combination anthelmintic (ivermectin) flukeicide (clorsulon; Ivomec Plus, Merial Limited, Iselin, NJ); implanted with zeranol (Ralgrō); and administered oxytetracycline (i.m. injection; Pfizer Animal Health, Exton, PA) in mid- to late May of each year (1989 through 1993). Steers were then transported from the St. Gabriel Research Station to the Iberia Research Station for feeding. Angus steers in 1989 received the veterinary treatments described above but were not transported, as they were already at the Iberia Research Station.

Steers were allotted to one of six to eight pens (six to eight steers per pen) approximately 1 wk after arrival at the feedlot facilities, at which time the feedlot trial was initiated. To the extent possible, breed types were evenly distributed across pens annually. Steers were fed a ground corn–cottonseed hulls diet (76.5% and
15.7% as fed, respectively; 89% DM, 12% CP, 1.9 mcal/kg NE\textsubscript{m}, and 1.3 mcal/kg NE\textsubscript{g}). A shrunk weight (feed and water withdrawn for 18 h) was obtained at the initiation of the trial. Fat cover over the 13th rib was evaluated by ultrasound (Scanner 400 Veterinary Ultrasound System, Pie Data Medical, Maastricht, The Netherlands) and by subjective estimation (by a trained evaluator) on the first day of the trial.

Steers were weighed and evaluated (ultrasonically and subjective visually) for fat cover every 28 d. Steers attaining 10 mm of backfat were weighed (feed withdrawal for approximately 18 h) the following day and transported (130 km) to the Animal Science Department of the LSU Agricultural Center, Baton Rouge. Following an additional 36 h of feed withdrawal, steers were again weighed and weight loss between pre- and posttransit weights (shrink) was calculated. Steers failing to attain 10 mm of fat cover during the trial period were slaughtered at the termination of the trial (November, 1989, and February, 1990, 1991, 1992, and 1993). Steer carcass traits, physical composition, and palatability data are presented in Bidner et al. (2002).

All data were analyzed as a randomized block design using a generalized, linear, mixed-model procedure (PROC MIXED with the REML estimation method; Littell et al., 1996). The linear model for cow age at calving and cow weight and hip height data included calf crop year as a random effect and dam breed as a fixed effect. Cow age at calving was included as a covariate for cow weight and height traits. A set of contrasts was constructed to further examine dam breed effects.

The linear model for calf preweaning and weaning data included calf crop year and calf sire within sire breed as random effects and sire breed, dam breed within sire breed, and calf gender as fixed effects. Sire breed × calf gender interaction effect was also included in the model. Calf age at weaning was included as a covariate for analyses of preweaning ADG and weaning weight and hip height data. Sets of contrasts were constructed to further examine sire breed and dam breed within sire breed effects. Resultant breed type least squares means for adjusted 205-d hip height (bull basis) were used to calculate (sex-specific equation for converting adjusted hip height to frame score; BIF, 1996) frame scores.

The linear model for postweaning gain, feedlot, and harvest data included calf crop year and calf sire within sire breed as random effects and sire breed and dam breed within sire breed as fixed effects. Age of steer upon entry into the feedlot was included as a covariate for feedlot and harvest traits. In addition to the sire breed and dam breed within sire breed contrasts used for calf traits, a sire breed contrast comparing Angus-sired steers to the mean of all Brahman-derivative breed-sired steers was also included.

Results and Discussion

Cow traits. Mean cow age at calving was affected by dam breed \((P < 0.01)\) (Table 1). Purchased females for the foundation herd typically ranged from 12 to 30 mo of age at the time of purchase and were subsequently bred to calve initially at 2 yr of age. However, one Brahman and five Beefmaster females were older and ranged from 4 to 6 yr of age and eight of the Gelbray heifers were weaning heifers (8 mo of age) at the time of purchase. Consequently, mean age at calving was older \((P < 0.01)\) for British-Brahman dams than for B\textsubscript{1}H\textsubscript{1} cows and Beefmaster cows were older \((P < 0.05)\) than Brahman cows, respectively. Although the average age at calving of Gelbray and Simbrah cows did not differ from B\textsubscript{1}H\textsubscript{1} cows, Gelbray cows were younger \((P < 0.01)\) than Simbrah cows.

Both cow weight and height differed \((P < 0.01)\) among dam breeds (Table 1). Mean weight and height at weaning of “British” Brahman-derivative cows \((474.5 \text{ kg and } 133.5 \text{ cm})\) were greater \((P < 0.01)\) than that of B\textsubscript{1}H\textsubscript{1} cows; however, Brahman cows weighed more and were taller at weaning than Beefmaster cows \((P < 0.01)\). Mean weight and height at weaning of “Continental” Brahman-derivative cows \((525.5 \text{ kg and } 136.5 \text{ cm})\) were also greater \((P < 0.01)\) than that of B\textsubscript{1}H\textsubscript{1} cows. Simbrah cows weighed more and were taller at weaning than Gelbray cows \((P < 0.01)\). Gregory et al. (1992a) reported similar average weights for Gelbvieh and Simmental cows, but did observe a 1-cm greater hip height for Simmental than for Gelbvieh cows \((138 \text{ vs } 137 \text{ cm})\). Relative to weights at weaning of B\textsubscript{1}H\textsubscript{1} cows, Beefmaster cows were of similar size, Brahman and Gelbray cows were 11% heavier, and Simbrah cows were 21% heavier (i.e., B\textsubscript{1}H\textsubscript{1} and Beefmaster < Brahman and Gelbray < Simbrah).

Calf Preweaning Traits. Male calves had heavier \((P < 0.01)\) birth weights \((37.7 \text{ vs } 35.7 \text{ kg})\), greater \((P < 0.01)\) preweaning daily gains \((0.92 \text{ vs } 0.85 \text{ kg})\), heavier \((P < 0.01)\) weaning weights \((221 \text{ vs } 203 \text{ kg})\) and 205-d adjusted weights \((249 \text{ vs } 231 \text{ kg})\), and greater \((P < 0.01)\) 205-d adjusted hip heights \((122.9 \text{ vs } 121.9 \text{ cm})\) than male calves. Calf gender differences were consistent across sire breeds.

Calf birth weights tended \((P < 0.10)\) to be affected by sire breed and were affected \((P < 0.01)\) by dam breed within sire breed (Table 2). Calves sired by Brangus and Beefmaster bulls had lower \((P < 0.05)\) birth weights than calves sired by Gelbray or Simbrah bulls. Pala et al. (2000) reported similar birth weights \((41.6 \text{ vs } 39.7 \text{ kg})\) for Brangus- and Gelbvieh-sired calves. Estimates of breed direct additive effects for birth weight (Wyatt and Franke, 1986) suggest that the Brahman influence in Gelbray sires would increase birth weights relative to Gelbvieh-sired calves. Also, the use of Simmental breeding in calf sires would be anticipated to increase calf birth weight relative to Brangus-sired calves (Wyatt and Franke, 1986). Birth weights were similar for both Brangus- and Beefmaster-sired calves. Crockett et al. (1979) reported a 2.1-kg heavier birth weight for Beefmaster- than for Brangus-sired calves. In a review article, Thrift (1997) reported that Brangus- and Beefmaster-sired calves weighed a respective 5 and 3 kg.
Table 1. Dam breed least squares means and contrasts for cow age at calving and cow weight and height at weaning

<table>
<thead>
<tr>
<th>Breed</th>
<th>Age at calving, yr</th>
<th>Cow weight at weaning, kg</th>
<th>Cow height at weaning, cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>B₁H₁</td>
<td>111</td>
<td>4.0</td>
<td>96</td>
</tr>
<tr>
<td>BN</td>
<td>51</td>
<td>4.4</td>
<td>43</td>
</tr>
<tr>
<td>BM</td>
<td>60</td>
<td>4.6</td>
<td>51</td>
</tr>
<tr>
<td>GE</td>
<td>42</td>
<td>3.6</td>
<td>35</td>
</tr>
<tr>
<td>SI</td>
<td>62</td>
<td>4.3</td>
<td>54</td>
</tr>
<tr>
<td>Pooled SE</td>
<td>0.7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Dam breed contrasts**

- B₁H₁ vs (BN + BM) -0.5 ± 0.09** -23 ± 7.7** -2.5 ± 0.8**
- B₁H₁ vs (GE + SI) 0.1 ± 0.09 -74 ± 7.6** -5.8 ± 0.9**
- BN vs BM -0.3 ± 0.13* 53 ± 10.6** -7.5 ± 0.8**
- GE vs SI -0.7 ± 0.14** -45 ± 11.5** -8.7 ± 1.3**

*P < 0.05; **P < 0.01.

Breeds: BN = Brangus, BM = Beefmaster, GE = Gelbray, SI = Simbrah, and B₁H₁ = Brahman-Hereford F₁ crossbred.

Birth weights were also similar for Gelbray- and Simbrah-sired calves. Birth weights were similar for Beefmaster-sired calves out of Beefmaster and B₁H₁ dams. Straightbred Gelbray and Simbrah calves were heavier (P < 0.01) at birth than were Brangus-sired calves out of B₁H₁ dams (Table 2). Birth weights were similar for Beefmaster-sired calves out of Beefmaster and B₁H₁ dams. Straightbred Gelbray and Simbrah calves were heavier (P < 0.01) than Gelbray- and Simbrah-sired calves out of B₁H₁ dams. Calf birth weight differences among dam breeds in this study are possibly associated with dam breed differences in percentage Brahman breeding (38% in Brangus, Gelbray, and Simbrah vs 50% in Beefmaster and B₁H₁). A negative (−6.1 kg, relative to Angus) maternal additive effect for birth weight of calves born to Brahman dams, as reported by Wyatt and

Table 2. Dam breed within sire breed least squares means, sire breed contrasts, and dam breed within sire breed contrasts for calf preweaning traits and weaning age

<table>
<thead>
<tr>
<th>Sire</th>
<th>Dam</th>
<th>n</th>
<th>Birth wt, kg</th>
<th>Pre-weaning ADG, kg</th>
<th>Weaning age, d</th>
</tr>
</thead>
<tbody>
<tr>
<td>BN</td>
<td>BN</td>
<td>51</td>
<td>37</td>
<td>0.75</td>
<td>208</td>
</tr>
<tr>
<td></td>
<td>B₁H₁</td>
<td>23</td>
<td>34</td>
<td>0.96</td>
<td>204</td>
</tr>
<tr>
<td>BM</td>
<td>BM</td>
<td>60</td>
<td>36</td>
<td>0.83</td>
<td>202</td>
</tr>
<tr>
<td></td>
<td>B₁H₁</td>
<td>30</td>
<td>35</td>
<td>0.91</td>
<td>206</td>
</tr>
<tr>
<td>GE</td>
<td>GE</td>
<td>42</td>
<td>39</td>
<td>0.86</td>
<td>211</td>
</tr>
<tr>
<td></td>
<td>B₁H₁</td>
<td>25</td>
<td>35</td>
<td>0.90</td>
<td>204</td>
</tr>
<tr>
<td>SI</td>
<td>SI</td>
<td>62</td>
<td>42</td>
<td>0.95</td>
<td>221</td>
</tr>
<tr>
<td></td>
<td>B₁H₁</td>
<td>33</td>
<td>36</td>
<td>0.94</td>
<td>221</td>
</tr>
<tr>
<td>Pooled SE</td>
<td>1.5</td>
<td></td>
<td>0.046</td>
<td></td>
<td>12.4</td>
</tr>
</tbody>
</table>

**Sire breed contrasts**

- Bri-Cont -2.3 ± 0.017* -0.05 ± 0.017** -9.5 ± 8.1
- BN-BM -0.1 ± 1.2 -0.01 ± 0.024 2.3 ± 10.9
- GE-SI -1.7 ± 1.3 -0.06 ± 0.024* -13.6 ± 12.1

**Dam breed contrasts (within sire breed)**

- BN: BN-B₁H₁ 2.7 ± 1.3* -0.20 ± 0.036** 4.2 ± 5.2
- BM: BM-B₁H₁ 0.4 ± 1.2 -0.08 ± 0.032* -3.7 ± 5.0
- GE: GE-B₁H₁ 4.8 ± 1.3** -0.04 ± 0.036 7.2 ± 5.2
- SI: SI-B₁H₁ 5.7 ± 1.1** 0.01 ± 0.031 -0.0 ± 4.4

*P < 0.05; **P < 0.01.

Breeds: Bri = British Brahman-derivative breeds (BN and BM), Cont = Continental Brahman-derivative breeds (GE and SI), BN = Brangus, BM = Beefmaster, GE = Gelbray, SI = Simbrah, and B₁H₁ = Brahman-Hereford F₁ crossbred.

Sire breed effect (P < 0.1).

Dam breed within sire breed effect (P < 0.01).
Franke (1986), would have a suppressing effect on calf birth weights of dams with a greater percentage of Brahman breeding. Calving difficulty (dystocia) was remarkably low for all dam breed types (0, 4.0, 2.3, 4.5, and 3.3% for B1H1, Brangus, Beefmaster, Gelbray, and Simbrah cows) in this study. It is noteworthy that the B1H1 cows in this study had no recorded difficulties in calving Brangus-, Beefmaster-, Gelbray-, and Simbrah-sired calves.

Preweaning ADG was less ($P < 0.01$) for calves sired by British- than for Continental-Brahman composite breeds (Table 2). Although preweaning ADG was similar for Brangus- and Beefmaster-sired calves, Gelbray-sired calves had lower ($P < 0.05$) preweaning gains than Simbrah-sired calves. Preweaning ADG of Brangus calves was considerably lower (28%; $P < 0.01$) than that of Brangus-sired crossbred calves. Using estimated direct and maternal additive and heterotic effects, Wyatt and Franke (1986) predicted a preweaning ADG (expressed as a deviation from that of straightbred Angus calves) advantage of 32% for straightbred compared to crossbred Brangus-sired calves (0.140 vs 0.106 kg). Similarly, preweaning ADG of Beefmaster straightbred calves was less ($P < 0.05$) than that of Beefmaster-sired calves out of B1H1 dams. Preweaning ADG was similar for Gelbray- and Simbrah-sired straightbred and crossbred calves. Calf age at weaning did not differ significantly among sire breeds and between dam types within sire breeds.

Calf weaning weight and adjusted 205-d weight were affected ($P < 0.01$) by both sire breed and dam breed within sire breed (Table 3). Calves sired by Continental-Brahman composite bulls were heavier ($P < 0.01$) at weaning and had adjusted 205-d weights that were heavier ($P < 0.01$) than calves sired by British-Brahman composite bulls. Thrift (1997) reported lower weaning weights for Brangus- and Beefmaster-sired calves (9 and 12 kg, respectively) relative to Brahman-sired calves, but reported a slightly greater weaning weight for Simbrah-sired calves when compared to Brahman-sired calves. Pala et al. (2000) reported similar weaning weights for Gelbvieh- and Brangus-sired calves (215 vs 213 kg). However, these authors also reported similar weaning weights for calves out of Brangus-Hereford and Gelbvieh-Hereford cows. Brangus- and Beefmaster-sired calves had similar weaning and 205-d weights. Winder et al. (2000) reported a 28-kg heavier calf weaning weight for Beefmaster than for Brangus dams, but calf 205-d adjusted weight was similar between Beefmaster and Brangus dams in that study. Within the calves sired by Continental-Brahman bulls, Simbrah-sired calves were heavier ($P < 0.01$) at weaning and had adjusted 205-d weights that were heavier ($P < 0.05$) than calves sired by Gelbray bulls. Conversely, Gregory et al. (1992b) reported similar (247 kg) 200-d weights for Gelbvieh and Simmental straightbred calves.

Dam type within the British-Brahman sire breeds affected calf weaning and 205-d adjusted weights (Table 3). Weaning and 205-d adjusted weights were 21% greater ($P < 0.01$) for Brangus-sired calves with B1H1 dams than for straightbred Brangus. Wyatt and Franke (1986) predicted a 31% greater weaning weight advantage for crossbred than for straightbred Brangus-sired calves (32.9 vs 25.1 kg relative to Angus weaning weight). Weaning weights were greater ($P < 0.05$), as were 205-d adjusted weights ($P < 0.01$), for Beefmaster-sired crossbred than for Beefmaster straightbred calves. Weaning and 205-d adjusted weights were similar between straightbred and crossbred Gelbray- and Simbrah-sired calves. The lack of difference between the Gelbray and Simbrah purebreds and crossbreds was possibly the result of residual heterosis for maternal traits expressed in the first- and second-generation purebred Gelbray and Simbrah cows compared to the advanced-generation (> 3 generation) purebred Beefmaster and Brangus cows. Also the Continental-Brahman composite cows may have had larger maternal and direct additive genetic influences on preweaning ADG and weaning weight than did the two British-Brahman composite purebreds.

Calf adjusted 205-d hip height was affected ($P < 0.01$) by both sire breed and dam breed within sire breed (Table 3). Calves sired by Continental-Brahman composite bulls tended ($P < 0.10$) to be taller than calves sired by British-Brahman composite bulls. Brangus-sired calves tended ($P < 0.10$) to be taller than Beefmaster-sired calves. In terms of calculated frame scores (conversion equation using breed type least square means for adjusted 205-d hip heights; BIF, 1996), average frame scores for Brangus- and Beefmaster-sired calves were 7.0 and 6.3, respectively. Simbrah-sired calves were taller ($P < 0.05$) at weaning than were Gelbray-sired calves. Also, Simbrah-sired straightbred calves were taller ($P < 0.05$) than their crossbred counterparts. Calculated frame scores for Simbrah- and Gelbray-sired calves were 7.6 and 6.8, respectively (average of straightbred and crossbred cattle). Within the Simbrah-sired calves, calculated frame scores were 8.0 and 7.2 for straightbred and crossbred calves.

**Calf Postweaning Traits.** Postweaning gain during the backgrounding period was calculated as the difference between live weights at weaning and at the initiation of the feedlot phase. Only steer calves were evaluated for postweaning growth and feedlot performance. Straightbred Angus steers were also included in this phase of the study. Postweaning ADG was affected ($P < 0.05$) by both sire breed and dam breed within sire breed (Table 4). Angus steers gained at a faster rate ($P < 0.01$) than Brahman-derivative steers. Postweaning ADG did not differ among Brahman-derivative sire breeds. Postweaning ADG during the stocker phase was greater ($P < 0.01$) for Brangus than for Brangus-sired crossbred steers. The pattern of lower postweaning gain of steers from B1H1 dams compared to their straightbred contemporaries, that is, within sire breed, would perhaps suggest a negative maternal heterotic effect on postweaning gain. Brown et al. (1999) reported a negative maternal heterotic effect on postweaning
steers were heavier (\textit{P} < 0.01) at the hip than the remaining breed types. All steers were older (\textit{P} < 0.05) by sire breed and dam breed within sire breed contrasts for calf weaning traits.

Table 3. Dam breed within sire breed least squares means, sire breed contrasts, and dam breed within sire breed contrasts for calf weaning traits

<table>
<thead>
<tr>
<th>Breed</th>
<th>Dam</th>
<th>n</th>
<th>Weaning wt, kg$^{bd}$</th>
<th>Adjusted 205-d wt, kg$^{bd}$</th>
<th>Adjusted 205-d hip height, cm$^{ou}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>BN</td>
<td>BN</td>
<td>51</td>
<td>185</td>
<td>210</td>
<td>123</td>
</tr>
<tr>
<td>BN</td>
<td>B1H1</td>
<td>23</td>
<td>223</td>
<td>255</td>
<td>122</td>
</tr>
<tr>
<td>BM</td>
<td>BM</td>
<td>60</td>
<td>199</td>
<td>222</td>
<td>118</td>
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<td>B1H1</td>
<td>30</td>
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<td>245</td>
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<td>241</td>
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<tr>
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<td>B1H1</td>
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<td>212</td>
<td>241</td>
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<tr>
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<td>SI</td>
<td>62</td>
<td>231</td>
<td>256</td>
<td>128</td>
</tr>
<tr>
<td>SI</td>
<td>B1H1</td>
<td>33</td>
<td>223</td>
<td>251</td>
<td>124</td>
</tr>
<tr>
<td>Pooled SE</td>
<td> </td>
<td> </td>
<td> </td>
<td> </td>
<td>6.7</td>
</tr>
</tbody>
</table>

Sire breed contrasts

- Bri-Cont $\leq 13 \pm 3.4^{**}$
- BN-BM $\leq -2 \pm 4.7$
- GE-SI $\leq -16 \pm 4.8^{**}$

Dam breed contrasts (within sire breed)

- BN: BN-B1H1 $\leq -38\pm 7.0^{**}$
- BM: BM-B1H1 $\leq -16 \pm 6.3^{*}$
- GE: GE-B1H1 $\leq -2\pm 7.0$
- SI: SI-B1H1 $\leq 9\pm 6.0$

$\dagger P < 0.1; \ast P < 0.05; \ast\ast P < 0.01.$

$^{*}$Breeds: Bri = British Brahman-derivative breeds (BN and BM), Cont = Continental Brahman-derivative breeds (GE and SI), BN = Brangus, BM = Beefmaster, GE = Gelbray, SI = Simbrah, and B1H1 = Brahman-Hereford F1 crossbred.

$^{bd}$Sire breed effect ($P < 0.01$).

$^{ou}$Dam breed within sire breed effect ($P < 0.01$).

$^{u}$Sire breed effect ($P < 0.05$).

$^{o}$Dam breed within sire breed effect ($P < 0.05$).

(stocker) gains of steers with Brahman-Angus reciprocal cross dams.

Following the stocker phase, steers were placed on feed. Initial age was affected ($P < 0.05$) by sire breed and Angus steers were older ($P < 0.01$) than Brahman-derivative steers (Table 4). Gelbray straightbred calves were older ($P < 0.05$) than Gelbray-sired calves out of B1H1 dams.

Initial feedlot weight was affected ($P < 0.05$) by both sire breed and dam breed within sire breed (Table 4). These differences may be associated with differences in skeletal growth, in that initial feedlot hip height was also affected ($P < 0.01$) by sire breed and dam breed within sire breed (Table 4). Angus steers tended to have lower ($P < 0.10$) initial weights and were shorter ($P < 0.01$) at the hip than the remaining breed types. Although initial feedlot weight did not differ between British- and Continental-Brahman composite sire breeds, Continental-Brahman sired steers were taller ($P < 0.01$) at the hip. DeRouen et al. (2000) reported similar initial feedlot weights between Brangus- and Gelbray-sired steers. Initial initial feedlot age, weight, and hip height were similar for Brangus- and Beefmaster-sired steers. Although Crockett et al. (1979) reported heavier initial feedlot weights for Brangus- than for Beefmaster-sired (279 vs 272 kg) steers, steers in that study were selected (nine heaviest steers per breed annually) and placed in the feedlot immediately postweaning. Simbrah-sired steers were heavier ($P < 0.01$) and taller ($P < 0.01$) initially than were Gelbray-sired steers. Beefmaster-sired steers out of B1H1 dams tended ($P < 0.10$) to be initially heavier and were taller ($P < 0.05$) at the hip than straightbred Beefmaster steers. Conversely, straightbred Simbrah steers were initially taller ($P < 0.01$) and heavier ($P < 0.05$) than their Simbrah-sired crossbred counterparts. These dam breed differences likely reflect the resultant percentage of “British” (62.5 vs 56.3%) and Simmental breeding (62.5 vs 31.3%) in the Beefmaster- and Simbrah-sired purebred vs crossbred calves.

Sire breed affected ($P < 0.01$) the number of days steers were fed (Table 4). Angus-sired steers were fed for an average of 140 d, which was 54 fewer days ($P < 0.01$) than the Brahman-derivative steers. Steers sired by Brangus or Beefmaster bulls were fed 25 fewer days ($P < 0.05$) than steers sired by Gelbray or Simbrah bulls. Days on feed were similar for Brangus- and Beefmaster-sired steers and for Gelbray- and Simbrah-sired steers. Under similar management conditions, DeRouen et al. (2000) reported a 33-d longer feeding period for Gelbray- than for Brangus-sired calves (195 vs 162 d).

Steers were removed for slaughter based upon attaining a fat cover of 10 mm or greater. A total of 67 steers failed to attain sufficient fat cover over the 5-yr period. A respective 2, 36, 25, 39, and 48% (1, 13, 12, 19, and 22 steers) of the Angus-, Brangus-, Beefmaster-, Gelbray-, and Simbrah-sired steers were slaughtered at the termination of the feedlot trial and
reported that Brangus-sired steers gained 0.04 kg·d⁻¹ less than Brahman-sired steers, although feedlot gain was similar between Beefmaster- and Brahman-sired steers. Under identical management conditions as this study, DeRouen et al. (2000) reported a 0.31-kg difference in feedlot ADG difference between Brangus- and Gelbray-sired steers (1.17 vs 0.86 kg). However, these researchers also reported that Brangus- and Gelbray-sired steers did not differ in terms of feedlot ADG (1.68 vs 1.61 kg) when fed in a commercial feedlot and removed at a pen average 10 mm of backfat thickness. There was a tendency (P < 0.10) for straightbred Beefmaster steers to have greater feedlot ADG than Beefmaster-sired crossbred steers.

Final feedlot weight was affected by both sire breed (P < 0.01) and dam breed within sire breed (P < 0.05) (Table 5). These differences are partially associated with differences in skeletal growth, because final feedlot hip height was also affected (P < 0.01) by sire breed and dam breed within sire breed (Table 5). Angus steers had lower (P < 0.01) final weights and were shorter (P < 0.01) at the hip than the remaining breed types.

Continental-Brahman sired steers had heavier final feedlot weights (P < 0.01) and were taller (P < 0.01) at the hip than the British-Brahman sired steers (Table 5). In contrast, DeRouen et al. (2000) observed no differ-

Table 4. Dam breed within sire breed least squares means, sire breed contrasts, and dam breed within sire breed contrasts for steer postweaning gain and feedlot traits

<table>
<thead>
<tr>
<th>Breed</th>
<th>Sire</th>
<th>Dam</th>
<th>n</th>
<th>Post-weaning ADG, kg d⁻¹</th>
<th>Initial feedlot</th>
<th>Days on feed, d</th>
<th>Feedlot ADG, kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>AN</td>
<td>AN</td>
<td>48</td>
<td>0.50</td>
<td>460 ± 118 ± 308 ± 140 ± 1.17</td>
<td>1.17</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BN</td>
<td>BN</td>
<td>25</td>
<td>0.48</td>
<td>443 ± 126 ± 312 ± 201 ± 1.20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BM</td>
<td>BM</td>
<td>11</td>
<td>0.37</td>
<td>440 ± 128 ± 330 ± 160 ± 1.26</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GE</td>
<td>GE</td>
<td>34</td>
<td>0.43</td>
<td>432 ± 125 ± 308 ± 173 ± 1.30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SI</td>
<td>SI</td>
<td>19</td>
<td>0.42</td>
<td>451 ± 127 ± 317 ± 199 ± 1.16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B1H1</td>
<td>12</td>
<td>0.38</td>
<td>430 ± 127 ± 308 ± 208 ± 1.12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>SI</td>
<td>15</td>
<td>0.42</td>
<td>443 ± 130 ± 337 ± 205 ± 1.19</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B1H1</td>
<td>48</td>
<td>± 0.04</td>
<td>7.8 ± 1.2 ± 14 ± 14 ± 0.07</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Pooled SE 0.04 6 7 1.2 14 14 0.07

*Postweaning period was from weaning to the initiation of the feedlot phase.

**Sire breed effect (P < 0.01).

†Dam breed within sire breed effect (P < 0.05).

‡Sire breed contrast (within sire breed).

§Dam breed within sire breed effect (P < 0.01).

 contested with differences in skeletal growth, because final feedlot ADG was anticipated with individually harvesting steers at a targeted physiologically defined end point of 10 mm backfat. Crockett et al. (1979) reported that feedlot ADG was greatest for Simmental- (1.25 kg), intermediate for Beefmaster- (1.19 kg), and least for Brangus-sired steers (1.15 kg). In a review of literature, Franke (1997)
ence in final feedlot weight between Brangus- and Gelbray-sired steers for either south Louisiana or Oklahoma feedlot conditions. Brangus- and Beefmaster-sired steers were similar in terms of both final feedlot weight and hip height. When fed for a similar number of days, final feedlot weight has been reported to be heavier for Beefmaster- than for Brangus-sired (488 vs 477 kg) steers (Crockett et al., 1979). Franke (1997) reported a respective 20 and 36 kg less final feedlot weight for Brangus- and Beefmaster-sired steers than for Brahman-sired steers, but this comparison was based upon one study (Crockett et al., 1979). Simbrah-sired steers were taller (P < 0.01) and heavier (P < 0.01) than Gelbray-sired steers.

There was a tendency (P < 0.1) for straightbred Brangus steers to be taller than their crossbred contemporaries (Tables 5). Straightbred Simbrah steers were both heavier (P < 0.01) and taller (P < 0.01) at slaughter than were Simbrah-sired crossbred steers.

Slaughter weight, following transit from the feedlot to the slaughter facilities, was affected by both sire breed (P < 0.01) and dam breed within sire breed (P < 0.01) effects (Table 5). Breed differences in slaughter weight were very similar to those for final feedlot weight. Angus steers weighed less (P < 0.01) at slaughter than did steers of remaining breed types. Continental-Brahman sired steers weighed more (P < 0.01) than did British-Brahman sired steers. Slaughter weights were similar for Brangus- and Beefmaster-sired steers. Slaughter weights were heavier (P < 0.01) for Simbrah- than for Gelbray-sired steers. Slaughter weights were similar between Brangus-, Beefmaster-, and Gelbray-sired straightbred and crossbred steers. Straightbred Simbrah steers weighed more (P < 0.01) at slaughter than their crossbred counterparts.

Percent shrink was affected by dam breed within sire breed effects (P < 0.05) (Table 5). Among the Brahman-derivative breeds, percent shrink was similar for all sire breed contrasts. However, Angus steers experienced a greater (P < 0.01) percent weight loss between final feedlot and slaughter weights than did Brahman-derivative steers. Angus steers also had lower a dressing percentage (62.5%) than Brahman-derivative steers (64%; Bidner et al., 2002). Several studies have reported lower gastrointestinal tract and content weight of Brahman and Brahman-crosses compared to Bos taurus cattle (Butler et al., 1956; Carpenter et al., 1961; Ramsey et al., 1965) and may explain the lower percent shrink of Brahman-derivative compared to Angus steers in this study. However, percent shrink did not differ between

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**Table 5. Dam breed within sire breed least squares means, sire breed contrasts, and dam breed within sire breed contrasts for steer feedlot performance and slaughter traits**

<table>
<thead>
<tr>
<th>Sire Dam</th>
<th>n</th>
<th>Hip height, cm&lt;sup&gt;bd&lt;/sup&gt;</th>
<th>Wt, kg&lt;sup&gt;be&lt;/sup&gt;</th>
<th>Harvest wt, kg&lt;sup&gt;bd&lt;/sup&gt;</th>
<th>n</th>
<th>Shrink, %&lt;sup&gt;*a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>AN AN</td>
<td>48</td>
<td>126</td>
<td>469</td>
<td>451</td>
<td>44</td>
<td>3.8</td>
</tr>
<tr>
<td>BN BN</td>
<td>25</td>
<td>138</td>
<td>545</td>
<td>533</td>
<td>23</td>
<td>2.2</td>
</tr>
<tr>
<td>BM B&lt;sub&gt;1&lt;/sub&gt;H&lt;sub&gt;1&lt;/sub&gt; 11</td>
<td>136</td>
<td>523</td>
<td>507</td>
<td>10</td>
<td>3.1</td>
<td></td>
</tr>
<tr>
<td>BM B&lt;sub&gt;1&lt;/sub&gt;H&lt;sub&gt;1&lt;/sub&gt; 34</td>
<td>135</td>
<td>524</td>
<td>506</td>
<td>30</td>
<td>3.5</td>
<td></td>
</tr>
<tr>
<td>GE GE</td>
<td>19</td>
<td>137</td>
<td>557</td>
<td>538</td>
<td>19</td>
<td>3.5</td>
</tr>
<tr>
<td>GE B&lt;sub&gt;1&lt;/sub&gt;H&lt;sub&gt;1&lt;/sub&gt; 14</td>
<td>137</td>
<td>541</td>
<td>529</td>
<td>13</td>
<td>2.3</td>
<td></td>
</tr>
<tr>
<td>SI SI</td>
<td>31</td>
<td>144</td>
<td>622</td>
<td>604</td>
<td>30</td>
<td>2.4</td>
</tr>
<tr>
<td>SI B&lt;sub&gt;1&lt;/sub&gt;H&lt;sub&gt;1&lt;/sub&gt; 15</td>
<td>138</td>
<td>577</td>
<td>557</td>
<td>14</td>
<td>3.2</td>
<td></td>
</tr>
</tbody>
</table>

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*<sup>a</sup>Sire breed effect (P < 0.01).
*<sup>b</sup>Sire breed effect (P < 0.05).
*<sup>c</sup>Dam breed within sire breed effect (P < 0.01).
*<sup>d</sup>Dam breed within sire breed effect (P < 0.05).
*<sup>e</sup>Dam breed contrasts (within sire breed).
*<sup>f</sup>Dam breed contrasts (within sire breed).
straightbred (38% Brahman influence) and crossbred (44% Brahman influence) steers sired by either Brangus or Simbrah bulls. There was a tendency ($P < 0.1$) for Beefmaster- and Gelbray-sired straightbred steers to have a greater percent shrink than their crossbred counterparts.

Implications

Heavier calf weaning weights of the Gelbray- and Simbrah-sired calves when compared to Brangus- and Beefmaster-sired calves, independent of cow type, would be a production benefit for small herd-size producers. However, the heavier weights at weaning of the Continental Brahman-derivative cows, compared to the Brahman-Hereford F1 cows, would presumably have a greater maintenance cost, which may not be viewed as a production benefit. When fed to a targeted fat end point, slaughter weights were greater for the Brahman-derivative steers than for Angus steers and were greater for the Continental-Brahman than for the British-Brahman sired steers. Unfortunately, a greater proportion of the Brahman-derivative and the Continental-Brahman sired steers failed to reach the prescribed fat level than their respective Angus and British-Brahman sired counterparts. Similarly, greater slaughter weights among the breed types were associated with longer feeding periods.

Literature Cited

BIF. 1996. Beef Improvement Federation Guidelines for Uniform Beef Improvement Programs. 7th ed. Beef Improvement Federation, Colby, KS.


