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Feedlot performance, carcass merit, and meat tenderness in crossbred cattle from Hereford, Braford, and Bonsmara sires and Angus and Brangus dams

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ABSTRACT

The objective of this research was to evaluate the source and extent of tropical adaptation affecting feedlot and carcass traits. Calves of Brangus (BN) dams were sired by Braford (BFBN; n = 63; 38% Brahman), Hereford (HEBN; n = 38; 19% Brahman), and Bonsmara (BOBN; n = 53; 19% Brahman and 31% Africander) sires. Calves of Angus (AN) dams were sired by Hereford (HEAN; n = 38) and Bonsmara (BOAN; n = 45; 31% Africander) sires. Carcass yield and LM area were greater (P < 0.05) for HEBN compared with BFBN. Whereas BFBN had greater (P < 0.01) backfat and empty body fat than the BOBN counterparts, the latter had greater (P < 0.01) LM area. Contrasting HEBN and BOBN, HEBN were heavier (P < 0.05) and fatter (P < 0.05). However, BOBN were more heavily muscled (P < 0.05) and deposited more internal fat (P < 0.05). The BOAN steers were heavier (P < 0.05) upon feedlot arrival than HEAN steers. Steers of Brangus (BN) dams were heavier (P < 0.01), but steers of Angus (AN) dams exhibited greater (P < 0.01) marbling scores. There were neither sire-breed nor dam-breed differences (P > 0.15) in Warner-Bratzler shear force values. Presence of Brahman breeding (BN) in the dam breed positively affected weight traits, whereas absence of Brahman breeding (AN) positively affected carcass merit traits. In terms of sire breed contributions, neither extent nor source of tropical adaptation provided a distinct overall advantage in this study.

Key words: Bonsmara, Brahman, carcass, feedlot average daily gain, Warner-Bratzler shear force

INTRODUCTION

Price discounts for Brahman-influenced steers and market heifers can be significant and are mainly attributable to concerns regarding meat tenderness. Thrift and Thrift (2002) summarized carcass tenderness research that involved a comparison of *Bos indicus* breeding relative to *Bos taurus* breeding. They concluded that Warner-Bratzler shear values tend to increase as the proportion of *Bos indicus* inheritance increased. They further implied that the commercial beef cattle industry should refrain from producing cattle that are greater than 50% *Bos indicus* breeding. However, as noted by Thrift and Thrift (2002), the popularity of the *Bos*

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indicus × *Bos taurus* female, based upon her superior preweaning maternal performance in the southeastern and Gulf Coast areas, would make it unlikely that beef producers in these areas would cease the production of these valuable females and their male counterparts.

In Brahman cattle most carcass traits are moderate to highly heritable (e.g., 0.44 for marbling score and 0.47 for USDA QG) and offer potential for selection progress (Riley et al., 2002). However, heritability estimates for tenderness (Warner-Bratzler shear and taste panel) in Brahman cattle are low (below 0.15; Riley et al., 2003) to medium (0.21; Smith et al., 2006), and so response to selection may be slow. Insertion, through crossbreeding, of alternate tropically adapted germplasm having potentially more desirable palatability attributes may be a viable and more efficacious approach in addressing the tenderness issue associated with Brahman breeding.

Bonsmara (*Bos taurus africanus* [Sanga]) is a South African breed that is tropically adapted and may yield more tender cuts than Brahman and some *Bos taurus* breeds (Frylinck and Heinze, 2003). The objective of the present research was to evaluate Bonsmara-sired steer calves for tenderness in breed combinations involving tropically nonadapted (Angus) and traditional adapted (Brangus) cows on feedlot performance, carcass, and meat tenderness traits as affected by extent and source of tropical adaptation in beef cattle.

MATERIALS AND METHODS

All animals in the study were treated in accordance with recommendations of the Animal Care and Use Committee of the Louisiana State University Agricultural Center (Baton Rouge, LA). Male calves (n = 237) produced in the 2006 through 2009 spring calving seasons (fall weaning) at the Iberia Research Station (Jeanerette; 29.95° latitude, −91.71° longitude) were used for the study.

Mating Schemes and Paternity Analyses

Matings schemes and paternity analyses are described in-depth in Wyatt et al. (2013). Grade Angus (**AN**) cows were mated to registered Hereford (**HE**) and Bonsmara (**BO**) sires, and grade Brangus (**BN**) cows were mated to registered Braford (**BF**) and BO sires in the spring of 2005, 2006, 2007, and 2008. Also, grade BN cows were mated to HE sires in the spring of 2006, 2007, and 2008. Calves were F_1 calves of the 5 different mating types, i.e., BF (sire breed)–BN (dam breed) designated **BFBN**, HE (sire breed)–BN (dam breed) designated **HEBN**, BO (sire breed)–BN (dam breed) designated **BOBN**, HE (sire breed)–AN (dam breed) designated **HEAN**, and BO (sire breed)–AN (dam breed) designated **BOAN**. The numbers of male calves per breed type were 63 BFBN, 38 HEBN, 53 BOBN, 38 HEAN, and 45 BOAN. Male calves were produced from 10 BF (5 AI and 5 natural service), 11 HE (6 AI and 5 natural service), and 15 BO (10 AI and 6 natural service) sires. Paternity determination was based upon a combination of DNA analyses, gestation length, and coat color patterns (Wyatt et al., 2013).

Animal Management

Male calves were born in the spring and weaned in October of each year (2006 through 2009). Male calves were knife castrated, and calves having horns were dehorned at weaning. All calves were treated for internal parasites and liver flukes at weaning and again in the spring of the subsequent year. All calves were vaccinated (initial vaccination and booster) against infectious bovine rhinotracheitis, bovine viral diarrhea Type I and II, parainfluenza 3, bovine respiratory syncytial virus, *Campylobacter* (*Vibrio*), leptospirosis sp., and clostridial sp. in the autumn of each year.

Following autumn weaning, calves had access to either bermudagrass hay meadows or were fed bermudagrass hay free choice. Calves were supplemented with a concentrate ration (1% of BW/d) and received a mineral mix free choice (Lone Star 12–6 Pasture Mineral, Nacogdoches, TX). Typically, calves were placed on ryegrass pastures in December or January. Steers were removed from ryegrass pastures in late April or May of each year.

Steers were subsequently shipped 1,289 km to Agri Research Center Inc. in Canyon, Texas. With the exception of 2007, steers were weighed upon arrival at the feedlot. In 2007 a shrunk weight was obtained before shipping. A respective 60, 76, 85, and 44 steers were received at the feedlot on 4 April 2007, 15 May 2008, 31 May 2009, and 14 May 2010. Steers were vaccinated against infectious bovine rhinotracheitis, bovine viral diarrhea Type I and II, parainfluenza 3, bovine respiratory syncytial virus, *Campylobacter* (*Vibrio*), leptospirosis sp., and clostridial sp. upon arrival at the feedlot. Steers were also treated for internal and external parasites upon arrival and implanted with a trenbolone acetate and estradiol slow-release implant. Steers received a corn-based ration while in the feedlot. At slaughter, steers were weighed (unshrunk) and transported 51 km to Tyson Fresh Meats located in Amarillo, Texas. Slaughter dates were as follows: 2007, 19 September (32 steers) and 19 October (28 steers); 2008, 10 September (37 steers) and 8 October (48 steers); 2009, 9 September (52 steers) and 11 November (23 steers); and 2010, 7 October (44 steers). One steer died in 2009 because of bloat complications.

Carcass Evaluation

At slaughter, HCW and liver scores were recorded. Forty hours after slaughter, a detailed carcass evaluation was conducted by personnel from the Beef Carcass Research Center (West Texas A&M University, Canyon, TX), which included marbling score; physiological maturity; 12th-rib fat depth; LM area (**LMA**); and estimated kidney, pelvic, and heart fat. Carcasses were ribbed between