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## **Evaluating the Performance of F1 Brahman Sired Calves Compared to F1 Angus Sired Calves**

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Evaluating the Performance of F1 Brahman Sired Calves Compared to F1 Angus  
Sired Calves

by

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Undergraduate honors thesis under the direction of

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the Upper Division Honors Program.

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## **Abstract**

The Brangus breed was created to utilize the superior traits of Brahman cattle (ability to produce in extreme climates and with parasites) and Angus cattle (high carcass quality and early sexual maturity). In this study, performance of Angus sired F1 calves with Brahman dams and Brahman sired F1 calves with Angus dams were compared. Birth weights of all calves were recorded within 24 hours of birth. The weaning weight and hip heights were recorded and adjusted to 205 days. Brahman sired F1 calves were shown to have a larger birth weight, while Angus sired F1 calves showed a larger weaning weight. The results indicated that Angus sired F1 calves were more productive than Brahman sired F1 calves, but future research needs to explore feedlot efficiency and performance, as well as carcass quality and composition of the final product.

## **Chapter 1:**

### **Introduction**

The Louisiana beef production system comprises a large majority of *Bos indicus* crossbred animals. Crossbreeding has shown to improve productivity through hybrid vigor, or heterosis. Brahman, British, and Continental breeds are often used for crossbreeding by a large majority of commercial producers. The Brahman breed has been recognized as one of the most productive since they are capable of producing in the extreme climates and parasite population of the south. The Angus breed is known for their high carcass quality and early sexual maturity. The Brangus breed was created to utilize the superior traits of Angus and Brahman cattle. The combination of Angus and Brahman results in a Brangus breed that has renowned maternal traits and is very adaptable in adverse environments. The purpose of this project is to evaluate the performance of F1 Brahman sired calves compared to F1 Angus sired calves.

## **Chapter 2:**

### **Literature Review**

#### *Hybrid Vigor*

Hybrid vigor, or heterosis, is defined as crossing two different strains, varieties, breeds or species in which the offspring are superior in performance compared to the parents (Madhuri, Suman, & Pandey, 2009). The extra performance observed through hybrid vigor is simply the recovery of production losses that occurred through inbreeding in the parental breeds (G. Tang, 2011). However, hybrid vigor is reduced when crossbred cattle are mated together, with F2 individuals, or when bred back to one of the purebred parent breeds. With the challenging economic climate of the cattle industry, crossbreeding is an increasingly useful tool to help reduce wasted costs and enhance productivity (G. Tang, 2011). It has been used throughout the world and there is ample evidence to support the production gains possible from crossbreeding. Industry experts argue a well-designed, manageable crossbreeding system is vital in making genetic progress in the various economically important traits that drive profitability in today's beef industry (Madhuri, Suman, & Pandey, 2009). The key characteristics in cattle that can benefit from such programs are reproductive efficiency,



maternal performance, growth and feed efficiency and quality of meat (Madhuri, Suman, & Pandey, 2009).

Years of crossbreeding research has consistently shown that beef producers get higher levels of hybrid vigor when you cross a Brahman with a *Bos indicus* or *Bos taurus* breed compared to just breeding *Bos taurus* to *Bos taurus* or *Bos indicus* to *Bos indicus*. Due to this high level of hybrid vigor, Brahman cattle are often utilized as crossbreeding's common denominator in the southeastern United States, and the use of Brahman with the British or Continental breeds is one of the most popular crossbreeding practices in the southeastern United States (Thrift, PAS, & Thrift, 2003). The Brahman F1 cross is consistently superior to other crosses when evaluating traits such as weight per day of age and carcass efficiency. The Brahman F1 is also very popular because these cattle display many important characteristics of their Brahman breed that have proven essential in sub-tropical regions, such as drought resistance, heat tolerance, disease and parasite resistance and increased longevity. Brahman F1 calves are in high demand by cattlemen for replacement females or feeders in the feedlot due to these beneficial characteristics (Thrift, PAS, & Thrift, 2003).

### *Breed Background*

Known mostly for its carcass value and high quality beef, the Angus breed is often cross-bred with other breeds to increase carcass quality, and

maternal capabilities. Angus cattle are naturally polled so cross-breeding is practiced in efforts to dehorn other breeds. Angus tend to have a short black coat, more white fat, increased capability to marble, bright red lean meat, early sexual maturity, fertile, and ease of calving, and longevity in a production herd. Angus cattle are also known to perform well in a range of demanding commercial conditions and are traded between domestic and international markets, particularly Japan (Thrift, PAS, & Thrift, 2003).

Brahman cattle have developed as a major beef breed in the tropical humid and subtropical dry areas. Brahman are characterized by a hump above the shoulders and a pronounced dewlap. The coat is short and can be light to dark grey, various shades of red, or black. They show typical *Bos indicus* characteristics of shielded eyes, loose folds of skin on the dewlap and prepuce, and droopy ears. Brahman are intelligent, inquisitive and shy. The breed is medium in size with a tendency to temperament issues, longevity as a breeding animal, and late sexual maturity, so carcasses of young animals tend to be lean. The Brahman is suitable for crossbreeding, giving excellent hybrid vigor in the progeny (Thrift, PAS, & Thrift, 2003).

#### *Studies Involving F1 Performance*

Brahman hybrid calves and those out of Brahman F1 cows are noted for their fast gains, and these calves consistently produce more weight per day of age than most other breed contemporaries. Brahman cross calves

are more desirable to raise in many parts of the country, such as sub-tropical United States, South America, Asia, Australia and some tropical areas, during hot, humid months when the feed efficiency of European and British calves and crosses decreases. The ability of these Brahman cross cattle to finish during warm seasons is a definite economic factor that enhances their desirability (K. M. Rolfe, 2011).

Feed efficiency has been shown to be greater in *Bos indicus* type breeds of cattle. Previous research has also observed that *Bos indicus* x *Bos taurus* crosses had greater feed efficiency or gain to feed ration than *Bos taurus* x *Bos taurus* crosses. While efficiency is an important quality of the Brahman breed and its crosses, the carcasses are known for their high cutability, which results in a high yielding carcass with limited fat. Previous research reported that when evaluating Angus and Hereford cows that were bred to Brahman bulls showed that both crossbreds had increased gain efficiency. The first calf crops produced 89 steers, with no death loss experienced postweaning. Of those fed, 58 percent of the steers graded Choice, with the remaining animals being evaluated graded select and standard (G. Tang, 2011).

#### *Issues Associated with Bos indicus on Bos taurus females*

Superior preweaning productivity expressed during a relatively long lifespan is the primary reason *B. indicus* x *B. taurus* females, especially

Brahman  $\times$  *B. taurus* females, are utilized widely for commercial beef-cattle production in the southeastern and Gulf Coast areas. However, issues have been reported that contribute to the expense of producing these females (Madhuri, Suman, & Pandey, 2009). Specifically, it has been reported that when produced these particular F1 crosses increased dystocia/reduced survival rate expressed by Brahman-sired calves. Brahman sires typically produce lower birth weight purebred calves, but when crossed with other dam breeds, the birth weights tend to increase dramatically (Thrift, PAS, & Thrift, 2003). *Bos taurus* sire on Brahman females do not usually have problems with birth weights, due to the larger pelvic areas of Brahman females. Dystocia causes major economic losses to beef enterprises through cow and calf mortalities, increased labor, and veterinary costs, and reduced cow production (Thrift, PAS, & Thrift, 2003). In a study conducted by A. D. Herring, et al, calves produced by Angus vs. Hereford dams and calves born in different years had no significant difference, but the males were significantly larger than the females. The observed birth weight variation was not accounted for with the regression on breeding date within breeding year. Among Brahman crosses, males were significantly larger than females, which was consistent with previous reports [ (Cartwright, Ellis, Kruse, & Crouch, 1964), (Comerford, Bertrand, Bertrand, & Johnson, 1987), (Paschal, Sanders, & Kerr, 1991)] indicating the sire breed  $\times$  calf sex interactions on birth weight where large sex differences were found in *Bos*

*indicus* × *Bos Taurus* crossbred calves (Herring, Sanders, Knutson, & Lunt, 1996).

### *Fertility and Longevity of F1*

Previous research has reported relatively low heritability values for cattle longevity in a production herd (Thrift, PAS, & Thrift, 2003). Consequently, production longevity has true potential to be enhanced with crossbreeding. Results summarized from studies comparing longevity of crossbred and straightbred cows support this expectation (Thrift, PAS, & Thrift, 2003). Furthermore, longevity has been reported to increase with *B. indicus* × *B. taurus* crossbred cows (G. Tang, 2011). The increased longevity expressed by these crossbred cows favorably contributes to a herd that will consist primarily of early maturing, high-producing *Bos indicus* × *Bos taurus*. When female replacements are needed, the increased longevity of these crossbred cows allows for more intense selection. This increased level of weaning productivity was attributed to the cumulative effect of greater longevity of crossbred cows resulting from their greater fertility and average calf weaning weights (G. Tang, 2011).

## **Chapter 3:**

### **Materials and Methods**

Crossbreeding is a popular practice in South US to achieve hybrid vigor, which improves productivity. Two of the most common breeds used in crossbreeding commercial systems are Angus, which are known for their high carcass quality and early sexual maturity, and Brahman, known for productivity even in extreme climates and with parasite population. The Brangus breed was created to utilize the superior traits of Angus and Brahman cattle. The combination of Angus and Brahman results in a Brangus breed that has renowned maternal traits and is very adaptable in adverse environments. The objective of this experiment is to evaluate the performance of F1 Brahman sired calves compared to F1 Angus sired calves.

Six Angus x Brahman and seventeen Brahman x Angus F1 calves raised at LSU AgCenter Central Research Station were utilized for this experiment. Dams of purebred Angus or Brahman lineage were mated to select Brahman and Angus sires selected for calving ease, good growth characteristics, good maternal characteristics and good carcass characteristics. Angus and Brahman cows were bred to these select Brahman and Angus sires from May to June and calved from February to March. Birth weights of all calves were recorded at least 24 hours after birth, and all males were castrated after birth. Weaning weight and hip

height were measured and adjusted for 205 days of age. Steer calves were then sent to Gonzalez, TX for the evaluation of feedlot performance as well as measurement of carcass quality and composition characteristics, although this data will be represented in future studies.

## **Chapter 4:**

### **Results**

When evaluating birth weight of the two F1 cross groups, it was observed that average birth weight of Brahman sired F1 calves was greater than the average of the Angus sired F1 calves (Figure 1). This result validated previous reports of larger Brahman sired birth weights by A. D. Herring, et al (1996). The purebred calves had lower birth weights than Angus sired and Brahman sired F1 calves. Furthermore, it was noted that sex played a role in average birth weight. Bulls had a larger average birth weight than heifers (Figure 2).

There was no difference in the average weaning weights of Angus sired and Brahman sired F1 calves (Figure 3). Compared to the Angus sired and Brahman sired F1 calves, the purebred Brahman had lower weaning weights. Sex was also not a factor with weaning weights (Figure 4). When evaluating hip height, it was observed that Angus sired F1 calves had a greater hip height (Figure 5). The hip heights of purebred Brahman calves and Brahman sired F1 calves were similar, but Angus sired F1 calves had significantly higher hip heights. Sex did not play a role in hip heights of the calves (Figure 6).



Figure 1. Average birth weights of Angus sired F1, Brahman sired F1 calves and purebred Brahman calves.

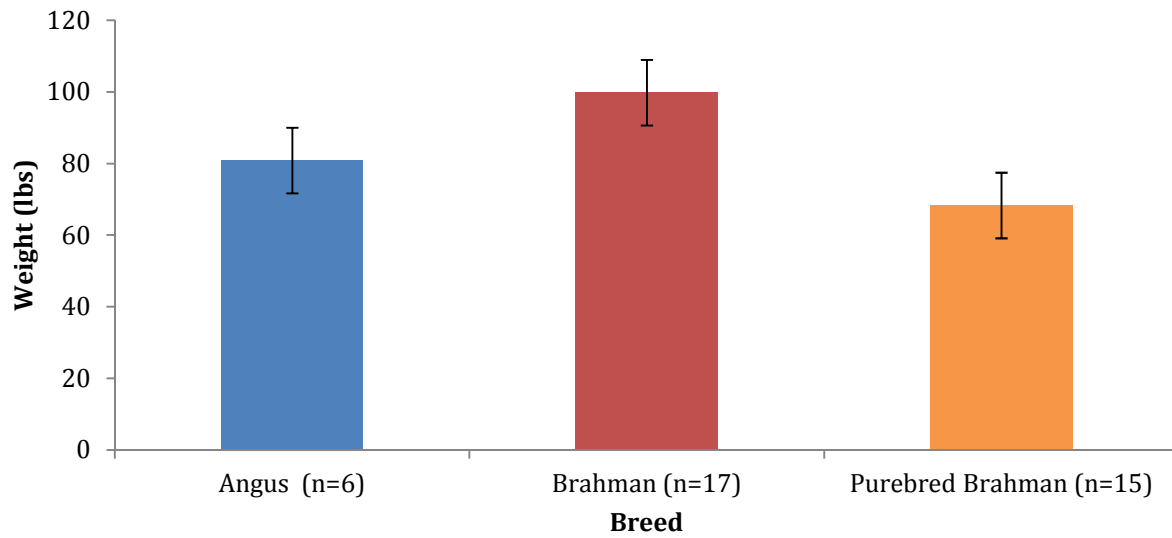


Figure 2. Average birth weights of sexes.

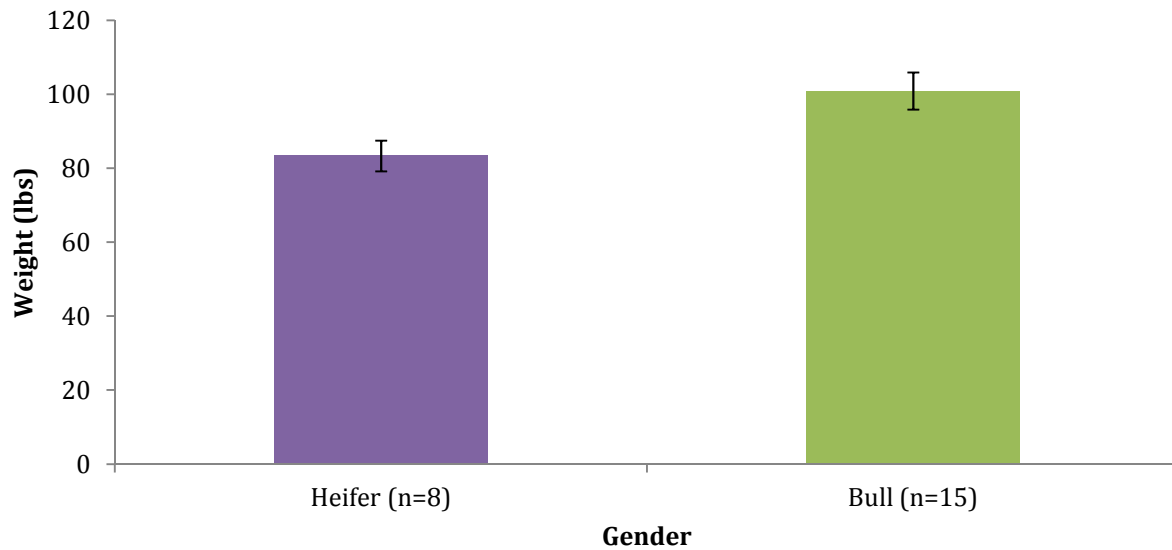


Figure 3. Average weaning weights of Angus sired F1, Brahman sired F1 calves and Purebred Brahman calves.

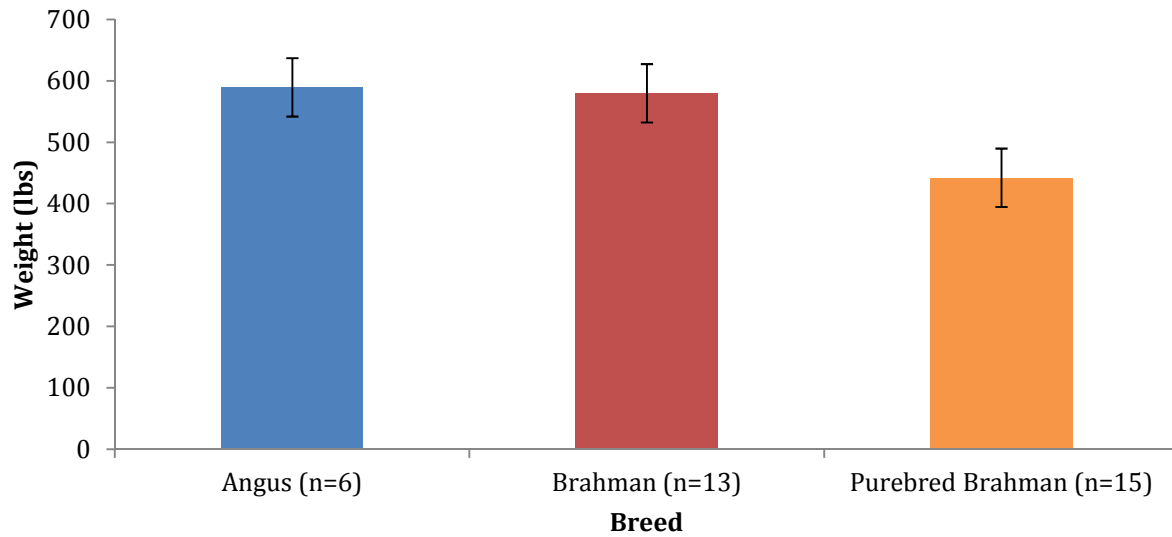


Figure 4. Average weaning weights of sexes.

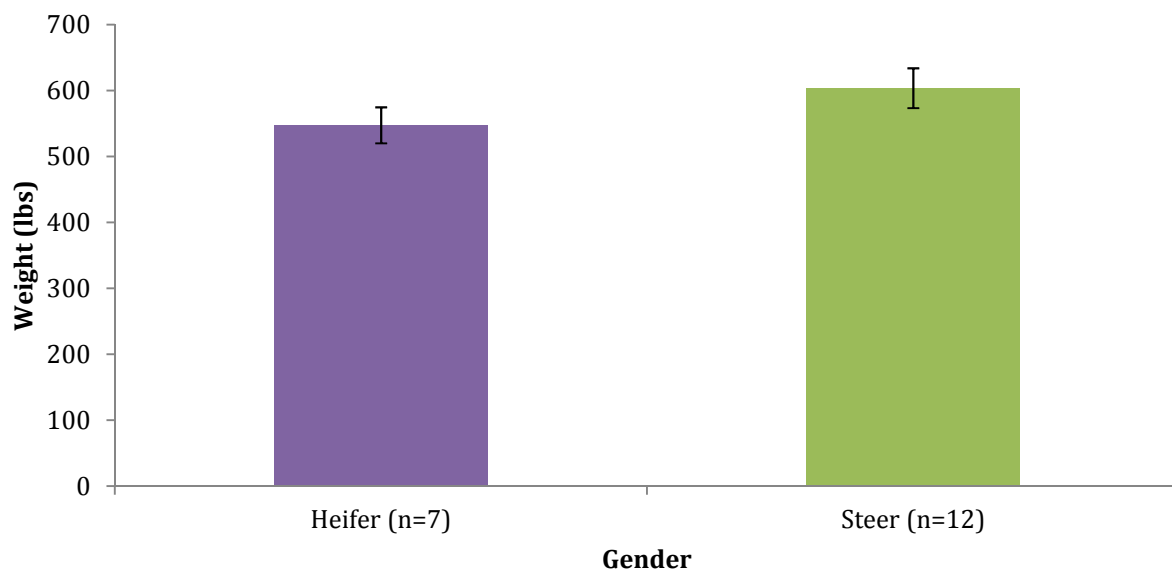


Figure 5. Average hip heights of Angus sired F1, Brahman sired F1 calves and Purebred Brahman calves.

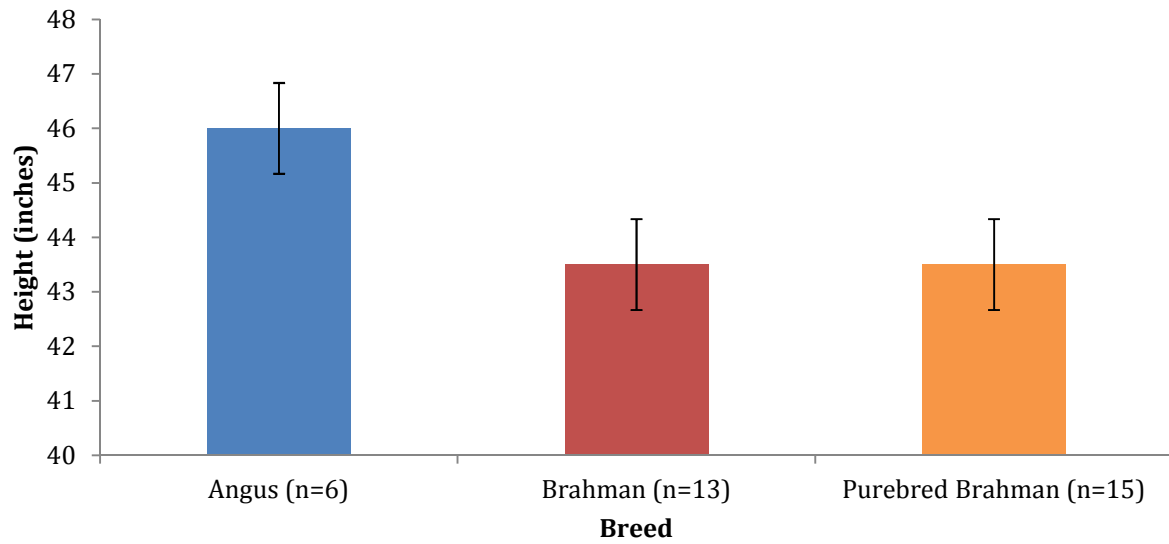
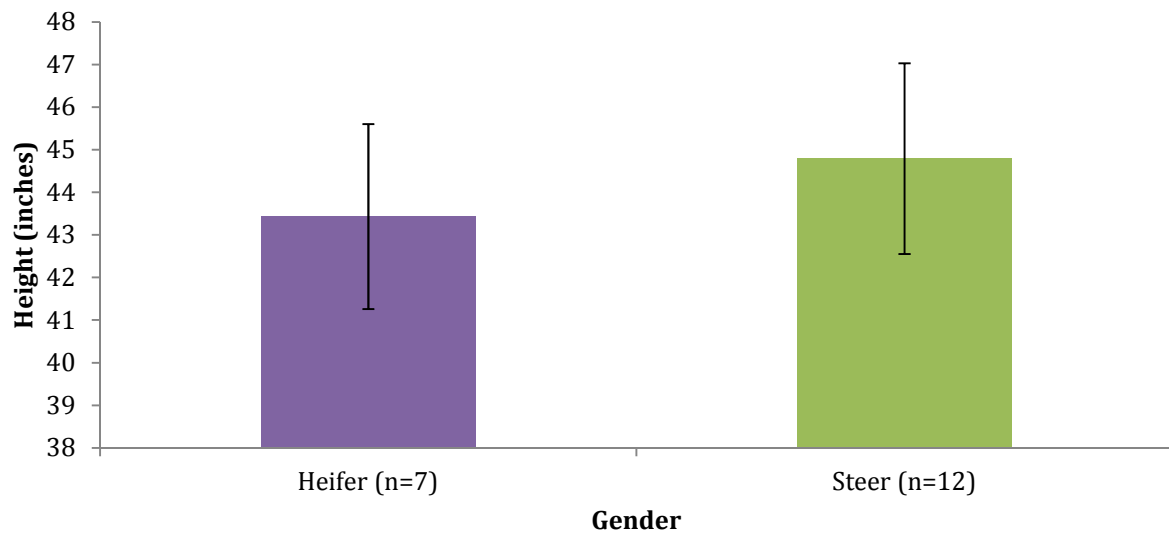


Figure 6. Average hip heights of sexes.



## **Chapter 5:**

### **Discussion and Conclusion**

Breed type affected the birth weights and hip heights in this experiment. Angus sired F1 calves and heifers had lower birth weights than their Brahman sired counterparts. Angus sired F1 calves also had increased hip height, compared with Brahman sired F1 calves. These results indicate that the Angus sired F1 calves were more easily produced (birth weights) and were more efficient in growing than Brahman sired F1 calves. The data also indicates that hybrid vigor was achieved. The F1 crossbred calves performed better than the purebred Brahman with birth weight and weaning weight, which shows that the F1 offspring had a superior performance than the purebred Brahman calves.

Currently, many producers are utilizing Brahman bulls on *Bos taurus* females to produce F1's. This practice is common because of higher populations, availability of *Bos taurus* females in the United States and hybrid vigor. However, this study validates previous reports of birth weight issues and producers should exercise care when utilizing this type of mating system. It should be noted that utilizing Brahman females with a *Bos taurus* bull may be the most efficient way to produce F1's as long as Brahman females are readily available. Although benefits of utilizing Angus sires were demonstrated in this study, future research must be conducted in areas such

as other breed types, degree of heat tolerance, parasite resistance, and feedlot performance and carcass characteristics of the final product to determine additional differences between Angus sired and Brahman sired F1 cattle.

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## **Vita**

Shari Alicia Mahoney was born on November 10, 1989 in Natchitoches, Louisiana. She graduated from Natchitoches Central High School in the spring of 2008, and attended Louisiana State University. In May 2012, Shari will receive her Bachelor of Science degree in Animal Science. In the fall of 2012, Shari will enter the School of Veterinary Medicine at Louisiana State University, Baton Rouge, LA.