

Brahman Research Report 2016

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Introduction

The two beef cattle herds kept at the Beef Research Unit (BRU) have a total of 397 cows (including 2-yr olds). The Angus-Brahman multibreed herd has 325 cows and the Brahman herd has 72 cows. Both herds are subject to the same management, feeding, and culling procedures. However, the mating system is different. The mating system in the Angus-Brahman multibreed herd is diallel where sires from each one of its six breed groups ranging from 0% to 100% Brahman (between 3 and 5 per breed group per year) are mated to dams of all six breed groups. Conversely, the mating system in the Brahman herd utilizes sires from multiple Brahman breeders in Florida (between 6 to 8 per year) to achieve an appropriate representation of the Brahman population in this herd. Further, some sires used in the Brahman herd are also used in the Angus-Brahman multibreed herd, thus the two herds are now connected for genetic evaluation and research. In addition, the Angus-Brahman multibreed and the Brahman herds are also connected to herds participating in the S-1064 Regional Project. Consequently, both herds are fully integrated into Hatch Project FLA-ANS- 005150 Improvement of Beef Cattle in Multibreed Populations: Phase V and Regional Project S-1064 (FLA-ANS-005448) Genetic improvement of adaptation and reproduction to enhance sustainability of cow-calf production in the Southern United States. In addition, these herds are also an integral part of the research efforts by faculty in our department (K. C. Jeong, R. Mateescu, C. Nelson, T. Scheffler, J. Scheffler), the department of Large Animal Clinical Sciences (D. O. Rae) and the department of Animal Sciences and Industry, KSU (J. M. Gonzalez).

Research Objectives (Regional and Local):

- a. Develop a Brahman population with animals from multiple herds to conduct genetics and genomics evaluation and selection for reproduction, growth, feed efficiency, ultrasound, carcass and meat palatability traits.
- b. Conduct genetic and genomic evaluation of animals for reproduction, growth, feed efficiency, ultrasound, and carcass and meat palatability traits using pedigree, genomic, and phenotypic information.
- c. Meta-analyses of economically important traits of cow productivity and fertility to assess breed and production system combinations.
- d. Investigation of early cow-life performance (first four parities) affecting lifetime production.
- e. Identification of genetic markers associated with meat quality traits to improve prediction for tenderness in beef cattle (R. Mateescu).
- f. Muscle metabolic phenotypes and their association with meat quality traits (T. Scheffler, J. Scheffler, J. M. Gonzalez).
- g. Animal and microbiological factors affecting the prevalence of Shiga Toxin Producing E. coli (STEC) and Cefotaxime Resistance (CefR) (K. C. Jeong).
- h. Influence and regulation of vitamin D on the immune system, health, and growth of beef calves (C. Nelson).

Management of the Brahman Herd

Cows and calves in the Brahman herd are kept on bahiagrass pastures with access to a complete mineral supplement. Calves are born from December to early March and weaning is in late August or early September. Substantial culling of cows in the Brahman herd needed to be done at the BRU to improve herd fertility and increase yearly calf crop and cow maternal ability. As a result of the culling conducted at the BRU:

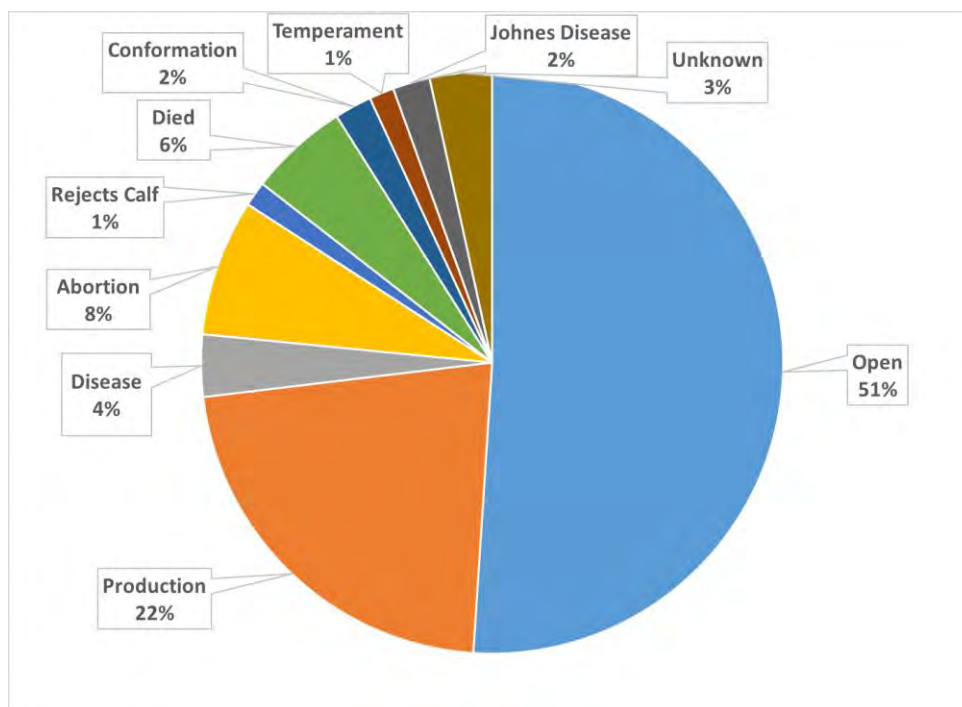
- a. Pregnancy rates increased from 48.3% in 2011 (Cows were at STARS in 2011) to 75% in 2016 when all cows present at mating are considered. Higher numbers are obtained when only animals present at mating are considered (i.e., excluding culled cows between mating and calving) reaching 90% in 2016. [The Table below presents number of cows inseminated, number of cows pregnant, and percentage of pregnant cows per year.](#)

Location	Year	Number Cows Inseminated	Number Cows Pregnant	% Pregnant
BKV	2011	29	14	48.3
BKV-BRU	2012	93	50	53.8
BRU	2013	121	75	62.0
BRU	2014	98	57	58.2
BRU	2015	97	71	73.2
BRU	2016	84	63	75.0

- b. Average weaning weight increased from 409.1 lb in 2011 to 463.1 lb in 2015 and average weaning weight per cow exposed increased from 183.4 lb/cow in 2011 to 243.5 lb/cow in 2015. [The Table below shows averages for birth weight, weaning weight, weaning age, average daily gain, and average weaning weight per cow exposed.](#)

Location	Year	Average Birth Wt, lb	Average Wean Wt, lb	Average Wean Age, days	Average Daily Gain, lb/day	Average Weaning Wt per Cow Exposed, lb/cow
BKV	2011	63.7	409.1	184.9	2.2	183.4
BKV-BRU	2012	69.5	472.7	197.3	2.4	233.8
BRU	2013	67.3	365.0	182.7	2.0	178.0
BRU	2014	69.7	423.8	195.7	2.2	198.9
BRU	2015	68.8	463.1	211.9	2.2	243.5
BRU	2016	72.4				

- c. [Reasons for culling in the Brahman herd are shown in the Figure below.](#) The two main culling reasons were open cows (51% of culls) and low cow maternal ability (meaning low milk and low calf weaning weights).



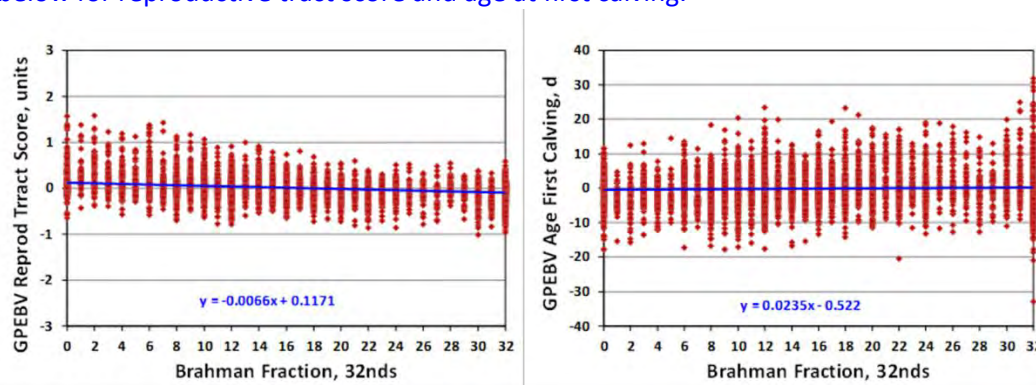
Research Accomplishments:

- Database containing phenotypes, pedigree, and genotypic database. Phenotypes include reproduction, growth, feed efficiency, ultrasound, carcass and meat palatability traits. Genotypes include Illumina 3k and 50k, and GeneSeek 150k and 250k.
- Establishment of a tissue sample (semen, blood, hair) repository.
- Establishment of connections between the UF Brahman herd, the UF Multibreed Angus-Brahman herd, private Florida Brahman herds and herds from the Southern Regional Project S-1064 through the use of common sires.
- Increased the number of sires used in the Brahman herd per year from 3 at STARS to between 6 and 8 sires per year at the BRU. Sires come Florida and other states in the Southern region. Use of a large number of sires not only helped create connections among herds but made the UF Brahman herd more representative of the Brahman population in Florida and the Southern region. [The Table below shows the sires used by year from 2010 to 2016.](#)

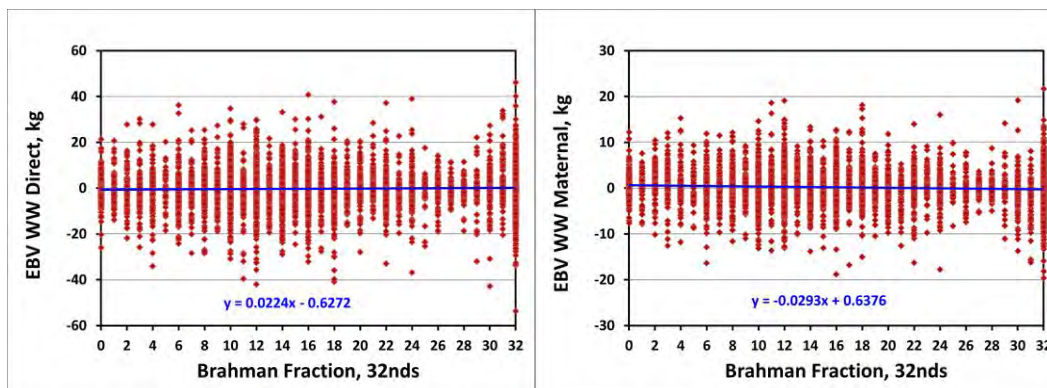
Exp Num	Bull Number	Registration Number	Bull Name	2010	2011	2012	2013	2014	2015	2016
78	3999078	306428	+BL LITTLE BOZO 1/8	1	1	0	1	1	0	0
135	3999135	675309	JDH MR MANSO 526/9	1	1	0	0	0	0	0
218	3999218	305990	JJ PONCRATA 276	0	0	0	0	1	0	0
230	3999230	783104	REP IMPRA MANGUM 370	1	0	0	0	1	0	0
248	3999248	816797	REP WALTER MANSO	1	1	1	0	0	1	0
267	3069427	858640	KCC 247 OF 979-205	0	0	1	1	1	0	0
283	3999283	871628	MSP DUBO CHERRA 45/1	0	0	0	1	1	0	0
284	3999284	863297	MR TAES 7145	1	1	1	1	1	0	0
285	3049147	856460	TH BURMA BEN SUVA 147-04	0	0	0	1	0	0	0
295	2120125	932327	UF MR GATOR 212-0125	0	0	0	0	1	0	0

296	3129930	908070	JCC LOXI MANSO 930/1	0	0	0	0	1	0	0
297	3999297	907983	MR. V8 259/7	0	0	0	0	0	1	0
298	2109107	890628	MR. TAES 0107	0	0	1	0	0	0	0
299	2069272	864628	KCC 272 OF 185-176	0	0	1	0	0	0	0
300	2120041	932326	UF MR GATOR 212-0041	0	0	0	0	1	0	0
307	2139468	920088	KCC 468 of 292-357	0	0	0	0	0	1	0
308	3999308	920078	KCC 446 OF 549-395	0	0	0	0	0	1	0
309	3999309	864627	KCC 286 OF 185-199	0	0	0	0	0	1	0
277	3999277	778115	MR. SUNLAND 6X 874	0	0	0	1	1	1	1
282	3999282	845544	NMSU 6X CLOVERDALE 5129	0	1	0	1	1	1	1
152	3999152	764048	JCC SUGARA LOX ESTO 735	0	0	0	0	0	0	1
326	3999326	898580	KCC 411 OF 475-230	0	0	0	0	0	0	1
327	3999327	920819	KCC 459 OF 292-341	0	0	0	0	0	0	1
328	3139679	922108	DEP Sir Manso Emperor	0	0	0	1	0	0	0
286	3109369	889491	KCC 369 OF 256-282	0	0	0	1	0	0	0
311	2089803	875993	DPR Jason Challos 803	0	0	0	0	0	1	1

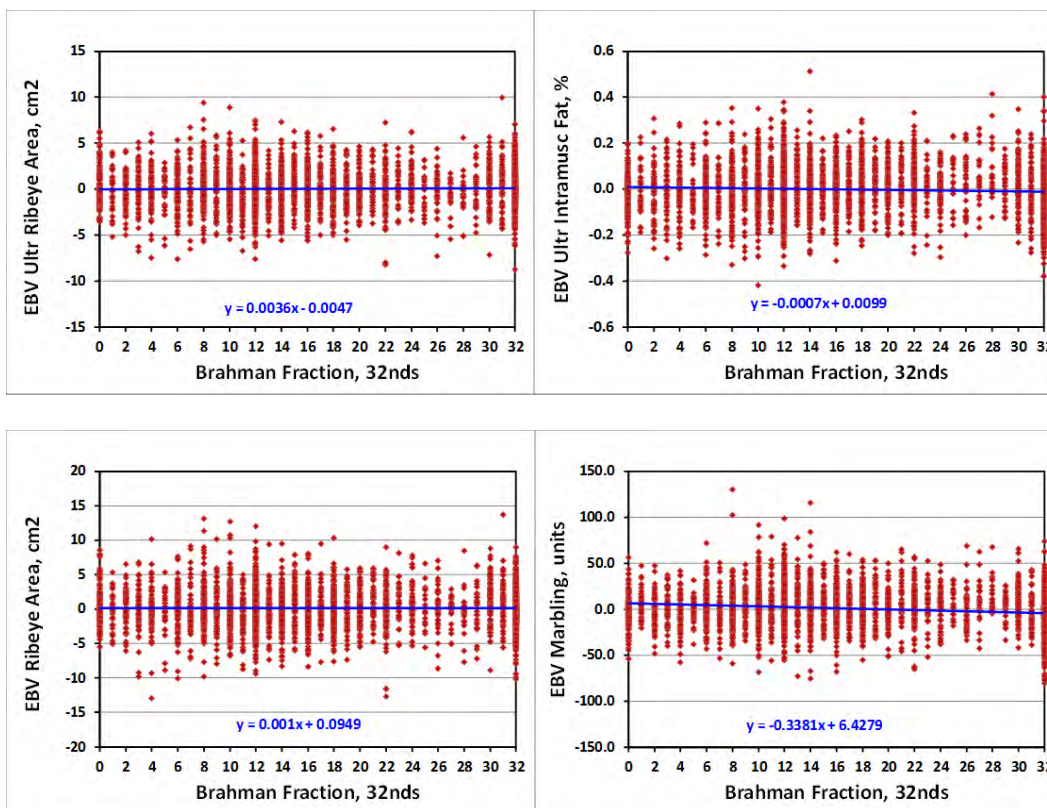
- e. Genomic-polygenic analysis of heifers from the Angus-Brahman multibreed and Brahman herds for yearling weight, reproductive tract score, age at first calving, and first calving interval. Genomic-polygenic values of animals ranging from 0 to 100% Brahman are shown in the Figure below for reproductive tract score and age at first calving.



- f. Genomic-polygenic analysis of animals from the Angus-Brahman multibreed and Brahman herds for yearling weight direct and maternal, ultrasound ribeye area, ultrasound backfat, and ultrasound marbling.
- g. Genomic-polygenic analysis of animals from the Angus-Brahman multibreed and Brahman herds for birth weight direct and maternal, weaning weight direct and maternal, postweaning gain direct, ultrasound ribeye area, ultrasound backfat, and ultrasound marbling. Genomic-polygenic values of animals ranging from 0 to 100% Brahman are shown in the Figure below for weaning weight direct and weaning weight maternal.

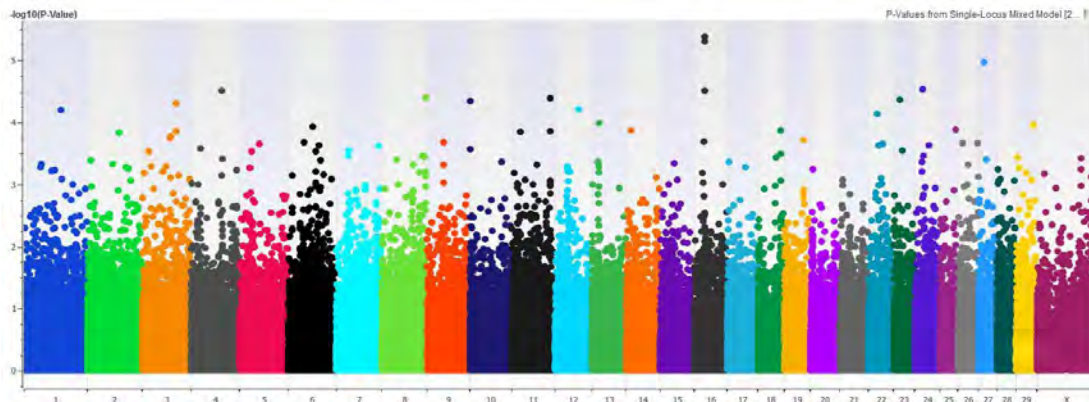


- h. Genomic-polygenic analysis of animals from the Angus-Brahman multibreed and Brahman herds for 9 ultrasound (yearling weight, ribeye area, fat over the ribeye, marbling) and carcass traits (slaughter weight, hot carcass weight, ribeye area, fat over the ribeye, and marbling). Genomic-polygenic values of animals ranging from 0 to 100% Brahman are shown in the Figure below for ultrasound ribeye area and ultrasound marbling and their corresponding carcass traits, i.e., ribeye area and marbling.



- i. Genomic tools to improve meat quality traits in Angus-Brahman cattle. Several genomic regions were associated with tenderness of beef in a multibreed Angus-Brahman population. Investigation of several regions revealed strong candidate genes with possible direct relations to meat tenderization process. The predictive analysis revealed that opportunity existed for development and implementation of a system to communicate tenderness attributes to consumers and improve the probability that consumers' eating expectations are met.

The Figure below shows the genome-wide association results with 150K genotypes for Warner-Bratzler Shear Force on 418 animals ranging from 0 to 100% Brahman.



- j. Relating muscle fiber morphometrics and protein degradation to meat quality in a multibreed herd. Warner-Bratzler Shear Force (WBSF) increased as the percentage of Brahman increased. The degree of μ -calpain autolysis at 24 h decreased as WBSF values increased, and autolysis decreased as the percentage of Brahman increased. Citrate synthase activity increased with greater percentage of Brahman indicating that Brahman genetics tended to influence oxidative capacity. Postmortem proteolysis and muscle fiber type will be utilized to establish predictors for the optimum breed group that provides desirable meat quality and palatability traits, while having enough Brahman influence to thrive in sub-tropical climates.
- k. Effect of Brahman genetics on myofibrillar protein degradation, collagen crosslinking, and meat tenderness. This research showed that loin eye (*longissimus lumborum*) steaks from steers of greater percentage Brahman had reduced tenderness when measured objectively and subjectively. Additionally, trained sensory panelists detected an increase in connective tissue content as percentage Brahman increased. Decreases in tenderness from Brahman steaks were most likely due to the reduction in degradation of desmin and troponin-T proteins and not increases in hydroxylslypyridinoline crosslinks.
- l. Colonization of beef cattle by Shiga toxin-producing *Escherichia coli* during the first year of life: a cohort study. This study identified that beef calves were more likely to shed STEC during the first 6 months and that STEC shedding decreased as the animal matured. Animal breed group, sex of the calf, and average weight gain were not significantly associated with STEC colonization. The Figure below shows the prevalence of STEC and mean body weight of calves ranging from 0 for 100% Brahman during their first year of life.

