

UF-Gainesville Beef Cattle News Corner

The Florida Brahman Genomic Selection Project: Initial Steps

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Introduction

Brahman is an essential component of crossbred beef production systems in Florida because of its great adaptability and endurance under the hot and humid conditions of this subtropical region. However, Brahman cattle are frequently criticized for the level of tenderness and marbling of their meat as well as their lower fertility relative to *Bos taurus* breeds and Brahman-*Bos taurus* crossbred cattle. ***Nevertheless, our research at the University of Florida (UF) has shown that Brahman animals display a range of EPD (expected progeny differences) for fertility, growth, ultrasound, and carcass traits comparable to that of Angus, Brangus, and Brahman × Angus crossbreds.*** The substantial genetic diversity among Brahman cattle observed in the UF cattle herds indicated that genetic improvement for these traits in Florida could be achieved through a concerted long-term selection effort. To maximize genetic progress throughout Florida, all available private Florida Brahman herds and the UF herds should participate in this endeavor. This was the original idea behind the Florida Brahman Genomic Selection Project. ***The aim of this project is to develop a statewide selection and mating program for Florida Brahman cattle focused on genomic selection and assortative mating to improve three target traits of high economic importance: meat tenderness, marbling, and reproductive tract score, a trait closely associated with fertility and age at first calving.*** The Florida Brahman project will generate genomic EPD for the three target traits as well as for various supporting traits (e.g., weaning and yearling weights, ultrasound traits, other carcass traits) utilizing pedigree, phenotypes, and genotypes. Genomic EPD for several traits would later be combined using relative economic weights to construct selection indexes for use within and across herds. Although this project was funded by the Florida Cattle Enhancement Board for 2 years (January 2017 to December 2018), it is actually a long-term project that should continue uninterrupted over the coming years to accomplish the intended goals and to appropriately assess its impact on the Florida Brahman population.

Research and Outreach Activities

The Florida Brahman Genomic Selection Project depends on pedigree, phenotypes, and genotypes from Florida Brahman private herds and UF herds. ***In fact, Florida Brahman breeders***

are an integral part of this project; their participation is crucial to achieve the statewide goals specified for this project (pedigree and phenotype database, tissue sample and DNA repository, genomic EPD summary). Consequently, our first task was to contact all Brahman breeders in Florida through email and telephone calls informing them of the project, goals, anticipated outcomes, and expected benefits. A meeting at the Florida Cattlemen’s Association in February of 2017 was a turning point. Currently, eight Brahman breeders have confirmed their participation in the project. Their contribution consists of pedigree records (animals, sires, dams), phenotypic records (reproductive tract scores, growth, ultrasound, and carcass), and tissue samples for genotyping with a high-density chip (GeneSeek GGP250k). In addition, Mr. Chris Shivers, Executive Vice-President of the American Brahman Breeders Association (ABBA) provided us with the historical pedigree and phenotype files from all Florida Brahman breeders that submitted information from 1976 to 2016. We are currently constructing the accumulated pedigree and phenotype files needed for the Florida Brahman genomic evaluation using information supplied by contributing Florida Brahman breeders, ABBA, and UF Brahman and Brahman-Angus multibreed herds. Table 1 shows the current number of animals in the pedigree and phenotype files.

Table 1. Numbers of pedigree and phenotype records as of April 2017		
Dataset	Pedigree file	Phenotype file
Florida Brahman breeders (April 2017)	198	115
ABBA (All years; Unedited files)	15,844	7,358
UF Brahman herd	673	446
UF Brahman-Angus Multibreed herd	8,302	6,755

It should be emphasized that these numbers of animals and records correspond to unedited files; numbers of animals and records in the 2017 genomic evaluation will be smaller. However, the information from these four sources of data gives this project an excellent starting point. We are currently in the process of collecting tissue samples from a large number of animals from participating Brahman breeders and UF herds (calves, yearlings, 2-year olds, cows, and sires) that will be genotyped with high (GeneSeek GGP250k) and medium density chips (GeneSeek GGP 50k) in 2017. Genotypes from these animals will be added to the existing Illumina 3k from 1,300 animals, GGP150k from 120 animals, and GGP250k from 800 animals to be used in the first statewide Brahman genomic evaluation in 2017. The resulting edited pedigree, phenotype, and genotype files will be used to compute genomic EPD for the three target traits (meat tenderness, marbling, and reproductive tract score) as well as supporting traits (growth, ultrasound, and carcass) in the second semester of 2017. Substantial amount of information from Brahman breeders exist for growth and ultrasound traits; however, most of the information for meat tenderness, marbling, reproductive tract scores, and carcass traits will come from the UF

Brahman-Angus and Brahman herds. Thus, we will likely see a large variation among genomic EPD from Brahman animals in the complete Florida Brahman population similar to that observed in our research with UF Brahman and Brahman-Angus multibreed animals. Examples of this variation in genomic EPD from UF cattle herds are shown for ribeye area and marbling in Figure 1 below. Red diamonds represent EBV for individual animals. Brahman animals are those with Brahman fraction = 32, Angus are those with Brahman fraction = 0, and Brahman-Angus crossbreds have Brahman fractions ranging from 1/32nds to 31/32nds.

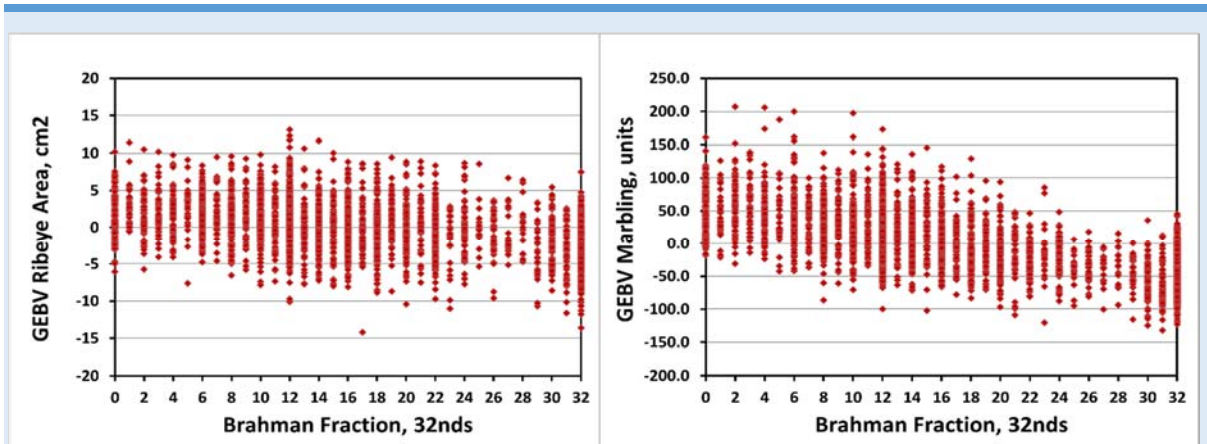


Figure 1. Variation in genomic EBV for ribeye area and marbling in UF Brahman and Brahman-Angus multibreed herds.

This variability among Brahman genomic EPD will greatly facilitate the identification of superior animals for meat tenderness, marbling, and reproductive tract scores to be used as parents of the next generation within and across Brahman herds. Continued genomic evaluation and selection of animals in the Florida Brahman population over the coming years should yield measurable progress for the three target as well as supporting traits. ***The larger the participation of private Brahman breeders in this program, the larger the chances of identifying individual animals with uniquely favorable meat tenderness, marbling, and reproductive tract scores.*** Hence the importance of the continued participation of the largest possible number of private Brahman breeders in the Florida Brahman genomic selection program.

For more information on this project or interest in joining the project, please contact Dr. Mauricio Elzo (maelzo@ufl.edu or 352-392-7564).