



# Beef Cattle Genetic Evaluations

NCERA-199 leadership, coordination, research, and outreach have helped maximize adoption and minimize costs of innovative tools and strategies for beef cattle genetic evaluations and breeding.

## Who cares and why?

The production of high quality, healthy, and affordable beef begins by identifying the best animals for breeding. Improving cattle genetics through selective breeding can lead to animals that gain weight faster, produce more desirable meat, and are more tolerant of pests, diseases, and stressful environmental conditions. Breeders and producers need ways to evaluate the genetic merits of cattle and predict the traits and performance of their offspring. In the U.S., National Cattle Evaluation (NCE) programs are the main avenue for collecting, analyzing, and distributing genetic information. However, many breed associations find it difficult to fund NCE programs. Furthermore, when genetic evaluations are done through specific breed associations and independent breeders, it is difficult to establish broadly accepted breeding goals or adopt new approaches and technologies industry-wide. The research supporting these programs also tends to be disjointed, leading to overlapping studies and research gaps. All of these limitations make it difficult to adapt breeding practices to changes in beef production and marketing practices. Uncoordinated, inefficient NCE programs could reduce the economic viability, international competitiveness, and sustainability of U.S. beef cattle producers, leaving consumers without the affordable beef products they desire.

## What has the project done so far?

NCERA-199 has facilitated research and exchange of information about National Cattle Evaluation programs. A major focus of NCERA-199 research has been improving methods for evaluating beef cattle genetics and selecting animals for breeding. Scientists have identified economically important traits and have developed tools for predicting whether the offspring of a certain animal will be below or above average for a certain trait. In addition, researchers have designed and distributed software that enables producers to compare bulls from different breeds and crossbred bulls to each other. NCERA-199 scientists have also developed new statistical methods and computing techniques and have helped standardize how results from genetic evaluations are presented to the beef cattle industry. Moreover, they have found new ways to quickly and easily disseminate this information, including a free web-based platform for analyzing genomic data. NCERA-199 researchers and Extension professionals have served as leaders and speakers at workshops and symposiums for breed



© 2010 Stephanie Smith  
NCERA-199 has provided the beef industry with predictions of the heritability of certain traits and diseases in cattle. This information has influenced the selection of bulls for breeding and increased the competitiveness and marketing opportunities for bulls, semen, and embryos with certain genetic traits. Top photo by Scott Bauer/USDA. Bottom photo by Steph Smith Photography, Flickr.

associations, beef cattle producers, and groups such as the National Cattlemen's Beef Association and Beef Improvement Federation. Other outreach efforts such as the "Brown Bagger Series: Beef Genetics from Molecular to Management" have been delivered online and via teleconferences. NCERA-199 has also contributed to online curriculum for graduate programs, offering students at universities across the U.S. the opportunity to engage in cattle genetics and breeding coursework.

## Impact Statements

**B**y enabling beef cattle genetics research and coordinating the spread of and access to new data, tools, and techniques, NCERA-199 has:

**G**iven breeders a wider portfolio of evaluated traits to consider, providing more ways to improve herd genetics.

**M**ade it possible to do genetic evaluations more often, helping ensure that breeding selections are informed and successful.

**I**ncreased adoption of breeding strategies that produce cattle that are hardier in certain environments and production systems and more valuable in certain marketing systems.

**I**ncreased global competitiveness and marketing opportunities for producers of cattle, cattle semen, and embryos.

**I**mproved training and education in the area of beef cattle genetics across the U.S.

**A**dvanced statistical methods that can be used in genetics research avenues outside the beef cattle industry.



New product tracking technology and inspection protocols make it easier to identify the traits that consumers seek out in the beef products they purchase and easier to trace the source of contaminated beef products back to the original herd. This information influences breeding and marketing decisions. Top photo courtesy of the Borlaug Institute. Bottom photo by Scott Sheperd, USDA.

## What research is still needed?

Researchers must continue to develop genetic predictions for a wide portfolio of economically important traits. In particular, research efforts must include methods for combining genomic information, pedigree, and performance data for multiple trait, multiple breed evaluations. Future research must also attempt to expand NCE methods to incorporate data from a greater variety of breeds, production systems, and marketing strategies.

## Want to know more?

Administrative Advisor:  
Maynard Hogberg ([hogberg@iastate.edu](mailto:hogberg@iastate.edu))

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Compiled and designed by Sara Delheimer