

National Program for the Genetic Improvement of Feed Efficiency in Beef Cattle

The Participants

| | | | |
|---|--|--|---|
|  University of Missouri  WASHINGTON STATE UNIVERSITY  TEXAS A&M UNIVERSITY  USDA  OAS  TEXAS A&M UNIVERSITY VETERINARY MEDICINE & BIOMEDICAL SCIENCES |  ILLINOIS UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN Iowa State University Dr. Dorian Garrick Dr. Stephanie Hansen Dr. Dan Loy Dr. Megan Van Emon Texas A&M University Dr. Chris Seabury University of Illinois Dr. Jon Beaver Dr. Dan Shike University of Minnesota Dr. Scott Fahrenkrug University of Missouri Dr. Jerry Taylor, Project Director Dr. Monty Kerley Dr. Robert Schnabel  USDA United States Department of Agriculture National Institute of Food and Agriculture | IOWA STATE UNIVERSITY Dr. Robert Weaber University of Nebraska Dr. Matt Spangler GeneSeek, A Neogen Company Dr. Elisa Marques USDA-BELTSVILLE Dr. Tad Sonstegard USDA-MARC Dr. Harvey Freetly Dr. John Pollak Washington State University Dr. Kris Johnson Dr. Holly Neibergs |  UNIVERSITY OF NEBRASKA LINCOLN  K-STATE Research and Extension  GENESEEK a Neogen Company  BEEF EFFICIENCY RESEARCH - EDUCATION - EXTENSION 2 |
|---|--|--|---|

20 investigators 10 institutions

Why Improve Efficiency?

- ▶ A feed efficiency improvement of approximately 10% (2 pound reduced RFI) across the entire feedlot sector would reduce feed costs \$1.2 Billion in 2011 (Weaber, 2011)
- ▶ Fewer resources used = improved global food security, reduced footprint-- Sustainability



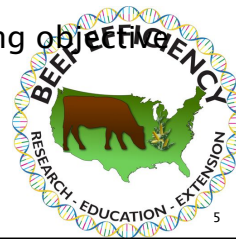
Understanding the components of feed efficiency

- ▶ More efficient cattle may have improved digestion or metabolism of nutrients, or
- ▶ More efficient cattle may utilize absorbed nutrients more efficiently



What Impact Can (will) Genomics Have?

- ▶ Genomic information has the potential to increase accuracy
 - Proportional to %GV
 - Impacts inversely related to EPD accuracy
- ▶ Multiple trait selection is critical and could become more cumbersome
 - Economic indexes help alleviate this
 - Use index values that meet your breeding objectives



The Project

- ▶ **Up to 5 Year/\$5M USDA NIFA funded project**
 - April 1, 2011 to March 31, 2016
 - 2/3 fundamental and applied research
 - 1/3 extension and outreach
 - Demonstration project involves 24 collaborating producers and a commercial feedlot



Research Objectives

- ▶ Assemble DNA samples, individual FI, growth and carcass composition data for 8,000 animals representing 8 major beef breeds

| Breed | Year ^a | | | | | Total |
|--------------|----------------------|----------------------|-------------|-------------------------|-------------------------|-------------|
| | 1 | 2 | 3 | 4 | 5 | |
| Angus | 698 (MU) 600 (UI) | 200 (MU) | | 300 (MU) | | 1798 |
| Red Angus | 300 (UI) | 300 (UI) | | | | 600 |
| Simmental | 1139 (UI) | | 300 (MU) | | | 1439 |
| Gelbvieh | 300 (MU) | 100 (MU) | | 50 (USMARC) | 50 (USMARC) | 500 |
| Charolais | 60 (WSU) | 60 (WSU) 450 (UI) | 60 (WSU) | 60 (WSU) | 60 (WSU) | 1300 |
| Hereford | 300 (AHA) | 300 (AHA) | 300 (AHA) | 50 (USMARC) | 50 (USMARC) | 1600 |
| Wagyu | 70 (WSU) | 70 (WSU) | 70 (WSU) | 70 (WSU) | 70 (WSU) | 350 |
| Limousin | 42 (ISU) | 42 (ISU) | 42 (ISU) | 42 (ISU) 50 (USMARC) | 42 (ISU) 50 (USMARC) | 310 |
| Total | 3509 | 1522 | 1222 | 972 | 672 | 7897 |

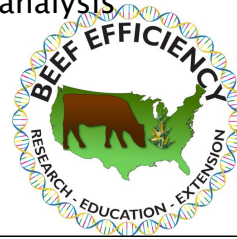
The Project

- ▶ **Research objectives to improve beef cattle feed efficiency:**
 - Genotyping will included high density (700 K) SNP or imputed from 50K
 - Develop national across-breed genomic selection program
 - Identify nutritionally driven (forage-concentrate) interactions



The Project

- ▶ **Research objectives to improve beef cattle feed efficiency:**
 - Evaluate the genetics of microbial population establishment and the effects on efficiency
 - Identify genes controlling metabolism
 - Efficiency differences associated with mitochondrial and nuclear genomes
 - Detailed evaluation of high and low RFI cattle, including a repository of tissues for future analysis
- ▶ Early results?



Extension Program Goals

- ▶ Highly integrated with research component
 - Technology transfer
- ▶ Involves stakeholders early in the process
- ▶ Engages all segments of the industry
- ▶ Demonstrates progress in efficiency change by stakeholders by project conclusion
- ▶ Industry education component (tied to research results)



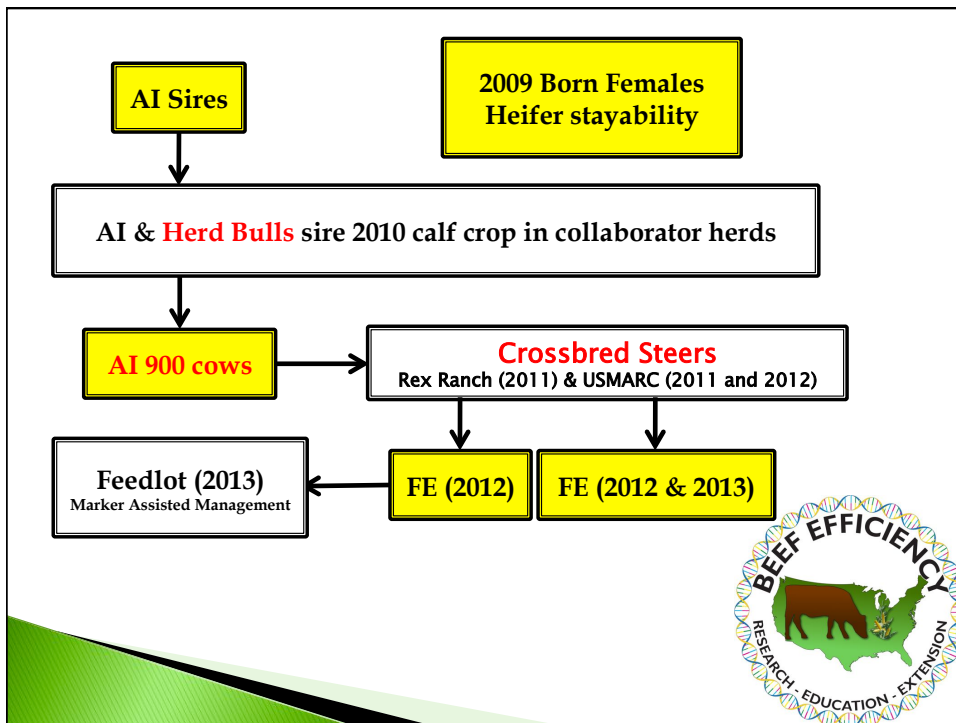
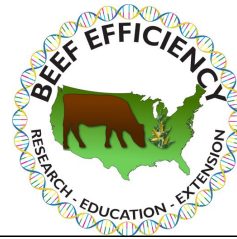
Extension Field Project

- ▶ Field demonstration project will demonstrate utility of molecular EBVs for FE and component traits and “test drive” the technology



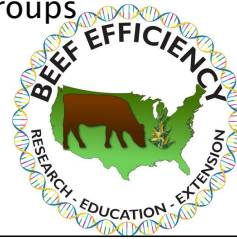
In seedstock herds:

- 50K MEBVs for WW in Y1
- MEBVs for feed intake/efficiency in Y3



Marker assisted management

- ▶ Identify nutrition or management by genetic interactions
- ▶ Determine practical sources of information
 - Reduced panel tests
 - Genetic information
- ▶ Management based on genetic knowledge
 - Nutrition and management
 - Sorting into outcome or management groups



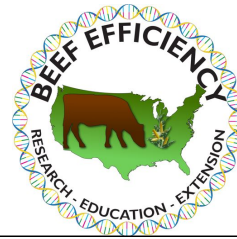
Industry Feedback

- ▶ Advisory board that includes demonstration project participants, plus representatives of feedlot sector.
- ▶ Will meet annually to give feedback.



Resources Today

- ▶ www.beefefficiency.org
- ▶ Conference presentations
- ▶ Updates on NCBA's Cattlemen-to-Cattlemen
 - Three segments filmed in 2011 and 2012 archived on website
- ▶ NCBA Cattlemen's College 2012
 - Presentations archived on website



www.beefefficiency.org

National Program for Genetic Improvement of Feed Efficiency in Beef Cattle

USDA
United States Department of Agriculture

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The National Program for Genetic Improvement of Feed Efficiency in Beef Cattle is a multiyear USDA funded project to develop selection tools and better understanding of feed efficiency in beef production. Because feed intake is a technologically challenging and expensive trait to record on large numbers of animals we expect most of the selection for increased feed efficiency to occur through selection on genetic marker information. Our goal is to identify the genetic markers associated across multiple breeds with feed intake in the beef production system.

This project will utilize genomic DNA tests in combination with feed intake and other product quality information from 8,000 animals representing 8 breeds:

- Angus
- Red Angus
- Hereford
- Limousine
- Charolais
- Gasconne
- Senes
- Limousine

Beyond developing genetic marker tests for use in multiple breeds of cattle, we will also conduct research to help us better understand feed efficiency.

- Gene expression analysis of various tissues in animals with differences in feed efficiency
- Determine optimal population

News

The [agenda](#) for the National Beef Cattle Evaluation Consortium "Brown Blogger" webinar has been announced. Contact [Bob Orsabe](#) to sign up.

2012 Feed Efficiency Producer Meeting

How can a genome evaluation of feed efficiency take into account gene interactions?
Click [here](#) for the answer.

Look us up at the NCBA Trade Show Feb 6-9

To stay informed

Contact one of the team members, or

Click the “Contact Us” button on the website

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United States Department of Agriculture
National Institute of Food and Agriculture

