



Current status of adoption of DNA-testing by US Beef Breed Associations

Alison Van Eenennaam, Ph.D.

Cooperative Extension Specialist
Animal Biotechnology and Genomics
University of California, Davis

alvaneennaam@ucdavis.edu

(530) 752-7942

animalscience.ucdavis.edu/animalbiotech

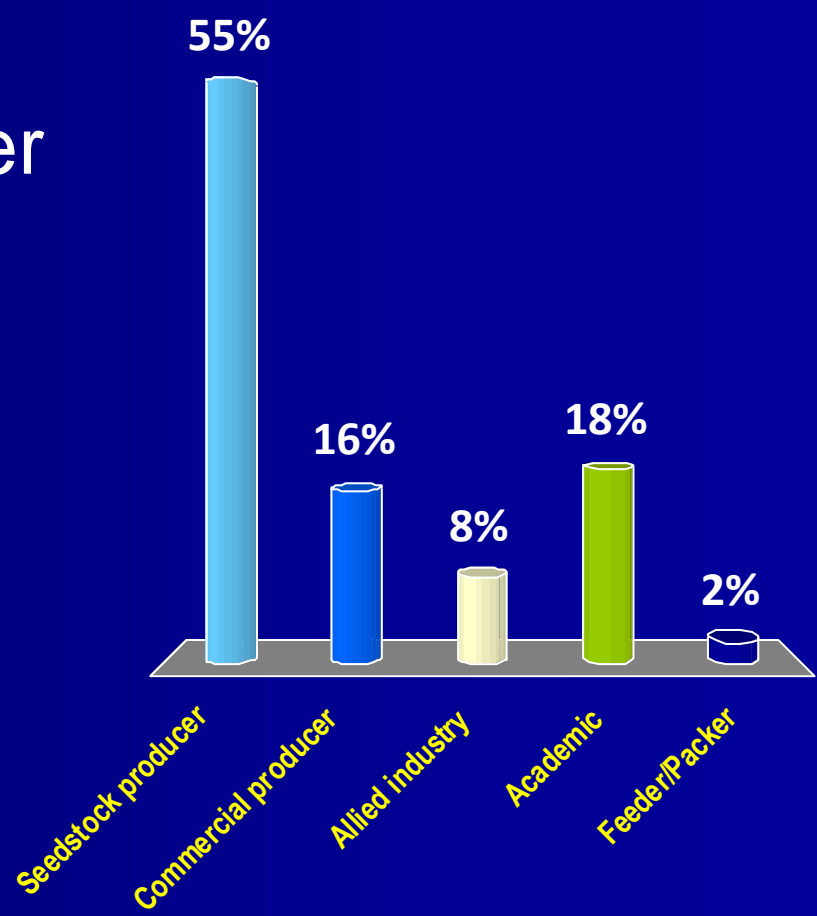




Summary of input from producers attending BIF 2009

Who are you?

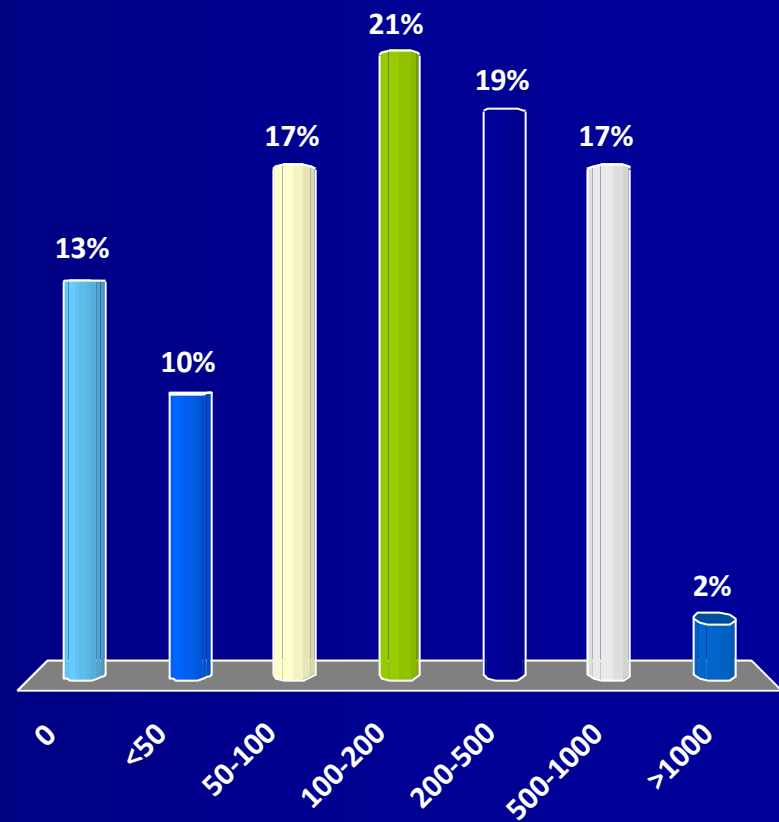
1. Seedstock producer
2. Commercial producer
3. Allied industry
4. Academic
5. Feeder/Packer





How many cows do you run?

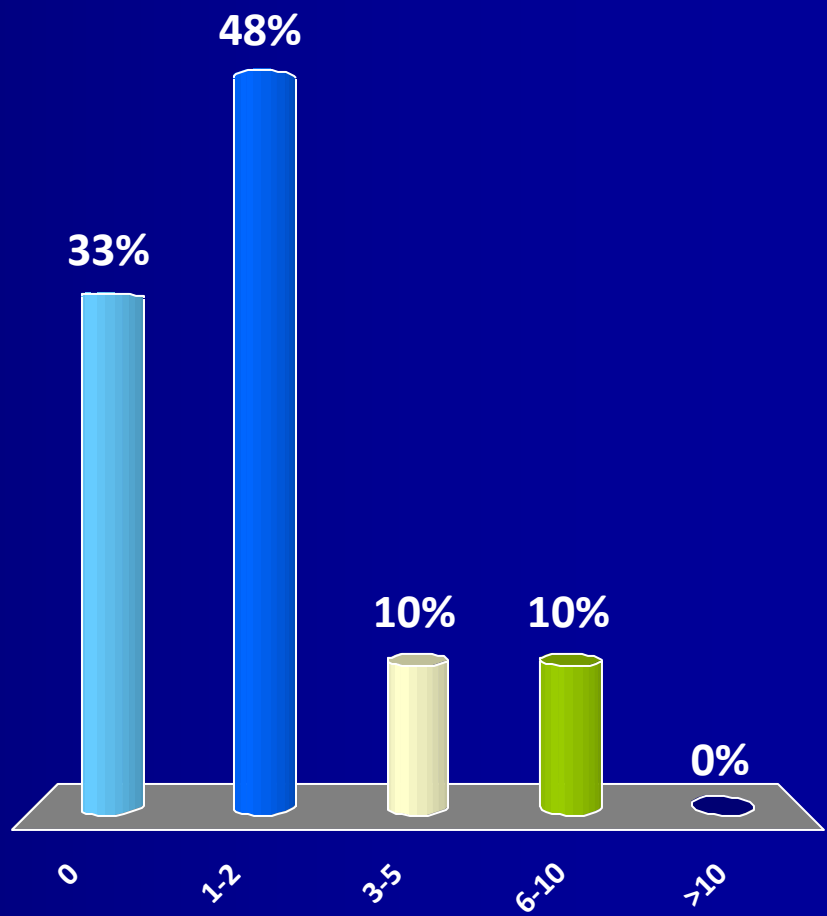
- 1. 0
- 2. <50
- 3. 50-100
- 4. 100-200
- 5. 200-500
- 6. 500-1000
- 7. >1000





How many bulls do you plan to purchase this year?

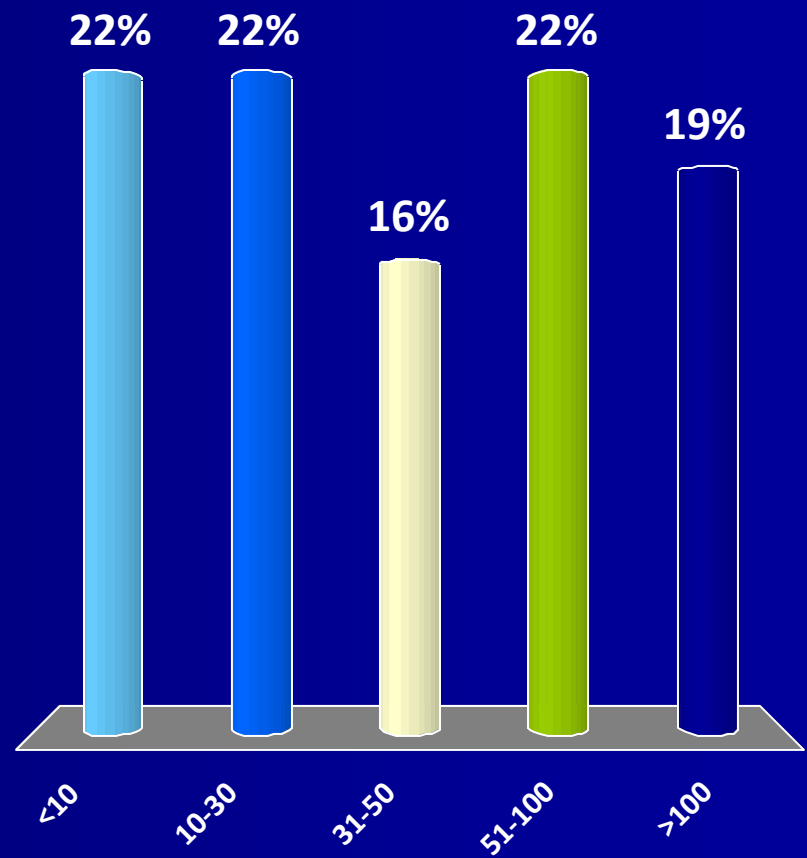
- 1. 0
- 2. 1-2
- 3. 3-5
- 4. 6-10
- 5. >10





How many bulls do you plan to sell this year?

- 1. <10
- 2. 10-30
- 3. 31-50
- 4. 51-100
- 5. >100





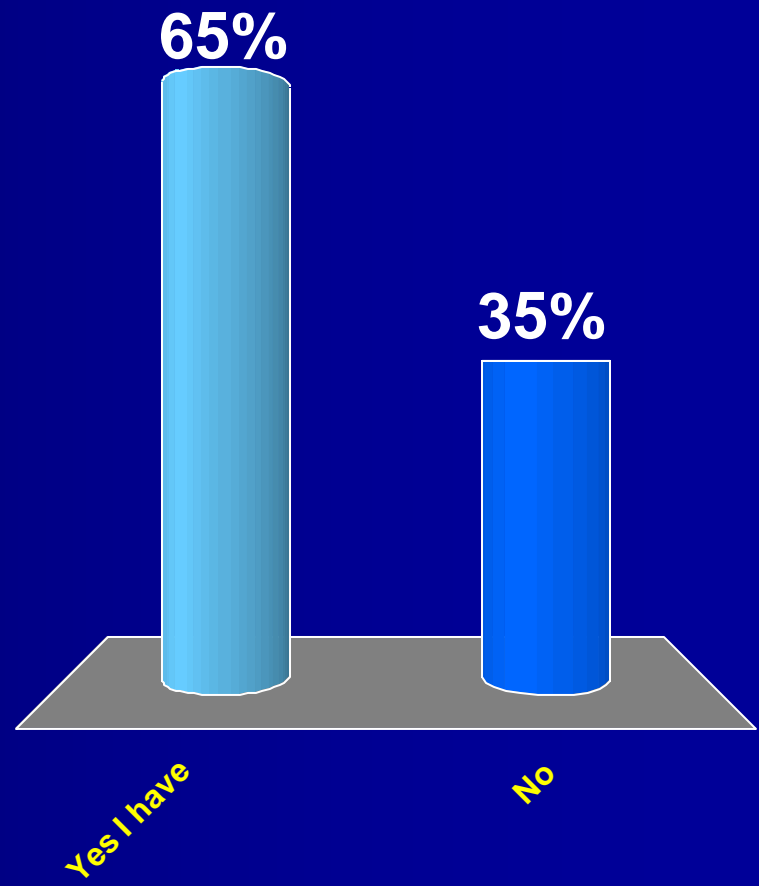
Who has tested their cattle for simple traits?

- 1. Yes I have
- 2. No



Examples

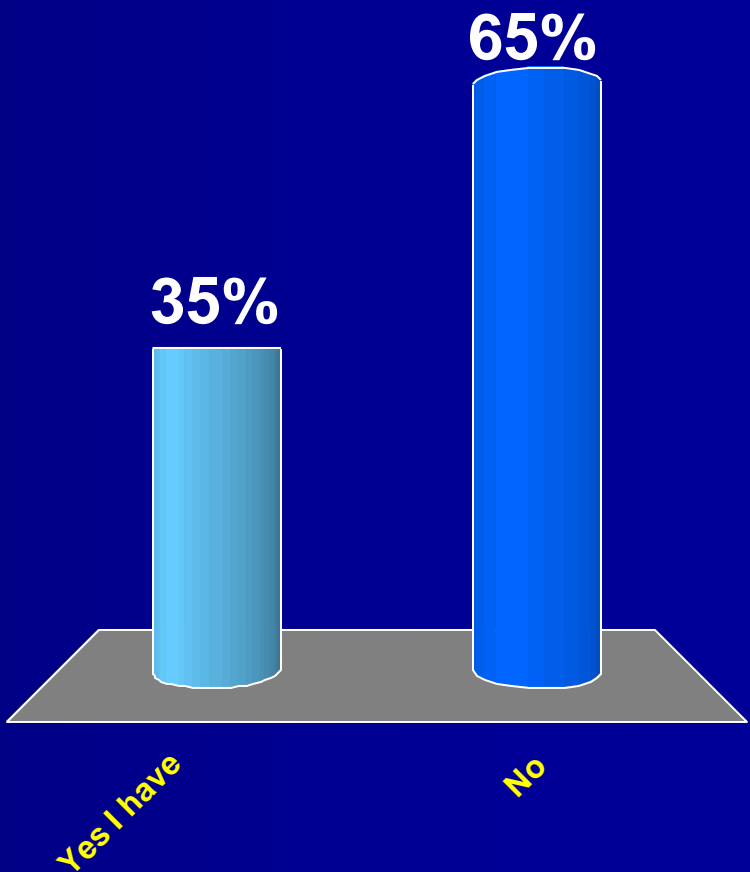
- Horned/Polled
- Coat color
- Genetic defects





Who has tested their cattle for complex (multigenic) traits?

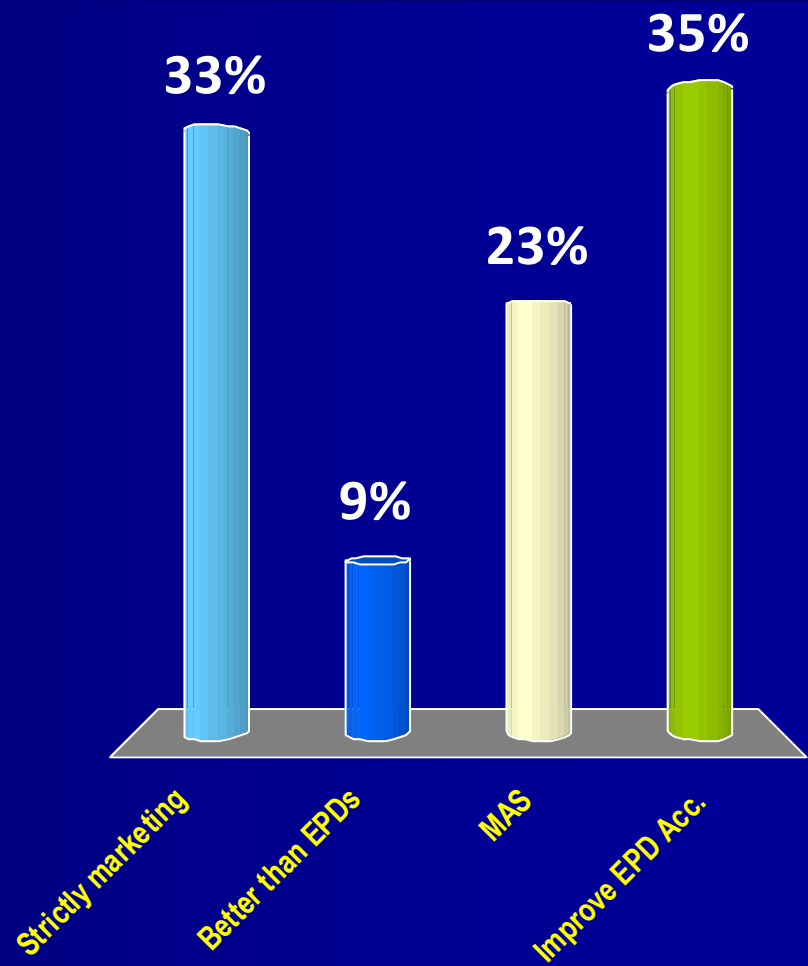
- 1. Yes I have
- 2. No





Why do you use DNA tests?

- 1. Strictly marketing
- 2. Better than EPDs
- 3. MAS
- 4. Improve EPD Acc.





Cornell University

Search Cornell

National Beef Cattle Evaluation Consortium

Colorado State University-Cornell University-University of Georgia

**Genetic Test
Validation
Results**[Home](#)[About NBCEC](#)[Research](#)[For Producers](#)[For Professionals](#)[Industry Links](#)[Contact Us](#)

The National Beef Cattle Evaluation Consortium (NBCEC) is an organization of researchers, educators, producers and industry leaders focused on genetic evaluation of beef cattle. Its mission is to advance U.S. beef genetics, increase the sustainability and competitiveness of the beef industry, and provide consumers with affordable and healthy beef products. NBCEC shows this commitment through research, animal evaluation, genetic test validation, industry collaboration and outreach, and professional development.

Current Projects – NBCEC conducts comprehensive, innovative and science-based beef cattle genetic research. Learn about the variety of their current projects.

Sire Selection Manual – This comprehensive manual features a variety of NBCEC research and genetic technology that producers can apply to their farms and ranches

Genetic Test Validation – NBCEC provides independent, unbiased, third-party validation of genetic tests for the beef cattle industry. See a variety of test results and the validity of the claims.

BIF Annual Meeting – Attend the Beef Improvement Federation's Annual Research Symposium and Annual Meeting, April 30 – May 3 in Sacramento, CA.

Commercial genetic test validations



The purpose of the NBCEC commercial DNA test validation is to independently verify associations between genetic tests and traits as claimed by the commercial genotyping company using phenotypes and DNA from reference cattle populations

The validation process is a partnership of the owners of DNA and phenotypes (e.g., breed associations) and genomics companies, facilitated by the NBCEC

A. L. Van Eenennaam, J. Li, R. M. Thallman, R. L. Quaas, M. E. Dikeman, C. A. Gill, D. E. Franke, M. G. Thomas. 2007. Validation of commercial DNA tests for quantitative beef quality traits. *Journal of Animal Science*. 85:891-900.

Commercial genetic test validations

[Overview](#)[Pfizer Animal Genetics \(Bovigen\)](#)[IGENITY](#)[MMI Genomics](#)[Ancillary Results](#)

Summary of NBCEC validations for commercially-available DNA-tests for complex (quantitative or multigenic) traits in beef cattle (note: validations do not include tests for "simple" traits such as coat color, horned/polled, AM status etc.)

Company	Test Name	Trait	Date of validation
Igenity www.igenity.com	Profile®	Fat Thickness	12/2008
	Profile®	Marbling Score	12/2008
	Profile®	Quality Grade (% ≥ Choice)	12/2008
	Profile®	Rib Eye Area	12/2008
	Profile®	Yield Grade	12/2008
	Profile®	Average Daily Gain	12/2008
	Profile®	Tenderness	12/2007
	Profile®	Residual Feed Intake (RFI) (for <i>Bos indicus</i> influenced cattle)	12/2007
	Profile®	Residual Feed Intake (RFI) (for <i>Bos taurus</i> cattle)	6/2008
	Profile®	Dry matter intake (DMI) (for <i>Bos indicus</i> influenced cattle)	12/2007
	Profile®	Heifer Pregnancy Rate	
	Profile®	Stayability (longevity)	
	Profile®	Maternal Calving Ease	
	Profile®	Docility	
Pfizer Animal Genetics (Bovigen) www.bovigen.com	GeneSTAR® Tenderness MVP	Tenderness	2/2009
	GeneSTAR® Marbling MVP	% IMF (Feedlot cattle)	2/2009
	GeneSTAR® Feed Efficiency MVP	Net Feed Intake (NFI)	2/2009
MMI genomics www.metamorphixinc.com	Tru-Marbling™	Marbling Score and Quality Grade	
	Tru-Tenderness™	Tenderness	



I asked US breed associations the following 2 questions

- 1. At this stage does your breed association have plans to incorporate DNA tests into any EPDs in the foreseeable future?**
- 2. Is your breed association contemplating the development of a validation population or similar resource?**



US Breed Associations responding to questions regarding use of DNA

Got a response from:

Angus, Braford, Brahman, Brangus,
Gelbvieh, Limousin, Maine-Anjou, Salers,
Santa Gertrudis, Simmental

Did not get a response from:

Beefmaster, Charolais, Chianina, Hereford,
Red Angus



Breed	Question 1	Question 2.
Angus	Actively pursuing incorporation of Igenity profile scores into carcass marker-assisted EPDs	No
Braford	No	No
Brahman	Yes – no further details	Yes – no further details
Brangus	Yes	Yes, but not completely defined yet
Gelbvieh	Planning to do this but waiting for results from weight trait project – AGI does genetic evaluations so need to provide them with variances/covariances	No
Limousin	Yes for marbling, REA, gain and docility.	No
Maine-Anjou	No – not at this time	Project planned with U of Missouri (Jerry Taylor) to do marker research specific to M-A genetics – have DNA and semen on file there from past project
Salers	No – would like to	Working in conjunction with U of Missouri (Jerry Taylor) to develop Salers database of DNA
Santa Gertrudis	Yes – contemplating inclusion of DNA in genetic evaluation, they are on Breedplan and are in the exploratory phase of doing a joint evaluation	Have not got that far yet – are in the exploratory phase of incorporating something like that to have a direct comparison of Australian and US genetics
Simmental	Yes – waiting for tests to get better. Did have the first marker-assisted tenderness WBSF EPD in but not doing that at the current time	Working with University of Illinois to obtain large population of phenotyped (Grosafe) males offspring from 3 commercial ranches using Simmental (and Angus, Red Angus, Gelbvieh, and composite sires)

[Contact IGENITY](#)Select Country: [Home](#) | [IGENITY News](#) | [Beef News](#) | [AGI and IGENITY](#)[Login](#)[Beef](#)[Dairy](#)[IGENITY News](#)[Beef News](#)[AGI Samples](#)[GAM and IGENITY](#)[Replacement
Heifers](#)[Confident Decisions](#)[AGI and IGENITY](#)[Abnormalities](#)[RFI Taurus](#)[ADG and Myostatin](#)[Software](#)[Curly Calf](#)[NALF](#)[Carcass Traits](#)[RFI Indicus](#)[RFID Tag](#)[Capture Fall Data](#)[DNA Tech. at KSU](#)[More Analyses](#)[Dairy News](#)[Newsletter](#)[Additional Resources](#)[Events Calendar](#)[Order a Kit](#)[Results](#)[Customer Login](#)[Contact IGENITY](#)[Forms](#)[Site Map](#)

Sign Up
for a free subscription to
the IGENITY Insider
e-newsletter

Angus Genetics Inc.[®] and IGENITY[®] to Introduce Industry's First Genomic-enhanced EPDs for Multiple Traits

Angus producers will have first access to breed-specific DNA profile

DULUTH, Ga. - July 14, 2009 - Angus Genetics Inc.[®] (AGI) and Merial have entered into an exclusive agreement to provide American Angus Association[®] breeders with genomic-enhanced expected progeny differences (EPDs) powered by IGENITY[®]. This will be the first time beef producers have access to genomic-enhanced EPDs for multiple traits at once - and from an Angus-specific DNA profile.

Bill Bowman, president, AGI, says this agreement joins two groups committed to advancing genetic improvement in the beef industry.

"AGI and IGENITY share a common vision to provide beef producers with the most advanced solutions to their genetic selection and management needs," Bowman says. "This represents a significant milestone for our industry - one our board has directed us to pursue aggressively for the past two years and supported with collaboration and research dollars."

The combination of a breed-specific DNA profile with the Angus National Cattle Evaluation (NCE) will result in higher-accuracy EPDs. This will be an especially powerful tool for evaluating young animals, as cattle will now have accuracies that were previously only possible once they had multiple progeny on the ground, Bowman says.

Dr. Stewart Bauck, executive director of research and development, IGENITY, commends AGI and its parent company, the American Angus Association, for leading this charge.

"The American Angus Association has set the standard in data collection and embracing cutting-edge technologies," he says. "We appreciate the work the Association has done to keep the breed at the forefront of the beef industry by helping bring this advancement to Angus breeders."

Bowman says the selection of a DNA technology partner was a logical decision.

"IGENITY has a robust profile of analyses, including the industry's only DNA analyses for reproduction and maternal traits in combination with all of the economically important carcass traits," he says. "Plus, the addition of the genomic tools from IGENITY into our NCE system provides us the ability to improve the accuracy of Angus EPDs - especially in young animals."

Dr. Bauck adds that genomic-enhanced EPDs for multiple traits have become a reality after years of collaboration among beef industry leaders.

"The industry agreed that genomic-enhanced EPDs were the next advancement in DNA technology," he says. "It was our responsibility as the leading DNA technology provider to take action and move the topic of genomic-enhanced EPDs from an industry discussion to a user-friendly solution."

AMERICAN ANGUS ASSOCIATION® — THE BUSINESS BREED

3201 Frederick Avenue • St. Joseph, MO 64506 • (816) 383-5100 • Fax (816) 233-9703 • E-mail: angus@angus.org

[Special Features](#)

[General Info](#)

[Rules and Forms](#)

[Mission Statement](#)

[Contact Us](#)

[Data Access and Use](#)



Established in 2007, Angus Genetics Inc.®(AGI), a subsidiary of the American Angus Association®, was created to assist breed organizations by providing customized genetic evaluation services. In recent years, the seedstock industry has seen a transition where universities have shifted away from genetic evaluation service roles to more fully focus efforts towards research endeavors. AGI was established to answer the seedstock industry's need to have a genetic evaluation service provider during this process.

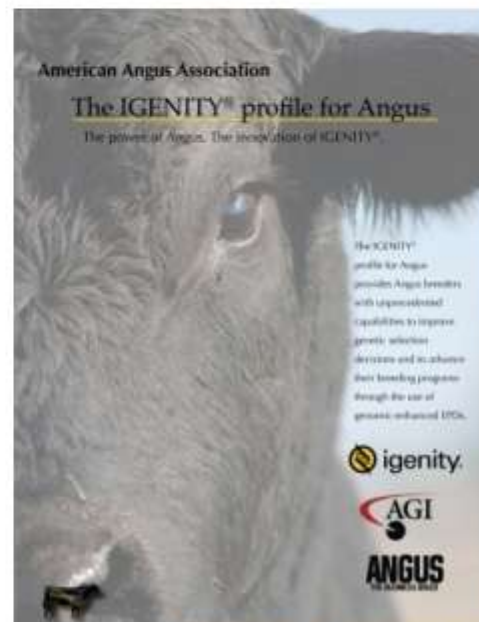
Pulling it all together: Genomic-enhanced EPDs - A fact sheet that describes genomic-enhanced EPDs, how they were developed, what they mean, and how genomic profiles enhance current selection tools to achieve more accuracy on predictions for younger animals. [Click here.](#)

Genomic-enhanced EPDs fact sheet - A fact sheet describing how to read the IGENITY® Profile for Angus results and how to use genomic-enhanced EPDs for Angus. The information also includes an example of DNA profile scores. [Click here.](#)

ANGUS

THE BUSINESS BREED

To order the profile go to
your AAA Login account.



[Click here for the Igenity® Profile for Angus Brochure](#)

The Power of the IGENITY[®] profile for Angus

The American Angus Association[®] through its subsidiary, Angus Genetics Inc.[®] (AGI), has a vision to provide Angus breeders with the most advanced solutions to their genetic selection and management needs.

Genomic-enhanced Expected Progeny Differences (EPDs) can now be calculated for your animals using the highly predictable American Angus Association database along with IGENITY[®] profile results to provide a more thorough characterization of economically important traits and improved accuracy on young animals.

Using the IGENITY profile for Angus, breeders receive comprehensive genomic results for multiple, economically important traits.

- Marbling
- Ribeye Area
- Fat Thickness
- Carcass Weight
- Tenderness
- Percent Choice
- Yield Grade
- Helper Pregnancy
- Stayability
- Maternal Calving Ease
- Docility
- Average Daily Gain (ADG)
- Feed Efficiency
- Yearling Weight

Additional tests available:

- Arthrogryposis Multiplex (AM)
- Neuropathic Hydrocephalus (NH)
- Bovine Viral Diarrhea – Persistently Infected (BVD PI)
- Coat Color



ANGUS
THE BUSINESS BREED

Table 2. Estimates of additive genetic variance and heritability ($h^2 \pm \text{SE}$) for economically relevant trait marbling and indicators intramuscular fat percentage and molecular breeding value (on the diagonal), genetic covariances among traits (above diagonal), and genetic correlations ($r_g \pm \text{SE}$) derived from them (below diagonal).

Trait	MRB	IMF	MBV
Marbling score (MRB)	0.3812 0.48±0.03	0.1404	0.0179
Intramuscular fat (IMF)	0.56±0.09	0.1663 0.31±0.03	0.0253
Molecular breeding value (MBV)	0.38±0.10	0.80±0.22	0.0060 0.98±0.05

MacNeil, M. D., J. D. Nkrumah, B. W. Woodward, and S. L. Northcutt. 2009. Genetic evaluation of Angus cattle for carcass marbling using ultrasound and genomic indicators. *J. Anim Sci. In press*

Commercial genetic test validations



[IGENITY Carcass Composition and Average Daily Gain](#)

[IGENITY Tenderness](#)

[IGENITY Maternal Traits](#)

[IGENITY Docility](#)

[IGENITY Feed Efficiency](#) for Bos indicus-influenced cattle

[IGENITY Feed Efficiency](#) for Bos taurus cattle

[Peer-reviewed studies](#)

[Company website](#)



Commercial genetic test validation

[Overview](#)[Pfizer Animal Genetics \(Bovigen\)](#)[IGENITY](#)[MMI Genomics](#)[Ancillary Results](#)[Summary](#)[Test Claims](#)[Test Details](#)[Sample
Populations](#)[MBV
Quantiles](#)[Results](#)

Igenity profile Carcass Composition and Average Daily Gain



Summary

The IGENITY profile was found to be significantly associated with marbling score, back fat thickness, quality grade, ribeye area, and yield grade carcass traits and average daily gain in a commercial predominately *Bos taurus* sample population of 1364 animals. This test was not evaluated on a *Bos indicus*-influenced or purebred *Bos indicus* population.



Significance* of the Igenity Molecular Breeding Values for Carcass Traits and Average Daily Gain

Breed	TRAIT	Panel	b**	F	p	N
Commercial Validation population	USDA Marbling Score	MBS	0.76	28.6	0.0000001	1354
	Backfat Thickness	BFAT	0.81	12.46	0.0002	1354
	Quality Grade ¹ (% \geq Choice)	% \geq CHOICE	0.73	14.06	0.00009	1364
	Ribeye Area	REA	1.01	10.99	0.0005	1354
	Yield Grade	YG	1.16	21.98	0.000002	1354
	Average Daily Gain	ADG	0.61	14.69	0.00007	1364

* Molecular breeding values (MBVs) for each trait were provided by Igenity based on the various SNP panels for each trait.

Commercial genetic test validations

[Overview](#)[Pfizer Animal Genetics \(Bovigen\)](#)[IGENITY](#)[MMI Genomics](#)[Ancillary Results](#)[Summary](#)[Test Claims](#)[Test Details](#)[Sample
Populations](#)[MBV
Quantiles](#)[Results](#)

IGENITY profile Feed Efficiency for Bos taurus cattle SUMMARY

The IGENITY TAURUS feed efficiency MBVs were inconsistently associated with residual feed intake in the validation populations. In two populations there was a significant positive association of the MBV with the trait (North American Bos Taurus, CRC Temperate), but in the remaining four populations there was no significant effect and in both Angus populations the estimated association was negative, meaning that the results were associated in the opposite direction.

For further information on this validation contact Dr. John Pollak (607) 255-2846.

TEST DATASET	Trait	PANEL	b	P	N
TEMPERATE ¹ (CRC1)	RFI	TAURUS	0.309	0.04	~546
SHORTHORN ¹ (CRC)	RFI	TAURUS	0.393	0.17	~189
ANGUS (CRC) ¹	RFI	TAURUS	-0.426	0.95	~327
NORTH AMERICAN BOS TAURUS ²	RFI	TAURUS	0.351	0.005	~706
NORTH AMERICAN CHAROLAIS ³	RFI	TAURUS	0.022	.443	~393
NORTH AMERICAN ANGUS ³	RFI	TAURUS	-0.217	0.89	~436

¹ Data analyses for these validation populations were performed by Dr. David Johnston, Animal Genetics and Breeding Unit, University of New England, Armidale, Australia (6/2008).

² Data analyses for this validation population was performed by Gordon VanderVoort, Dr. Matt Kelly, Duc Lu and Dr. Stephen Miller, University of Guelph (6/2008)

³ Data analyses for these validation populations were performed by Dr. Denny Crews, Agriculture and Agri-Food Canada (6/2008)



LIMOUSIN

DNA profiles supplement phenotypic data

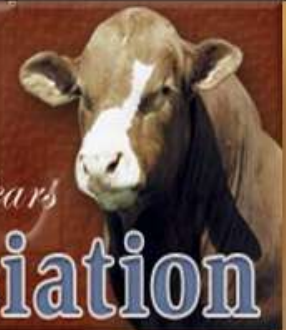
As you begin thinking about collecting ultrasound data this fall and winter, also consider testing your cattle for the [Igenity®](#) DNA profile. It includes information about carcass traits, such as marbling, quality grade, yield grade, fat thickness and ribeye area. Scientists at the [U.S. Department of Agriculture \(USDA\)](#) and several different universities discovered the markers in Igenity's carcass tests, and the [National Beef Cattle Evaluation Consortium \(NBCEC\)](#) independently validated them.

Because DNA-marker tests explain only part of the genetic variability for a given trait, they never should be used as a replacement for phenotypic data collection; however, they can be used to supplement phenotypic data in EPD computations.

For example, the [American Angus Association](#) and Igenity recently announced the introduction of genome-enhanced EPDs for carcass traits. Combining an Angus-specific DNA profile with traditional carcass and ultrasound data will result in EPDs with higher accuracies. That will be especially helpful in evaluations of young bulls because they now will have accuracies that previously were possible only after they had several progeny with carcass and ultrasound data.

To keep Limousin and Lim-Flex breeders on the cutting edge of genetic technology, NALF strongly recommends collecting both ultrasound and Igenity profile data. For more information about ultrasound or the Igenity profile, visit the "[Genetic Evaluation](#)" [section](#) of the NALF Web site, or contact [Lauren Hyde](#) in the NALF office.

[\[back to top\]](#)



Celebrating 40 Years

American Simmental Association

[Home](#)[Herdbook Online Services](#)[Data/Animal Search](#)[Contact ASA Staff](#)[Forms](#)[Commercial](#)[SimList](#)

Marker-Assisted EPDs

2004!!

The American Simmental Association's 2004 Fall Sire Summary

Featuring the Industry's First Marker Assisted EPDs

The 2004 Fall Sire Summary represented yet another groundbreaking event for ASA's genetic evaluation program. It contained the first Marker-Assisted EPDs (MA-EPDs) ever published. Calculated by Dr. Richard Quaas of Cornell University, these Shear Force MA-EPDs were the result of a far reaching collaboration between the ASA, Cornell University, the National Beef Cattle Evaluation Consortium and NCBA's Carcass Merit Project. This cutting edge technology blended the outcomes from DNA marker tests with tenderness data on sires' offspring to arrive at slightly more accurate EPDs, particularly on low-accuracy animals, than with tenderness data alone. Dr. Quaas offers up a brief overview on the technology below:

Explaining Marker-Assisted Expected Progeny Differences for WBSF. Traditional EPDs are calculated using phenotypic data – Warner-Bratzler Shear Force measurements – and pedigree to evaluate the merit of the average of a sire's genes. With the advent of DNA marker tests, however, we can now look more closely at particular segments of a sire's DNA. In particular, the US Meat Animal Research Center found two polymorphisms(a) in calpain1 gene that are associated with beef tenderness; these have been validated by the Nation Beef Cattle Evaluation Consortium utilizing data on Simmental-sired cattle provided by ASA. There are at least three commercial labs providing genotyping for these markers under a variety of names. Our genotypes all came from Frontier Beef – TenderGENE. Each marker has two alleles (forms): C and G for marker "316" and A and C for "520."

American Simmental Association

[Home](#)[Herdbook Online Services](#)[Data/Animal Search](#)[Contact ASA Staff](#)[Forms](#)[Commercial](#)[SimList](#)[ASSOCIATION](#)[MEMBERSHIP](#)[GENETIC EVALUATION](#)[PARENTAL VALIDATION](#)[TOTAL HERD ENROLLMENT](#)[GENETIC DEFECTS](#)[ANIMAL REGISTRATION](#)[SIMMENTAL GENETICS](#)[SIMANGUS](#)[MARKETING](#)[ULTRASOUND](#)[RESOURCE LIBRARY](#)[ASA FOUNDATION](#)[JUNIOR PROGRAM](#)[ASA PUBLICATION](#)[eSEMINAR ARCHIVE](#)[INTERNATIONAL](#)[SIMBRAH](#)

DNA Drive!

Questions? Wade Shafer: wshafer@simmgene.com

To donate: dna@simmgene.com

DNA Drive! If you recall, a couple years ago we asked you to donate semen on high-accuracy bulls for use in the many genomic projects ongoing in the industry. ASA breeders were very generous and the semen drive was a resounding success. Through your generosity, a DNA bank with samples on over 130 of the most influential bulls in the breed was assembled. Those samples have been used in numerous projects. In fact, because of the demand for the DNA in ongoing projects and the many projects on the horizon, we are in need of more semen.

In an effort to harness the power of genomic technology to make better beef and better cattle, there is increasing demand for DNA samples on high accuracy bulls. Because of this, breeds that amass large DNA repositories will put themselves in the best position to take advantage of the technology.

To assemble this large DNA repository, we are again asking for semen donations on high-accuracy bulls. As was the case with our last semen drive, since the ASA is a non-profit organization, the gift can be considered a charitable donation under tax provisions. Semen on Simmental bulls all the way back to ASA #1 (Parisien) will be of great value to the repository. So, if you have semen on old bulls sitting in your tank, you can likely help the cause--and maybe cut your tax bill. **[A list of the bulls that are in greatest demand is attached here](#)**, though we will accept semen from any high accuracy bull. (**[Click here for a PDF version](#)**).

Remember, the semen does not need to be frozen. Simply tape it to stiff cardboard and put it in an envelope or put it in a cardboard container and ship it to the ASA with attention to Marilyn. Also, since we intend to build a large repository, we can use up to 5 units per bull. If you have any questions email Wade at wshafer@simmgene.com.

Thank You for Your Support

Donations:

Greenway Farms
Bob Greenway
Gary & Tina Bogott
Jordan Farms
Rodney Hilley
Stephen Turner
Terry Nicholas
Terry Jordan
Oneta Turner
St. Vrain Simmentals
Willie Altenburg
West Nodaway
Simmentals

Pledges:

Gordon Hodges
Bruce Kappes
Mike Wells
John Irvine
the Andersland Family
Triglav Simmental
Ranch



Pfizer Animal Genetics to deliver unprecedented genomic innovations to cattle industry

Significant industry advancement coming from research on full 50K chip targets the highest level of accuracy possible across a comprehensive suite of traits

KALAMAZOO, Mich. (September 15, 2009)—Cattle producers will soon have access to a powerful new suite of traits from Pfizer Animal Genetics that uses significantly more information to generate genomic predictions. The result, which will lead to a set of traits that exhibit the highest level of accuracy to date, will emerge with the launch of the company's first commercial genomic predictions based directly on the high-density BovineSNP50 chip. The new offering will be available within the next few months, following completion of the final validation studies.

"This product introduction represents a signature event for the beef industry and our company," says Dr. Nigel Evans, vice president of Animal Genetics for Pfizer Animal Health. "More than two years of extensive research approaching 10,000 cattle genotyped with the Bovine SNP50 chip has yielded initial genomic predictions for a selection of economically important performance, efficiency and carcass traits. In the future, cattle producers will access many other innovative traits as they become available from Pfizer Animal Genetics' rich Research & Development pipeline."

"This progressive program of continual trait delivery over the next six to 24 months brings unprecedented genetic selection information to cattlemen and the beef industry," Dr. Evans states.

The genomic predictions developed by Pfizer Animal Genetics utilizing the SNP50 platform will be delivered using Molecular Value Predictions (MVPs). For beef producers this advancement means that substantially more genomic information than ever before will be captured and integrated into selection tools for making breeding and management decisions.

Some of the new MVPs will enhance the reliability of traditional expected progeny difference (EPD) traits. Other MVPs, in addition to what is offered through EPDs, are for traits that are expensive and time consuming to measure using traditional means, yet are economically important.

The first offering will have direct application for Angus breeders. However, Pfizer Animal Genetics will extend the offering to the full spectrum of genetics across the beef industry in the near future.

"This will be a great opportunity for cattlemen to take advantage of technology that previously wasn't available," says Ronnie Green, Ph.D.,



**I wonder what datasets are
being put together in the US?**



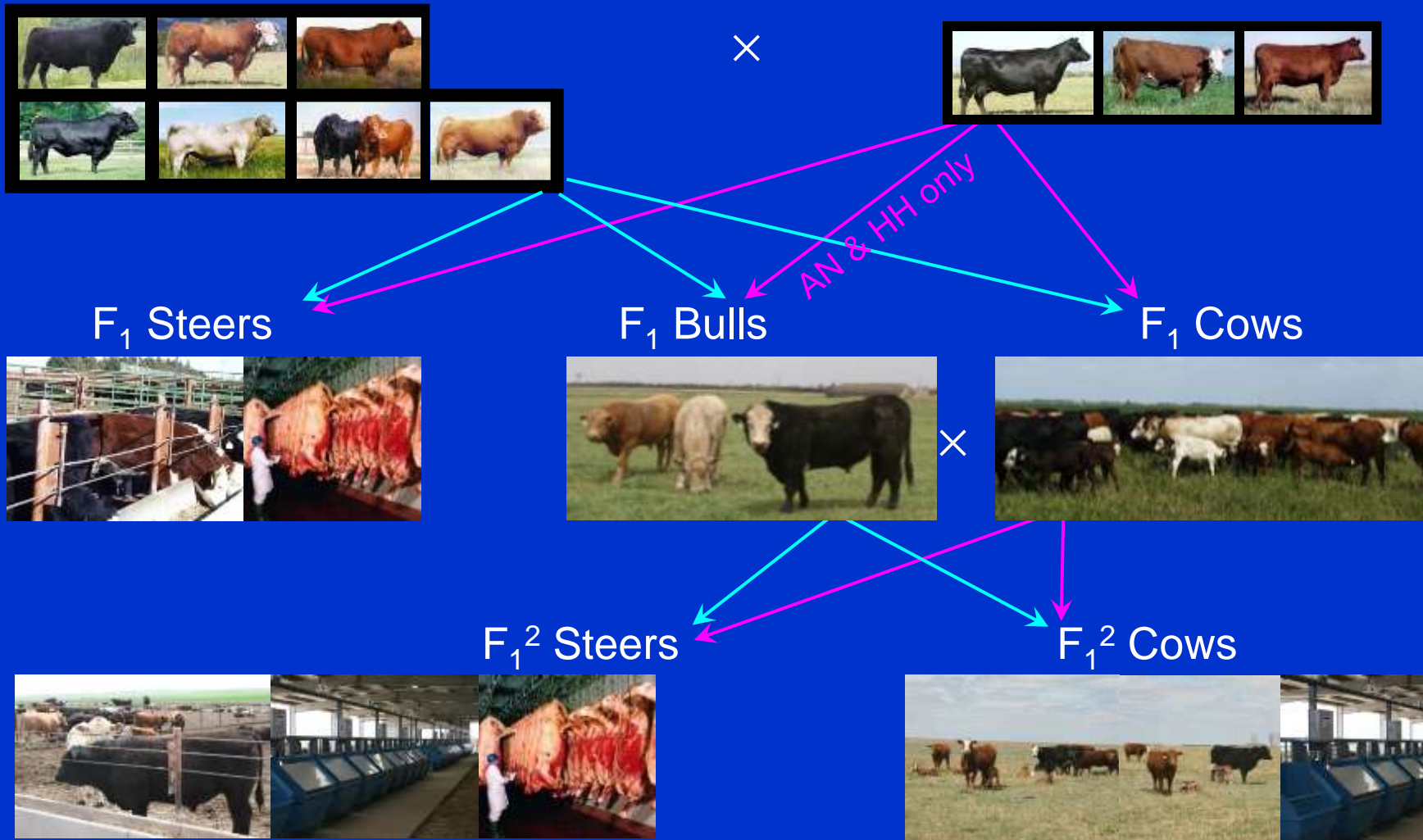
Principal Datasets

- Comprehensive phenotypes US MARC
Drs Thallman, Snelling, Kuehn, Keele, Bennett etc
 - Cycle VII – offspring of Angus, Hereford and MARC III cows mated to Angus, Charolais, Gelbvieh, Hereford, Limousin, Red Angus, or Simmental sires
 - Nebraska environment
 - Growth, carcass, reproduction, feed intake, disease

GPE Cycle VII Population

AI Sires: AN, HH, AR,
SM, CH, LM, GV

Base Cows:
AN, HH, MARC III



GPE New Continuous Sampling

AI Sires:

AN, HH, SM, CH, AR, LM, GV, SH,
BN, BM, MA, BR, CI, SG, SA, BV

Dams:

AN, HH, CH, SM,
MARC III, Cycle VII F₁



×



AN, HH, CH, SM

F₁ & BC Steers

F₁ Bulls

F₁ & BC Heifers



×



	EPD	Weights	Feed Efficiency	Carcass	Meat Quality	Meat Comp.	Fertility	Mature Maint.	Longevity	Male Fertility
<i>GPE Cycle VII</i>										
AI Sires	150									
F ₁ Bulls		73								73
F ₁ Steers		568		568	568	568				
F ₁ Cows		642					641	362	641	
F ₁ ² Steers		1313	1306	1249	1306	1220				
F ₁ ² Cows		710	691				702	Fut.		
<i>GPE - New Continuous Sampling</i>										
AI Sires	135									
F ₁ Bulls		59								59
F ₁ Steers		269	257	252						
F ₁ Heifers		353	345				Fut.			
Total	285	3987	2599	2069	1874	1788	1343	362	641	132

Principal Datasets

- Collection of > 2,000 Angus AI bulls put together by Jerry Taylor at University of Missouri and Merial
 - Smaller collections of other breeds (eg Limousin)
- US MARC collection of some 2,000 recent AI bulls including 16 breeds
 - Angus, Beefmaster, Brahman, Brangus, Braunvieh, Charolais, Chiangus, Gelbvieh, Hereford, Limousin, Maine Anjou, Red Angus, Salers, Santa Gertrudis, Shorthorn, and Simmental
 - Validation rather than training population

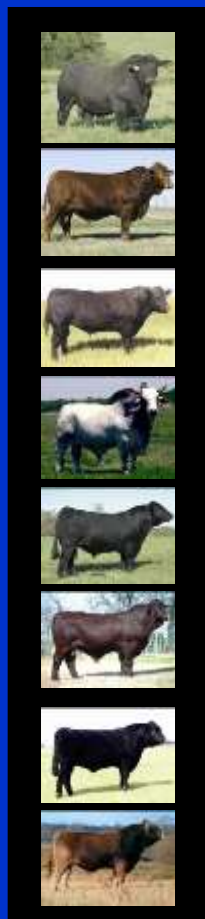
2000 Bull Project Sire Sampling Criteria

- Breed associations responsible for selecting and providing semen for DNA on influential sires
 - Current candidates for selection (transfer genetic evaluations for new traits directly into genetic improvement)
 - High accuracy (verify the process)
 - Influential within their breeds (many progeny)
 - Sample each breed broadly

Number of Sires Sampled



- Angus 402
- Hereford 317
- Simmental 253
- Red Angus 173
- Gelbvieh 136
- Limousin 131
- Charolais 125
- Shorthorn 86



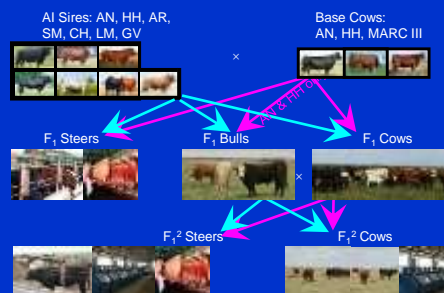
- Brangus 68
- Beefmaster 64
- Maine-Anjou 59
- Brahman 53
- Chiangus 47
- Santa Gertrudis 43
- Salers 42
- Braunvieh 27

2026

Model for Applying WGS to Beef Cattle

Training:
 USMARC Cycle VII
 USMARC Ongoing GPE
 DNA Testing Companies
 Seedstock Field Data
 (where applicable)

Validation:
 2,000 Bull Project
 International Collaboration



Application:
 Seedstock Breeders

Other Datasets

- Reproduction
 - Funded by USDA-NRI
 - Led by Dr Milt Thomas, New Mexico State University
 - 800 Brangus heifers from Camp Cooley
 - Growth and reproductive measures
 - Collection of DNA & phenotypes from Rex Ranch
 - Sisters of feedlot health project
 - Facilitated by NBCEC (Drs Pollak CU & Spangler UNL)

Other Datasets

- Beef Healthfulness (healthy Beef)
 - Facilitated by NBCEC
 - Funded by Pfizer Animal Genetics
 - led by Dr James Reecy at Iowa State University (ISU)
 - 2,200 Angus from Jack Cowley, Don Smith & ISU
 - Field work by Dr Alison Van Eenennaam UC Davis
 - Meat traits & taste panel - Oklahoma State University
 - Growth, carcass, meat traits, fatty acid, vitamin and mineral concentrations of ribeye

Other Datasets

- Feedlot Health
 - Facilitated by NBCEC
 - Funded by Pfizer Animal Genetics
 - Led by Dr Mark Enns at Colorado State University
 - 2,900 Angus steers from Rex Ranch, fed in Colorado
 - Feedlot growth and performance
 - Flight speed, chute score, stress measures
 - Visual indicators of sickness, BVD, lung lesions

Other Datasets

- Feed Intake (efficiency, RFI etc)
 - Portfolio of datasets championed by various researchers
 - University of Alberta, Dr Stephen Moore
 - Circle A/University of Missouri
 - University of Guelph
 - US MARC, Dr Cal Ferrell
- Comprehensive phenotypes Texas A&M
 - F2 Angus-Nellore Dr Clare Gill
 - Includes feed intake, temperament & behavior

The “Weight Trait Project”

John Pollak
Cornell University



Slide from John Pollak, BIF 2009 presentation

Cowboys Lament:

“There does not seem to be any organization to what we are doing or where we are going.”

So the Next Step

We NOW need to be developing projects that fosters collaboration on problems at every phase of technology transfer, and do so by integrating resources from other projects and grants.

I view the WTP is an organized effort to facilitate DNA technology transfer and while at the same time providing a national focus for integration.

Target Traits: Early Growth

Rationale:

Abundant data in discovery populations

Non-threatening to commercialization

Seedstock collaborators can evaluate success of the panel in their own herds

Discovery

US MARC discovery populations

International Collaboration (Australia, US and Canada)



LIMOUSIN

HEREFORD

Breed Associations



AMERICAN
Simmental
ASSOCIATION

406-587-4531

e-mail: simmental@simmgene.com
website: www.simmental.org



Identified collaborating producers

Provide data and EPDs for analysis

Database MBVs (genotypes)



North Dakota

2 Collaborators

South Dakota

4 Collaborators

Nebraska

6 Collaborators



Colorado

1 Collaborator

Kansas

5 Collaborators

Iowa

1 Collaborator

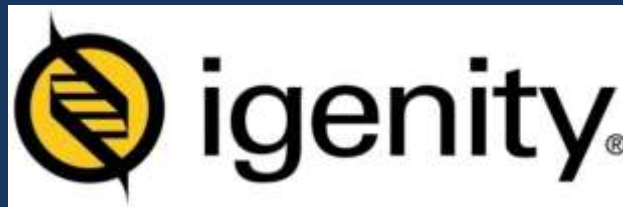
Seedstock Producers

Collect DNA samples (hair) on 2009 born calves and their dams.

**18 Seedstock providers
4 university herds
~6000 Cows
~6000 Calves**

Genetic Testing Company

Facilitate the creation of the “reduced panel” chip and provide genotyping services to the project.



Validation

This first phase of the weight trait project is focused on validation issues.

Alison Van Eenennaam: “.... *validation has focused on whether a product worked or not.*”

Moving to “*proportion of additive genetic variation accounted by a test*”. *Thallman et. al.*

The populations like the one we are developing in the weight trait project will allow for us to study estimating this proportion for weights and to do so within breed and across breed.

Integration of MBVs and EPDs

In the weight trait project we will do genetic evaluations for the weight traits with DNA information (MBVs or genotypes) and without that information included to examine the impact on accuracy of yearling bulls.

Allows the breed associations to address how they would capture and organize DNA information in their databases and for genetic evaluation.



Timing

Plan to capture DNA on all calves and cows spring and 2009.

Genotype during the fall and winter.

“Validation analysis” winter.

Genetic evaluation analyses research 2010.