



Welcome!

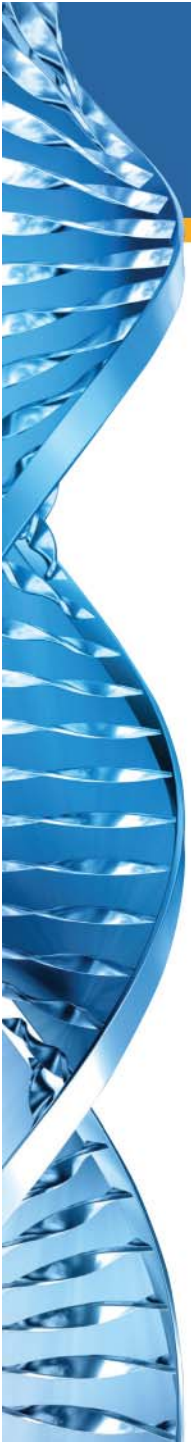
Tonya Amen, Ph.D
Cattle Genetics Specialist
Pfizer Animal Genetics

GENOMICS:

A New Era in Beef Cattle Selection and Breeding.

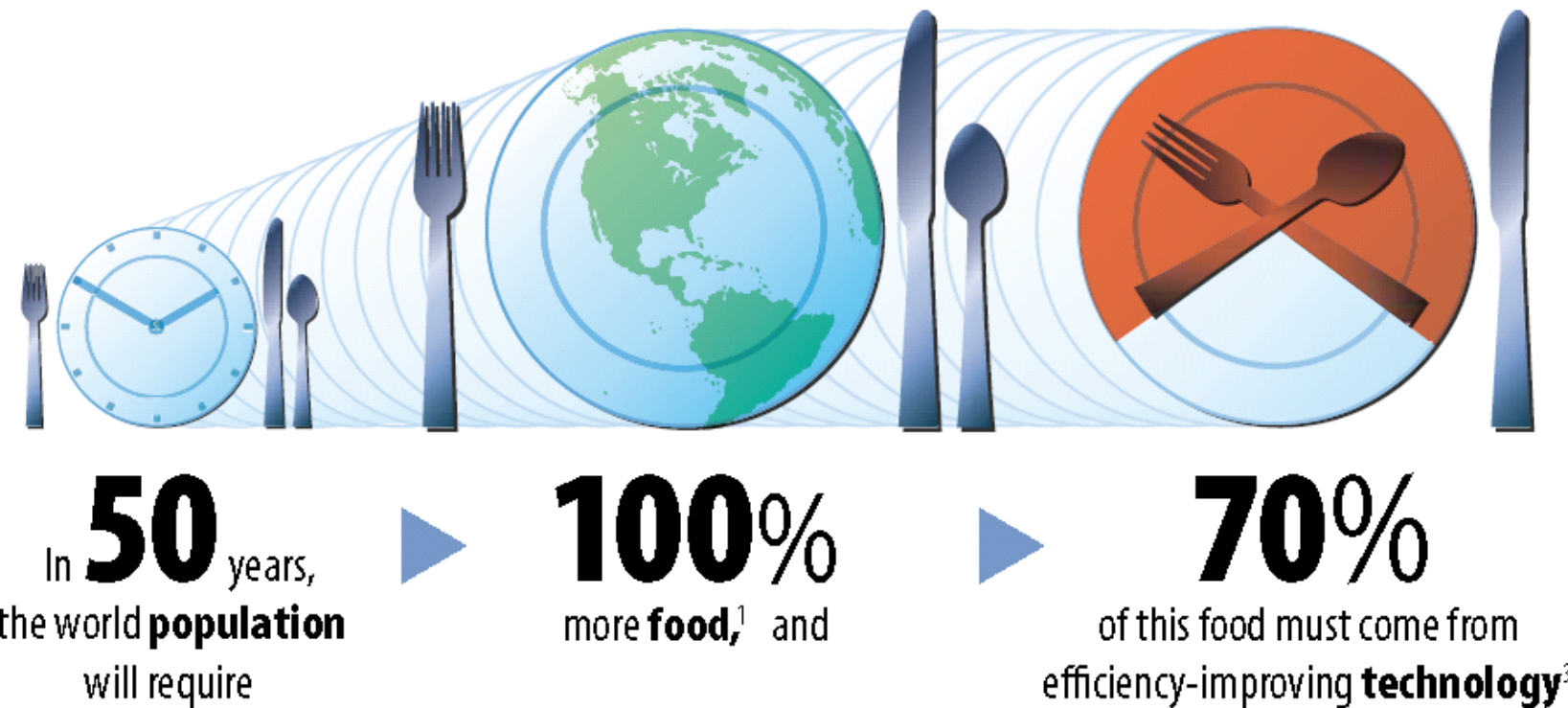


Outline

- 
- Why Genetics? Why now?
 - Simply Inherited Traits
 - Genetic Conditions
 - Coat Color
 - Parentage
 - Performance Traits
 - GeneSTAR®
 - HD 50K for Angus
 - Sample Collection

Why Genetics – The Challenge

Key Data

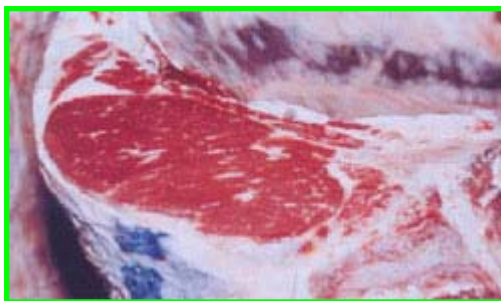




Please rank these sires based on visual appraisal for structural soundness, composition, body type and overall eye appeal.



Which sire is a carrier of one or more simple recessive genetic defects?



Which sire has the greatest genetic potential to sire calves that excel in marbling (quality grade)?

Advancements in Cattle Evaluation

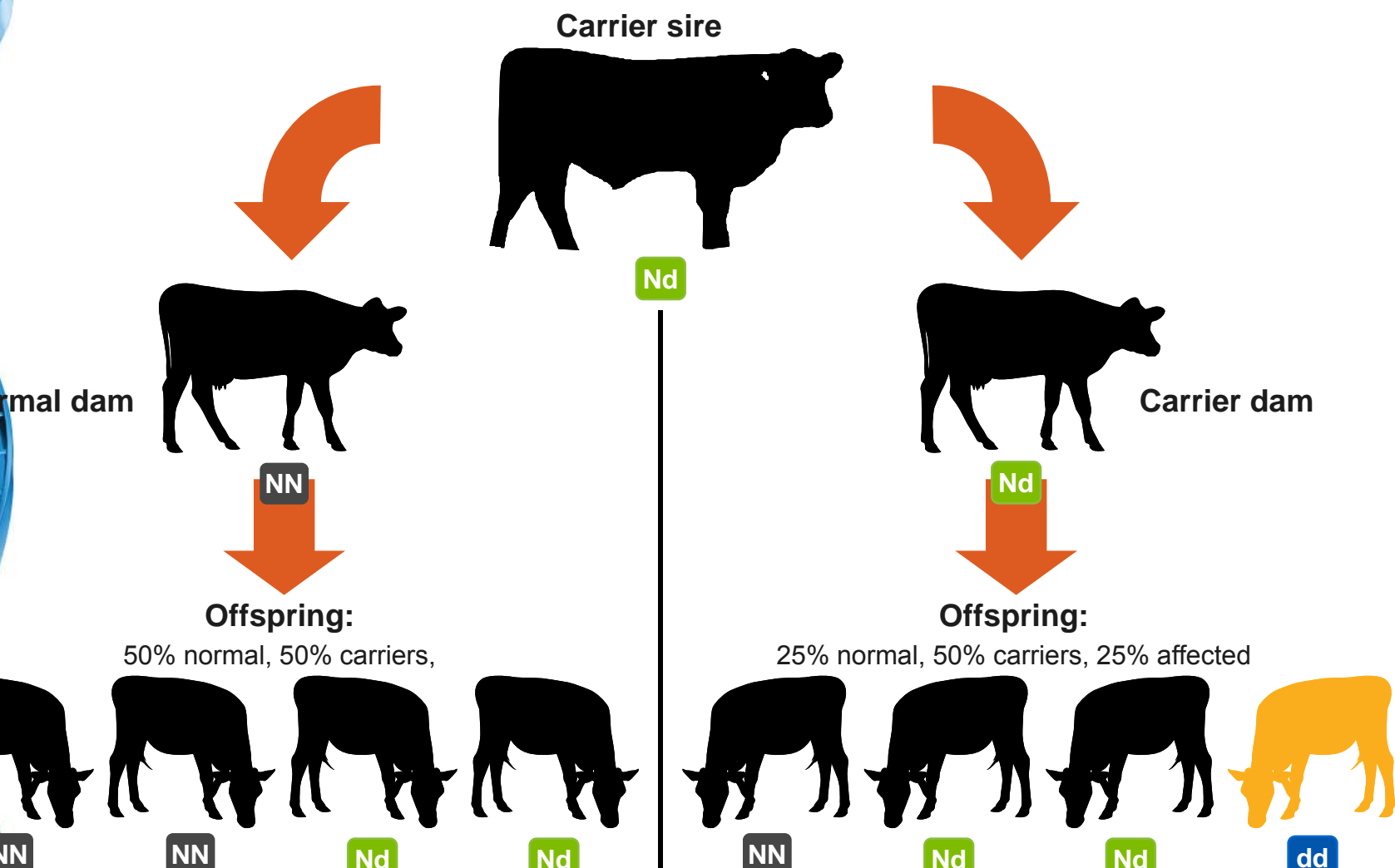


Visual appraisal
Pedigree information
Parentage verification
Performance data
EPDs and accuracies
Multi-breed, international evaluation
Economic selection indexes
DNA tests for simple recessives
Targeted marker panels
High-Density marker platforms
GE-EPDs and accuracies
GE-Indexes for simplified and dependable multiple trait selection



HOW DO YOU IDENTIFY CARRIERS OF SIMPLE RECESSIVES?

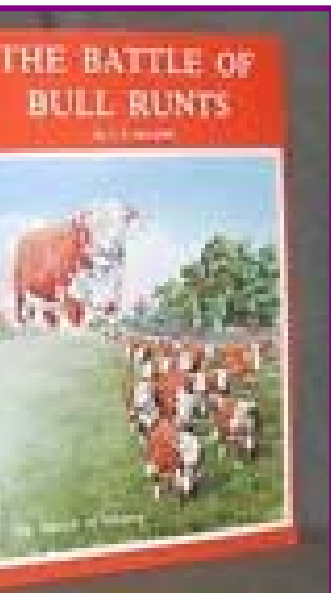
Simply-Inherited Traits



How Do You Identify Carriers of Simple Recessives?

Historic – Progeny Test

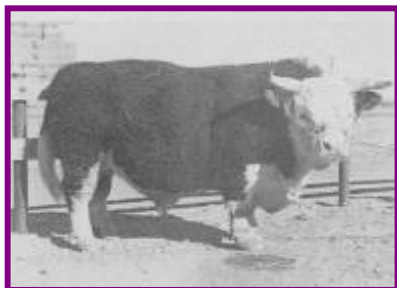
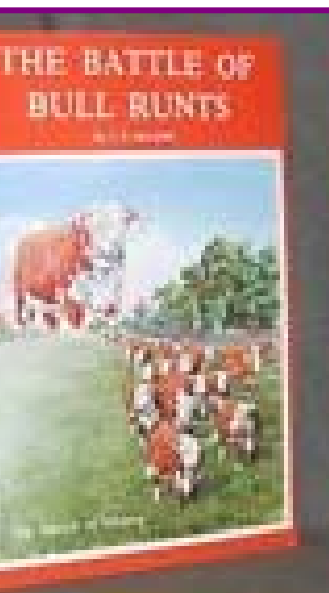
10 normal calves needed, out of known carrier cows with no affected progeny, for 99.9% certainty that a sire is free of genetic condition



How Do You Identify Carriers of Simple Recessives?

Historic – Progeny Test

0 normal calves needed, out of known carrier cows with no affected progeny, or 99.9% certainty that a sire is free of genetic condition



Today – DNA Test

Testing for Arthrogryposis Multiplex in your herd

Arthrogryposis Multiplex (AM), previously known in the U.S. as "Curly Calf Syndrome," is a lethal genetic defect caused by a simple recessive gene that results in a deletion on two separate genes in Angus and Angus-influenced cattle. AM-affected calves are born dead with a twisted spine and extended and contracted limbs, and calving difficulties are common.

The Impact of AM
Dr. Jon Beever at the University of Illinois has recently identified the gene deletion responsible for AM. His initial testing of 736 A.I. sires used in Angus and Angus-influenced breeding programs identified 58 of these sires to be AM carriers.

Identifying AM-carrier animals provides critical information for your future breeding decisions that can impact short- and long-term profitability. Carriers may be managed so the gene mutation can be eliminated from the current Angus population over time.

Testing for AM
Pfizer Animal Genetics, a business unit of Pfizer Animal Health, has produced a commercial version of the test originally developed by Dr. Beever. Pfizer will provide test results to the American Angus Association at the request of the breeder providing the DNA sample.

Samples may be submitted in one of the following forms:

- Hair follicles. When submitting hair samples, please make sure at least 25 follicles (bulb intact) are included to ensure an adequate volume of DNA to complete the test.
- Blood FTA® cards.
- Semen samples.
- Whole blood tubes.

To download test order forms and a DNA-sample collection guide, please visit www.pfizeranimalgenetics.com or contact a customer service representative at 1-877-BEEF DNA.

Chances of an AM Calf

As the illustrations show:

- Crossing an AM-free (AMF) animal with an AM-carrier (AMC) animal results in no affected animals. Half of the animals will be AM-free and half will be carriers.
- Crossing two AMC animals results in a 25 percent chance of an AM-affected calf (AHA) and a 50 percent chance of an AMC.

For breeders of Angus and Angus-influenced cattle, test results on suspect animals can:

- Advance breeding decisions, eliminating the recessive gene over time.
- Confirm carriers or syndrome-free animals.
- Facilitate winter and spring sale decisions.

Importance of AM Testing
Testing of suspect animals is essential to identifying carrier animals.

Benefits of Parentage Determination



- Verify A.I. sires and donor dams
- Pedigree Integrity
- Accurate Genetic Evaluation
- Manage defects
- Maintain hybrid vigor

Tracking Performance with Sire-Trace



**Match Sires to Offspring to
Improve Future Calf-Crops**

- Identify the most and least prolific sires
- Track down the most and least productive sires
- Replacement heifers with known sire parentage
 - Retain daughters of sires with the most appropriate predicted genetic merit for maternal

Tracking Performance with Sire-Trace



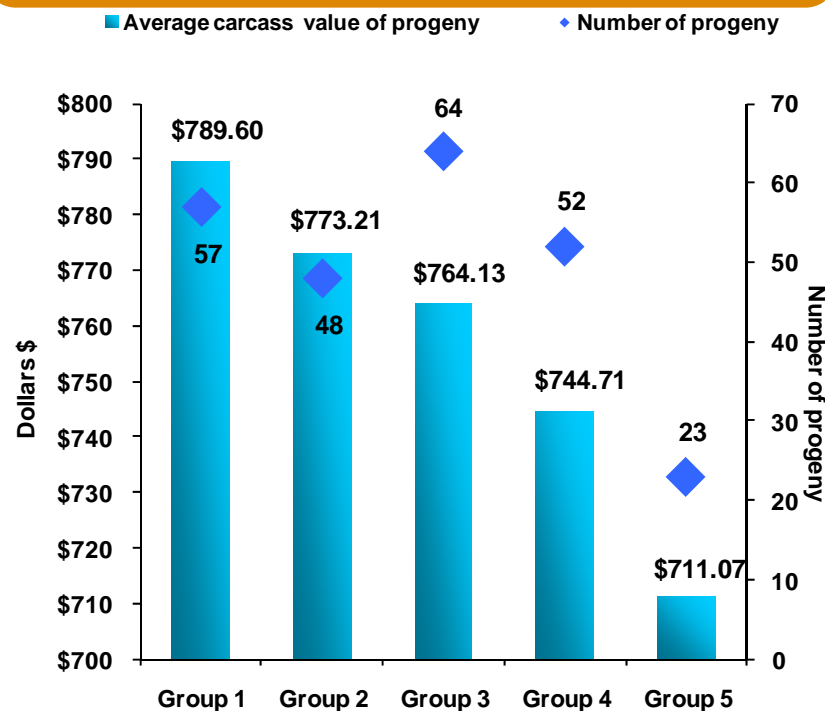
Research Shows Value of Sire Identification



Studies demonstrate that the difference between the best and worst sires can mean thousands of dollars earned – or lost – throughout their breeding lives




- **3 to 32:** range of calves per sire
- **\$78.53:** a single-year difference in progeny carcass value between the three best sires and three worst sires
- **\$5,800:** lifetime difference in progeny carcass value between the three best sires and the three worst sires

Each Group Consists of Three Sires. The Carcass Value is the Average of All Calves by All Three Sires



How Parentage Verification Works



		Marker 1	Marker 2	Marker 3
Progeny		AA	TT	GG
Sire 1		AA	TC	GG
Sire 2		AG	TC	CC



GENOMIC PREDICTIONS FOR PERFORMANCE TRAITS

Phenotype

**“Environment”
(non-genetic)**

Genetics

**Known
adjustments)**

**Unknown
(Groups)**

**Non-additive
(Hybrid Vigor)**

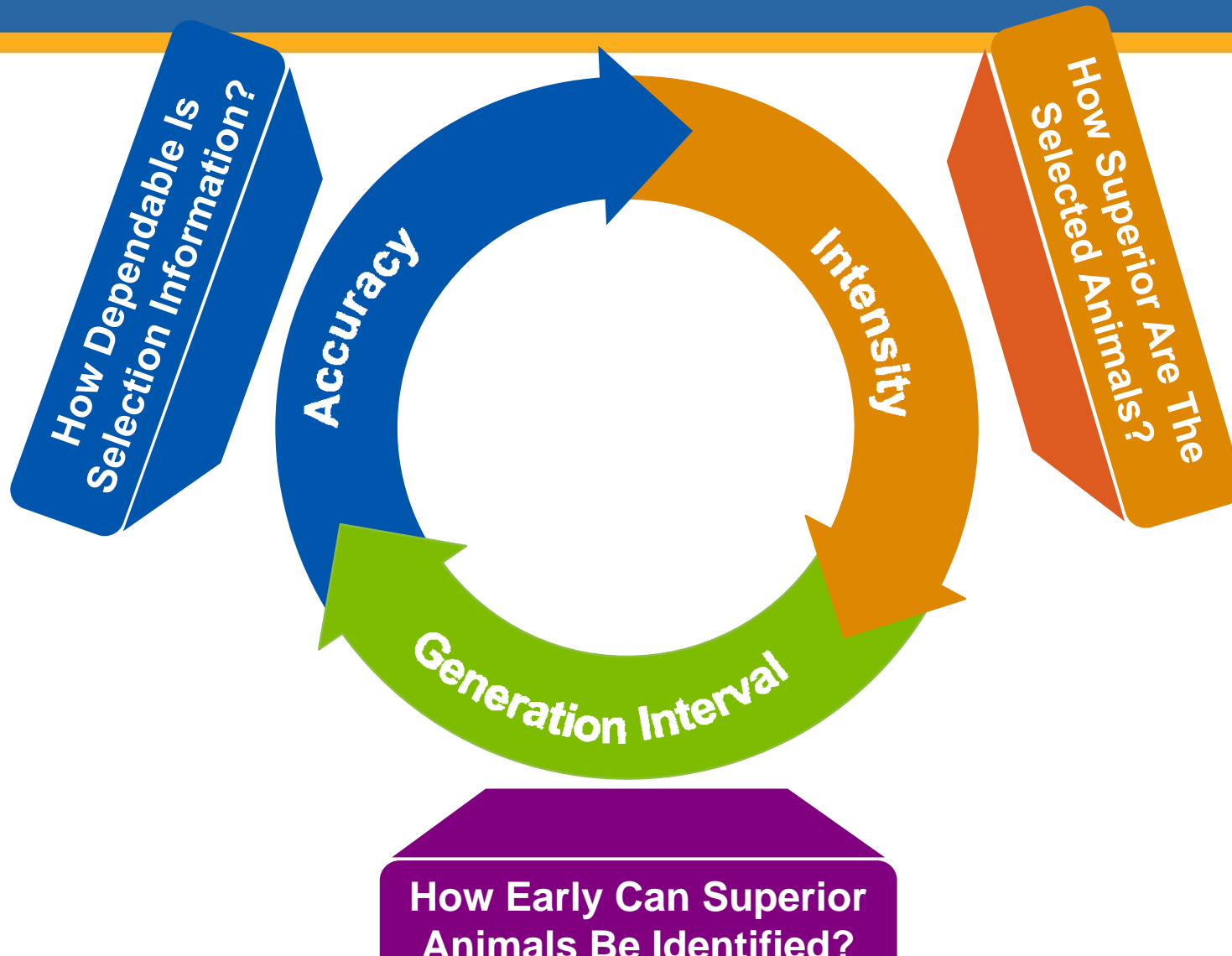
**Additive
(EPDs & MBVs)**

**Expected
Progeny
Difference**



**Molecular
Breeding
Value**

Response to Selection



Slide 19

- A4** Explanations for accuracy and intensity - similar to what's provided for generation interval - are missing in this version versus the original.

ANDERK33, 1/28/2011

Why Do We Need More Information?

Trait	BW	WW	Milk	YW	SC
Calves*	4.4	36	19	63	.76

As calves, full sibs share the same pedigree EPD profile

C Rancher	-.5	19	22	38	.62
	.96	.94	.91	.92	.89
C Stockman	8.5	41	12	80	1.02
	.95	.93	.91	.90	.84

EPDs Based on Progeny Performance Reflect GENE SAMPLING

Product Profile



- GeneSTAR® includes:
 - Feed Efficiency
 - Marbling
 - Tenderness
 - Homozygous Black
 - Palatability Index
- Effective in Any Breed

GeneSTAR®

Palatability Zones

For Ease of Interpretation, animals are categorized into *Palatability Zones* based on index scores:

Superior

- Scores Above 355
- Top 20% of Animals

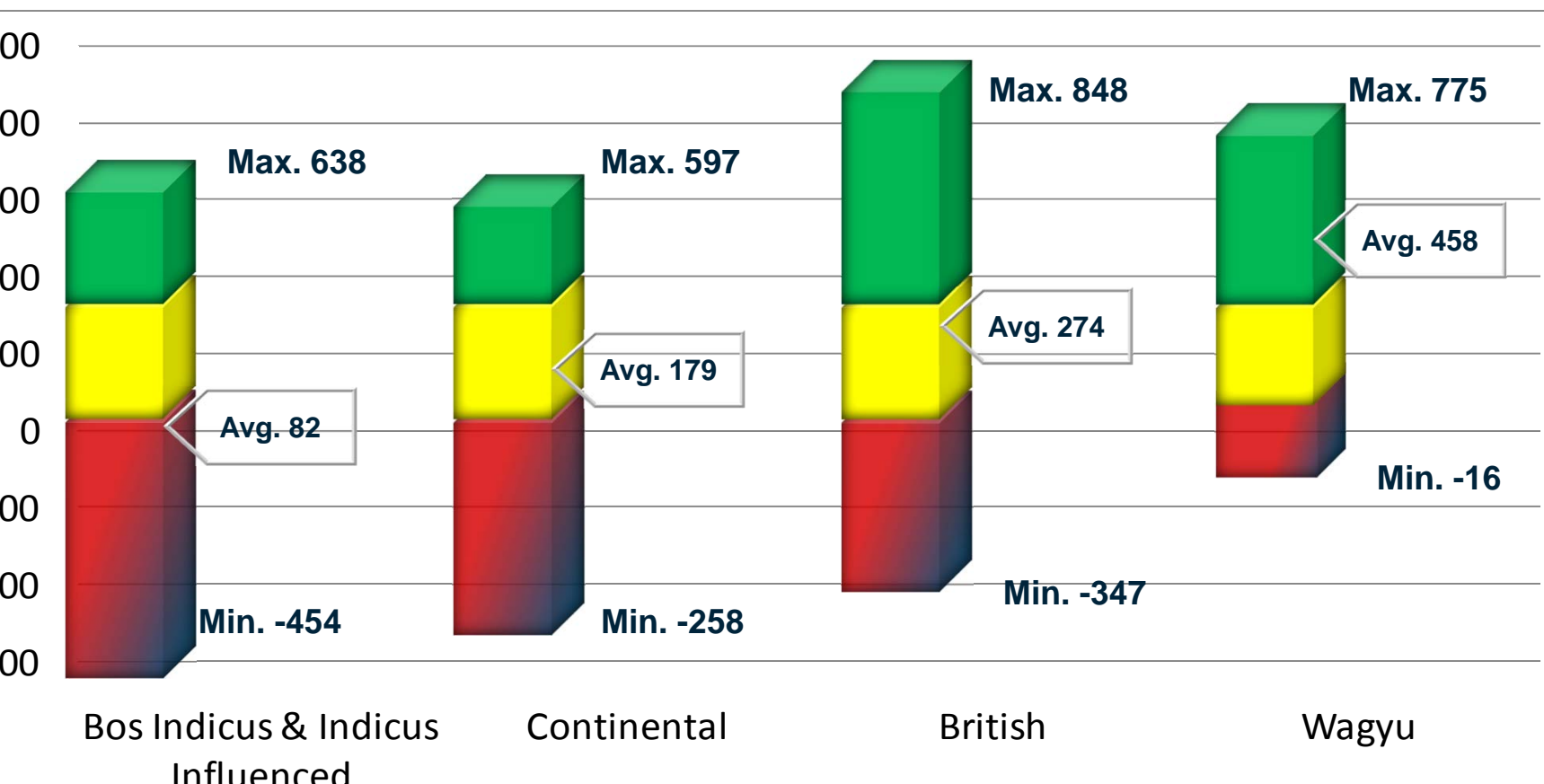
Acceptable

- Scores Between 100 & 355
- Middle 60% of Animals

Marginal

- Scores Below 100
- Bottom 20% of Animals

Palatability Index Ranges by Breed Type



Use of GeneSTAR MVP for Feed Efficiency

- Bull A FE MVP: -1.0
- Bull B FE MVP: +1.0
- Difference: -2.0 lbs/day
- ½ passed to offspring:
-1.0 lbs less feed/day



**180 days on feed X -1.0 lbs feed/day =
180 lbs less feed/head**

Technology Advancement



GeneSTAR[®]

MVP

1 marker
(Marbling)

198

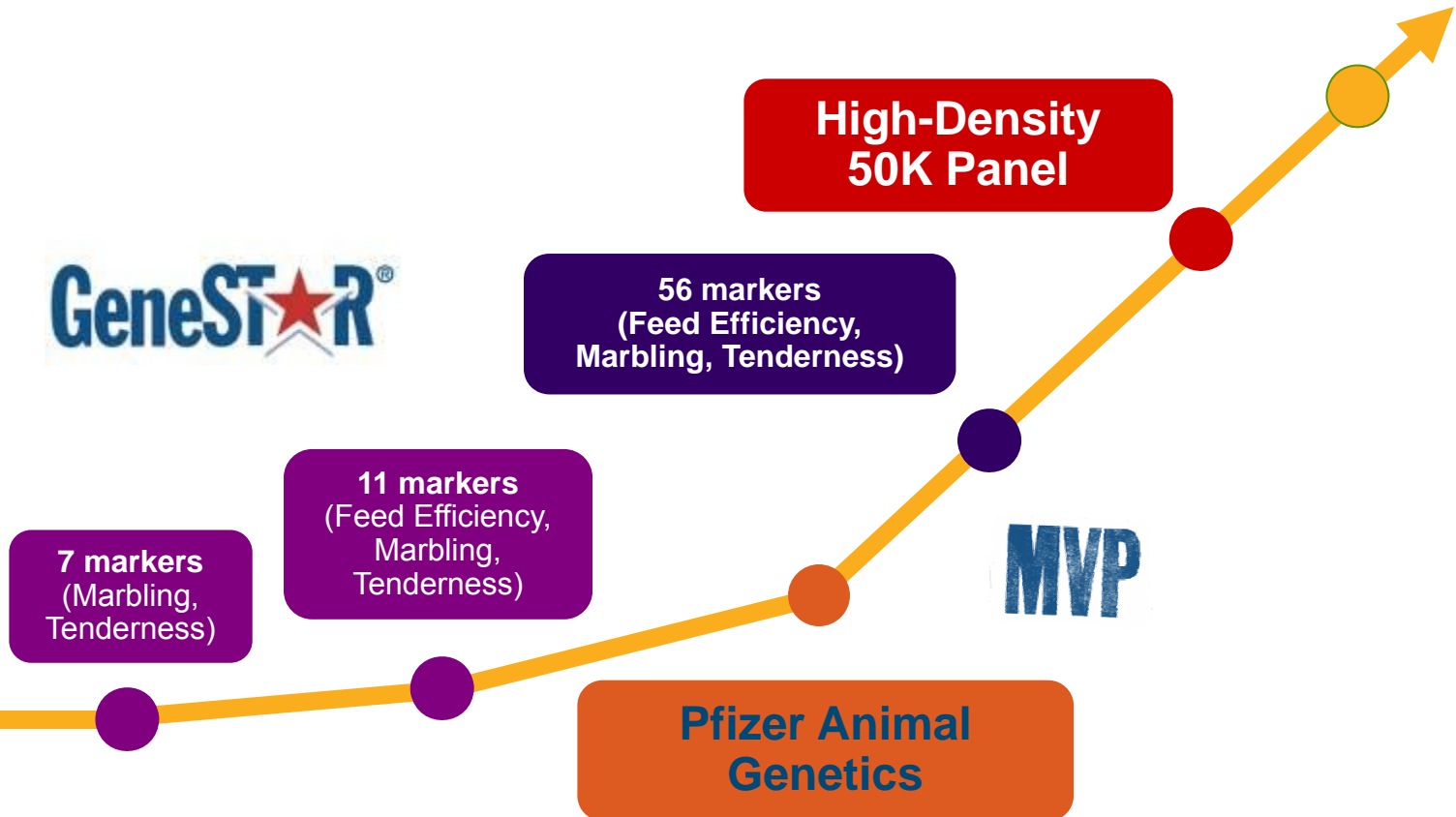
7 markers
(Marbling,
Tenderness)

11 markers
(Feed Efficiency,
Marbling,
Tenderness)

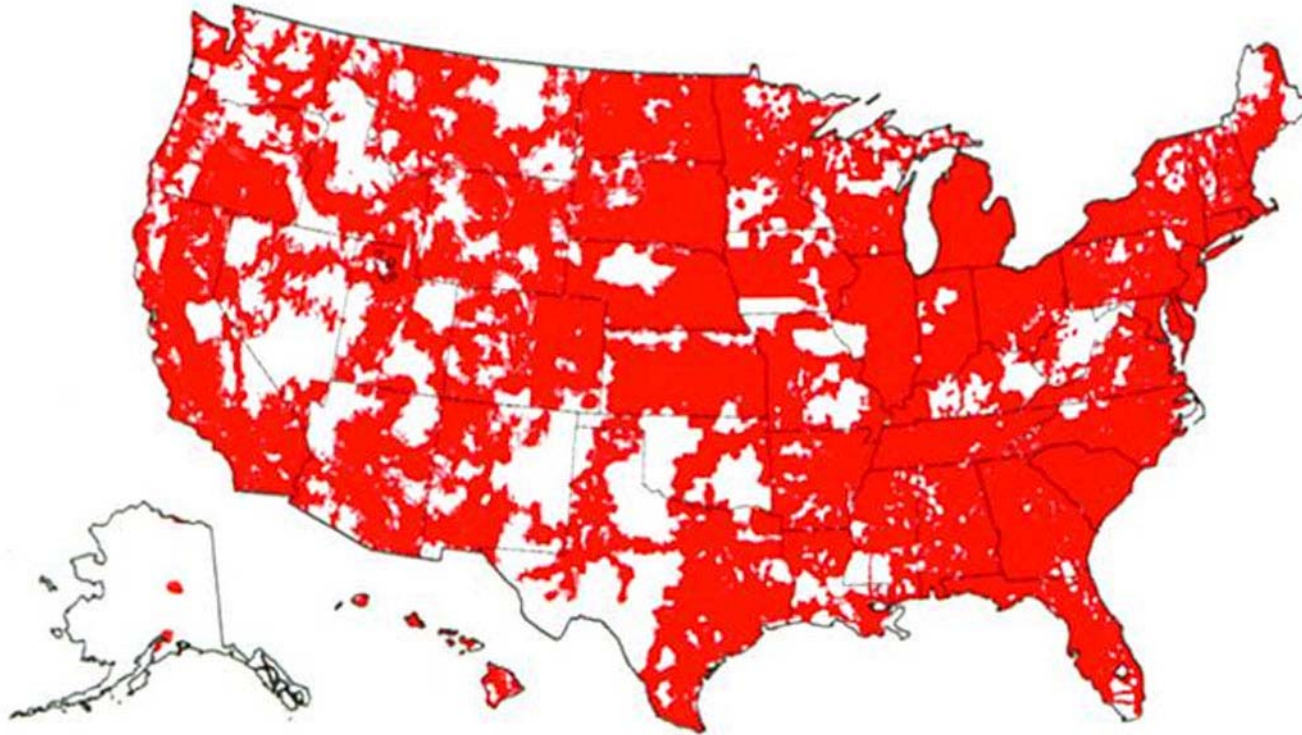
56 markers
(Feed Efficiency,
Marbling, Tenderness)

High-Density
50K Panel

Pfizer Animal
Genetics



It's All About Coverage



Verizon Wireless – 3G Broadband Coverage

Secured AAA Member Site

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

Performance Details as of 10/20/2010, Express Angus Ranches - 167457.

Herd ID/Tattoo: 242/E242, Bull Dam Assn Num: AAA 14119892 [NHF]
Calf Assn Num: AAA 14740749 [AMF-CAF-NHF] Sire Assn Num: AAA 12557724 [AMF-CAF-NHF]
Birth Date: 02/08/2004

As of 10/20/2010

Production								Maternal					
CED Acc	BW Acc	WW Acc	YW Acc	RADG Acc	YH Acc	SC Acc	Doc Acc	CEM Acc	Milk Acc	MkH MkD	MW Acc	MH Acc	\$EN
+11 .80	+2.1 .93	+40 .89	+86 .86	+16 .36	+0 .88	+59 .88	-4 .71	+9 .58	+21 .65	63 180	-9 .67	-.2 .68	+13.66

Carcass					
CW Acc	Marb Acc	RE Acc	Fat Acc	Carc Grp Carc Pg	Usnd Grp Usnd Pg
+2 .54	+1.20 .61	+.10 .63	+.076 .58	12 19	618 1460

\$Values					
\$W	\$F	\$G	\$QG	\$YG	\$B
+33.11	+29.03	+32.65	+36.17	-3.52	+44.71

DNA PROFILE SCORES

Results Recvd Date: 12/01/2009

CED	BW	WW	ADG	YW	RFI	DMI	YH	SC	Doc	HP	CEM	Milk	MW	MH	Stay
			7	2	6				3	7	4				6

CW	Marb	RE	FAT	Tend
8	8	7	9	6

Color	BVD

Results Recvd Date: 07/02/2010

CED	BW	WW	ADG	YW	RFI	DMI	YH	SC	Doc	HP	CEM	Milk	MW	MH	Stay
6	4	3	7	6	6	5	4	4	3	4	4	3	3	3	6

CW	Marb	RE	FAT	Tend
7	8	5	8	7

Color	BVD

Traits – HD 50K % Ranks

- Calving Ease Direct
- Birth Weight
- Weaning Weight
- Average Daily Gain
- **Yearling Weight**
- Dry Matter Intake
- **Residual Feed Intake***
- Calving Ease Maternal
- Milking Ability
- Carcass Weight
- Fat Thickness
- Ribeye Area
- Marbling Score
- Tenderness

*Residual Average Daily Gain EPD

GE-EPDs Powered by HD 50K



More Coverage Means

- **More** explained genetic variation for more traits
- **More** dependable **GE-EPDs** for selection, mating and marketing

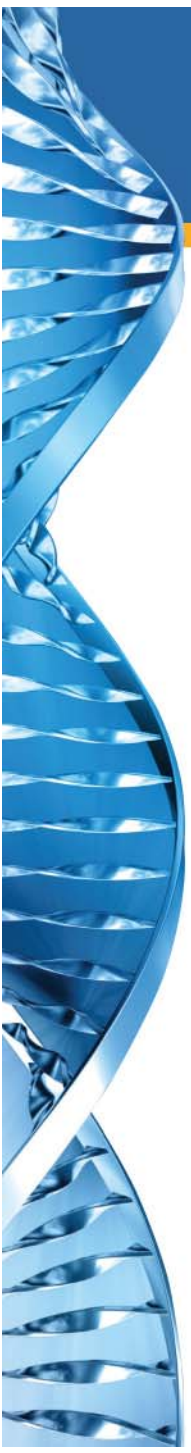
More Informed Breeding Decisions Sooner

	BW	WW	YW	MA	CW	MS	REA
Pedigree EPD	2.2	40	77	21	15	.73	.30

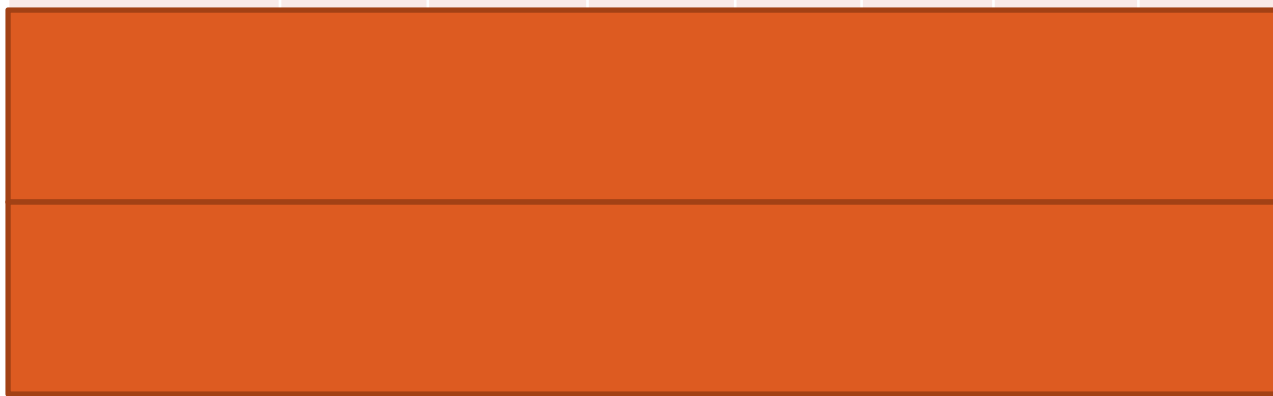
More Informed Breeding Decisions Sooner

	BW	WW	YW	MA	CW	MS	REA
Pedigree EPD	2.2	40	77	21	15	.73	.30
HD 50K % Rank	79%	14%	5%	2%	1%	1%	1%


More Informed Breeding Decisions Sooner



	BW	WW	YW	MA	CW	MS	REA
Pedigree EPD	2.2	40	77	21	15	.73	.30
HD 50K % Rank	79%	14%	5%	2%	1%	1%	1%
Expected Change	↑	↑	↑	↑	↑	↑	↑



More Informed Breeding Decisions Sooner



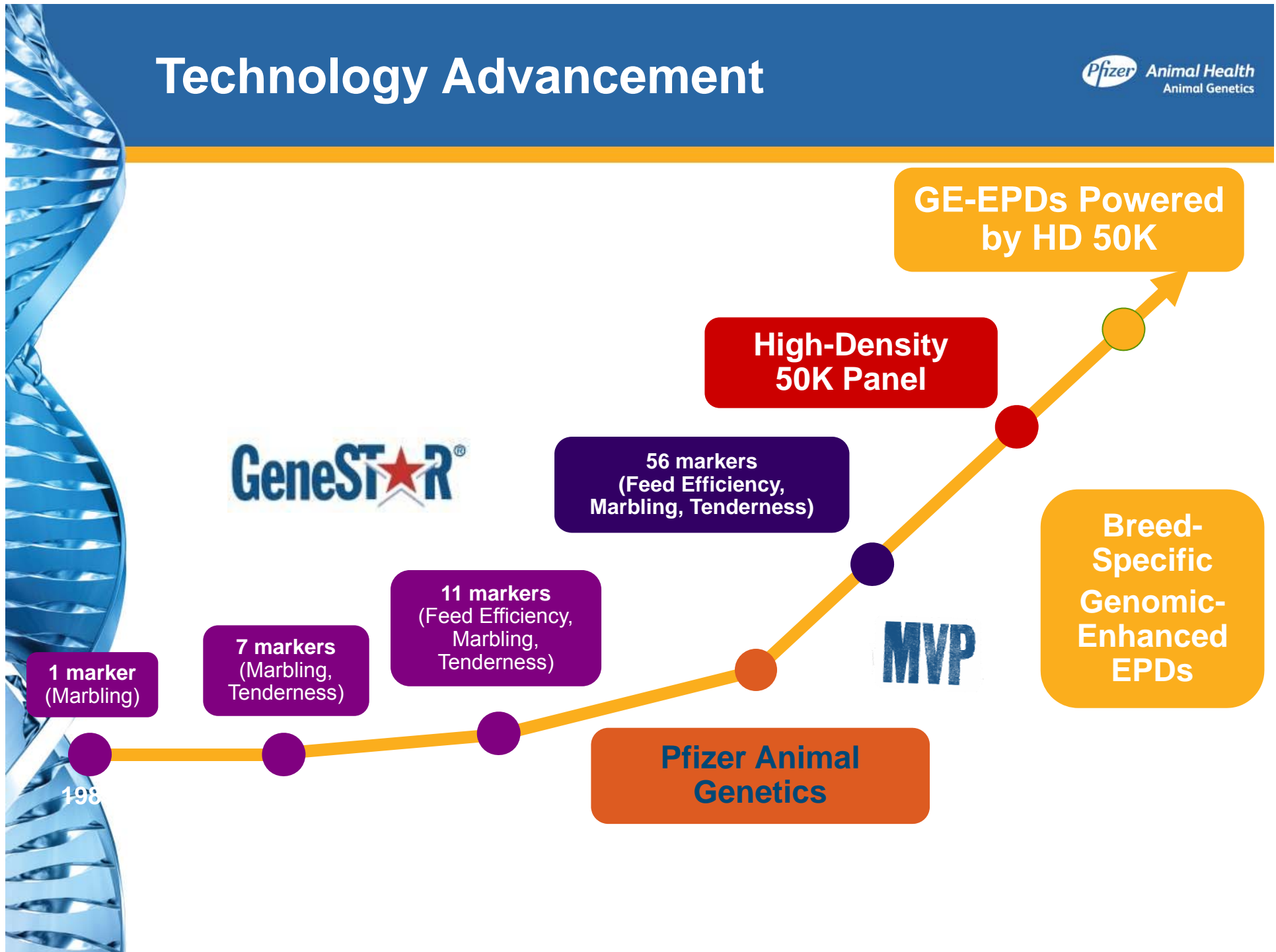
	BW	WW	YW	MA	CW	MS	REA
Pedigree EPD	2.2	40	77	21	15	.73	.30
HD 50K % Rank	79%	14%	5%	2%	1%	1%	1%
Expected Change	↑	↑	↑	↑	↑	↑	↑
High Acc EPD	4.0	52	99	30	32	1.21	.64



More Informed Breeding Decisions Sooner

	BW	WW	YW	MA	CW	MS	REA
Pedigree EPD	2.2	40	77	21	15	.73	.30
HD 50K % Rank	79%	14%	5%	2%	1%	1%	1%
Expected Change	↑	↑	↑	↑	↑	↑	↑
High Acc EPD	4.0	52	99	30	32	1.21	.64
High Acc % Rank	85%	20%	15%	5%	3%	1%	2%

Technology Advancement



Sources of information for EPDs

**Pedigree
Information**

**Individual
Performance
Data**

**Progeny
Performance
Data**



**Genomic
Predictions**

**Genomic-Enhanced EPDs,
Accuracies and Indexes
Powered by HD 50K**

**Time,
Money and
Opportunity
Costs**

Pfizer *Animal Health*
Animal Genetics

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

[AMF-CAF-NHF]

Parentage: Microsatellite, SNP
Genomic: IG384, PF50

(s): 1196584 - JMJ Ranch, Gould OK

AAA #11520398 [AMC-NHC]

AAA #12493607 [AMC-NHC-CAF]

AAA 12054694 [AMF]

AAA 14851313 [AMF-CAF-
NHE]

AAA 13674311

AAA 13328384

AAA #11418151 [AMF-CAF-NHF]

AAA #12783540 [AMF-CAF-NHF]

AAA 12139985

AAA #+11747039 [AMF-CAF-NHF]

AAA +13569349

AAA 11781043

Pathfinder + Embryo Transplant

As of 04/01/2011

Production								Maternal					
CED Acc	BW Acc	WW Acc	YW Acc	RADG Acc	YH Acc	SC Acc	Doc Acc	CEM Acc	Milk Acc	MkH MkD	MW Acc	MH Acc	SEN
+11 .44	+3 .66	+59 .53	+97 .48	+17 .33	+4 .61	+73 .52	+24 .55	+11 .14	+28 .19		+34 .05	+7 .05	-7.76

HD50K Accuracy and Progeny Equivalents

	AVG 50K Change in ACC from 0.05	Progeny Equivalent
BW	.25	8
WW	.23	16
YW ²	.27	20
RADG ³	.27	13
Milk	.15	13
CW	.17	7
MARB ⁴	.24	12
RE ⁴	.23	9
FAT ⁴	.23	11

² – ADG

³ – DMI

⁴ – carcass

progeny, not
scanned progeny
(scanned
progeny
equivalent closer
to 30-40

Sample Collection

Hair Follicles

- At least 25 follicles with bulbs intact



Blood

- FTA cards (**HD 50K preferred**)
- Whole blood in purple-top tubes



Semen

- Thawed – one or two units



For More Information...



Pfizer Animal Health
Animal Genetics

Choose Your Location:
AUS | NZ | CAN | USA | EUR | BR

Beef | Dairy | Testing and Results | Resources | Contact Us | News and Media

Providing value to the livestock industry from DNA technology.

Pfizer Animal Genetics, a business unit of Pfizer Animal Health, is the world's leading provider of comprehensive genetic information and support services – everything from Molecular Value Predictions (MVPs*), 50K HD technology and Genetic Conditions testing to familiar tests like GeneSTAR, SireTRACE* and SureTRAK.

Using a 3,000-DNA-marker panel, new CLARIFIDE™ is our first genomic offering for dairy cattle. We also offer the beef industry's first commercially available predictions using a High-Density 50,000-marker panel for black Angus.

By collaborating with industry partners, academic opinion leaders and customers, we're uniquely able to discover, demonstrate and validate genomic tests for economically relevant traits.

From breeding through marketing, our innovative solutions address real-world needs and help customers unlock the maximum value of a genetic profile.

What's New? Genetic Conditions Resource Center

CLARIFIDE for Dairy
AGI HD 50K for Angus
GeneSTAR MVPs
Order Form

News & Media | Location & Sales | Resources | Testing & Results

Press Releases | In the News | DNAge E-newsletter

www.pfizeranimalgenetics.com
or call
1.877.BEEF DNA



TECHNICAL SUMMARY

March 2010

High-Density (HD) 50K MVPs—The beef industry's first commercially available Molecular Value Predictions from a High-Density panel with more than 50,000 markers.

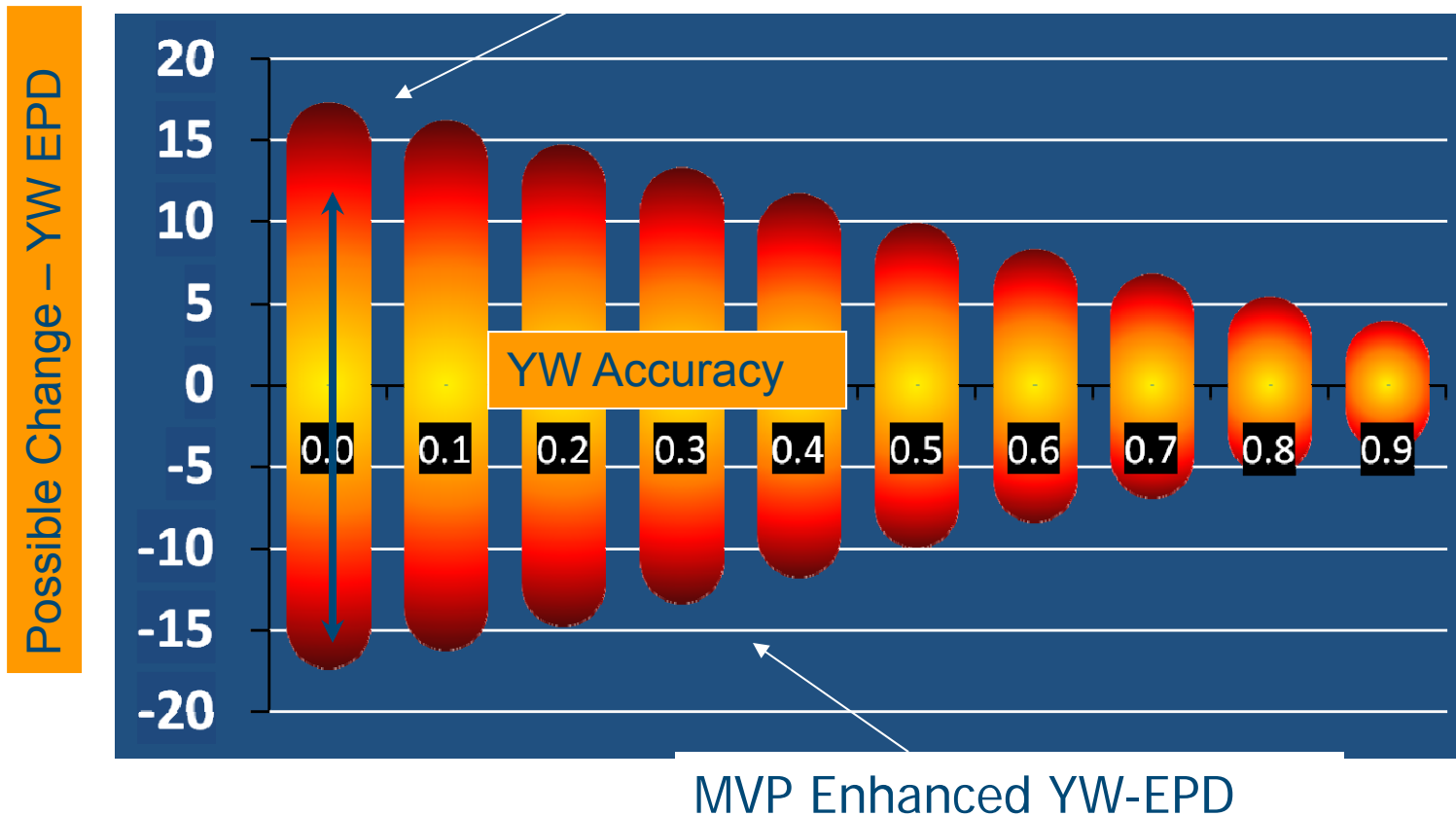




Thank You For Your Time!

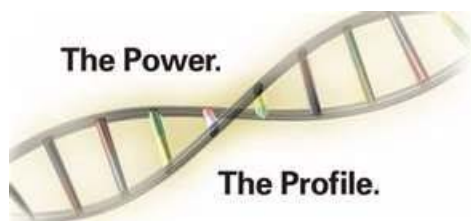
Tonya Amen
tonya.amen@pfizer.com
970-580-0198

More Accurate Selection



The HD 50K vs. IP Challenge

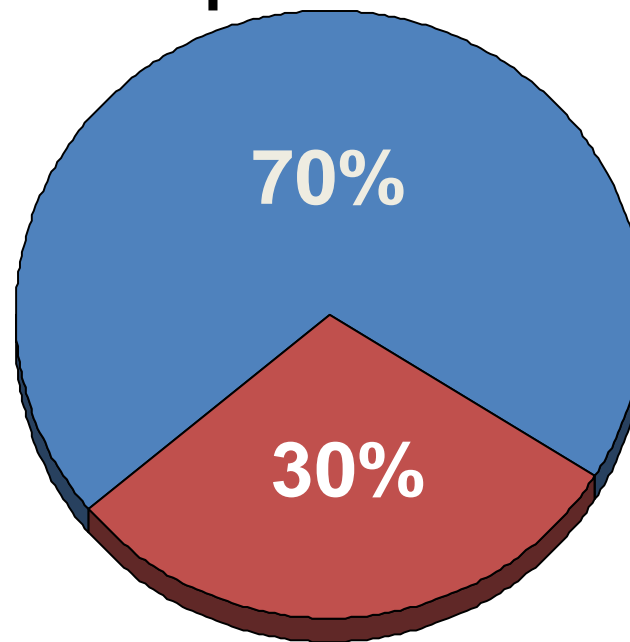
- 60 A.I. sires with progeny-proven EPDs from over 68,000 progeny in over 27,000 groups with HD 50K and Profile predictions



**Progeny-Proven,
High Accuracy EPDs
from Angus A.I. Sires**

Proportion of Explained Differences

Example - Proportion of variation in progeny-proven EPDs explained by genomic predictions

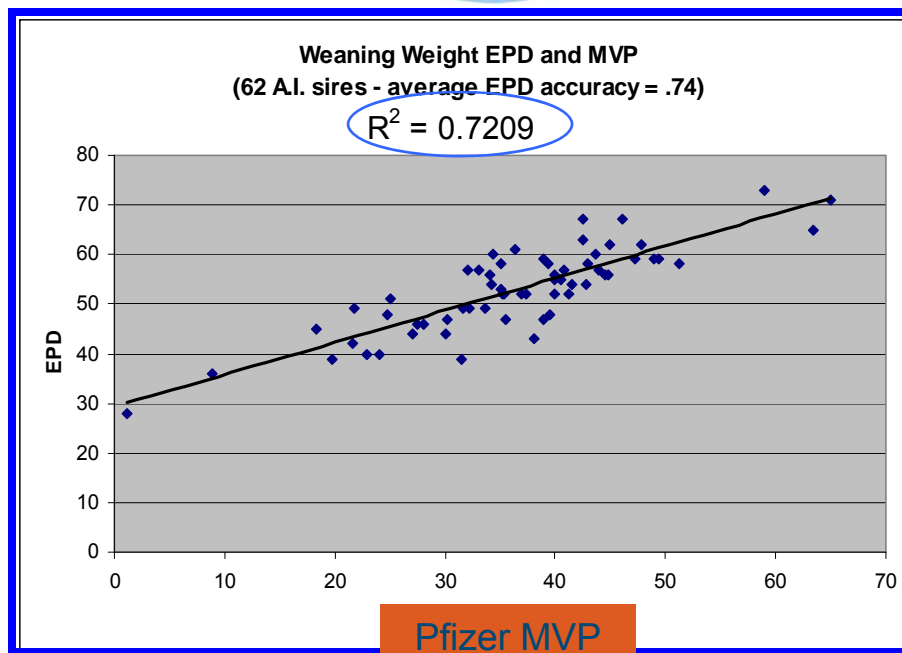
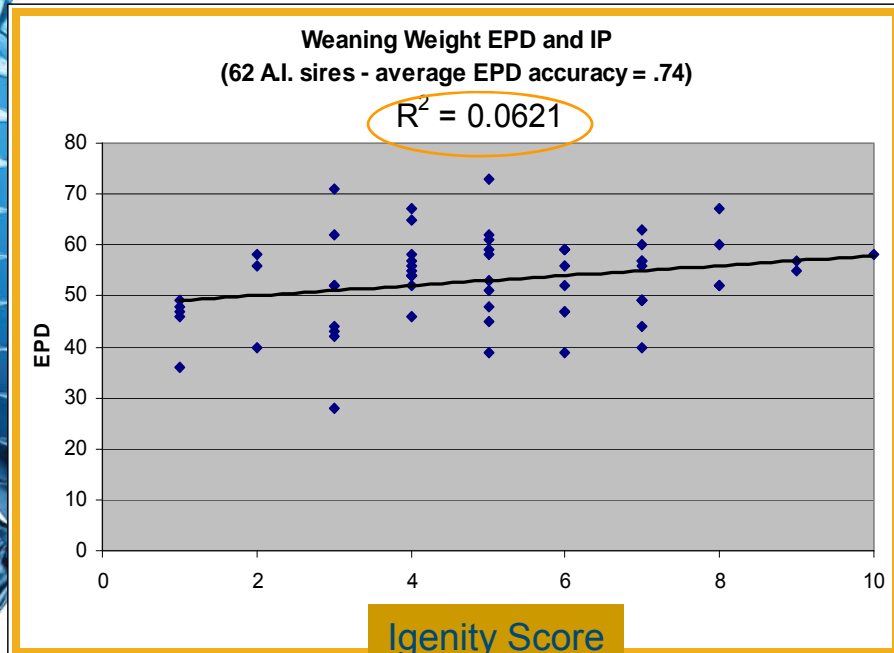


■ Explained ■ Unexplained

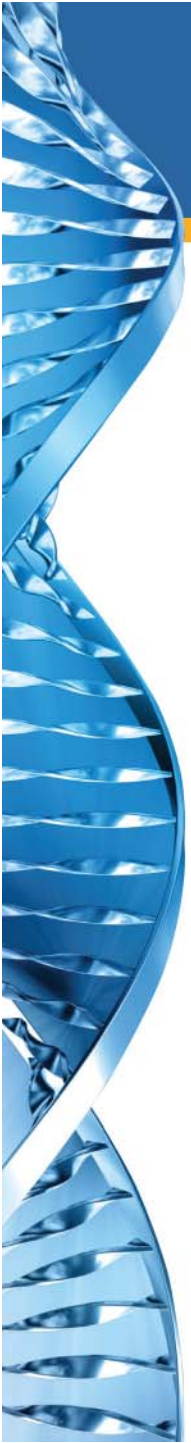
HD 50K vs. IP – Weaning Weight

Weaning Weight Direct

Igenity



HD50K

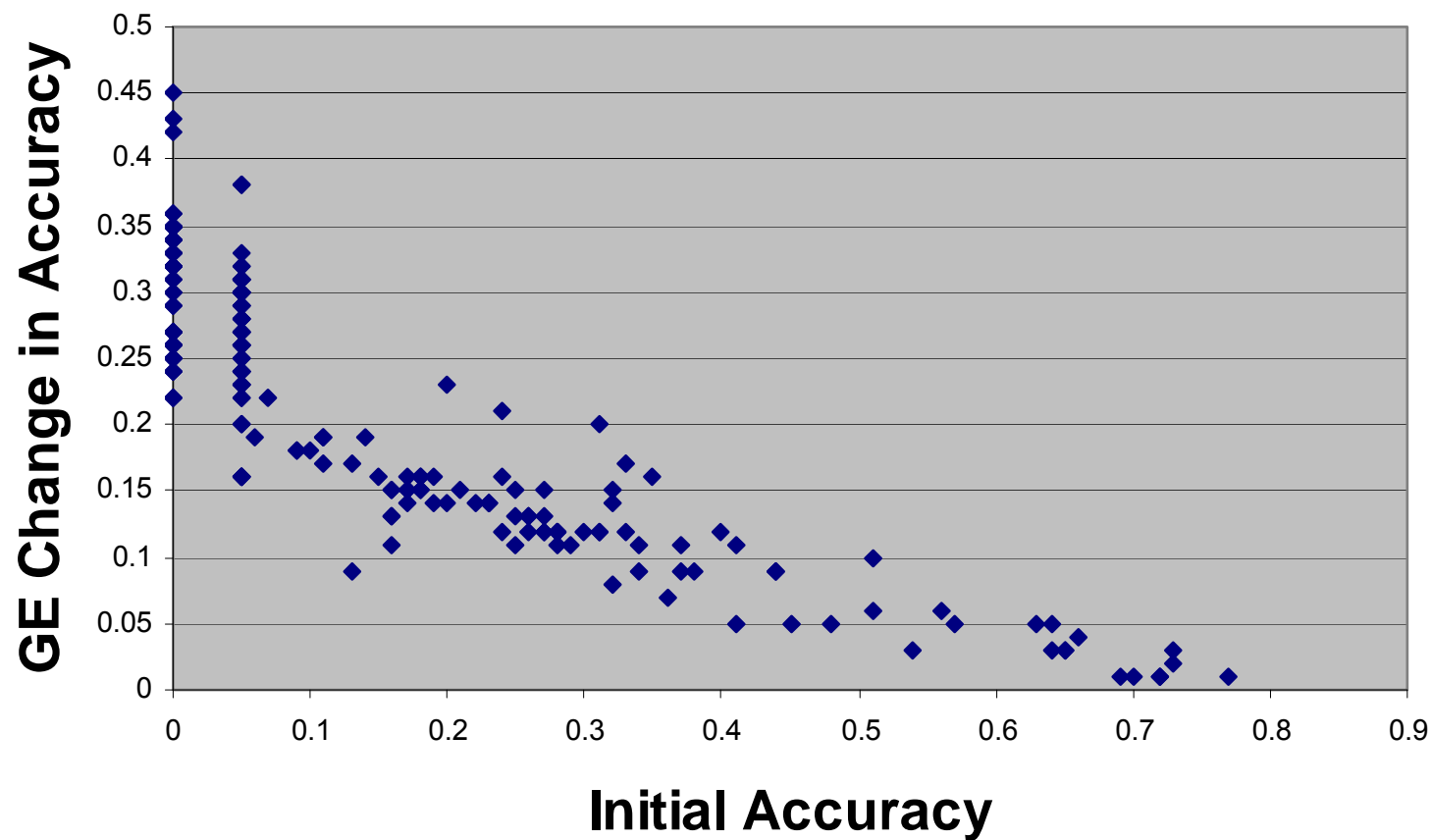
- 
- Notably more dependable ranking
 - Better identification of outliers – curve-benders, elite maternal and carcass sires
 - Impacts accuracy, intensity and generation interval
 - Updatable without re-test
 - Parentage included!



EPDs Before and After HD 50K RESIDUAL AVERAGE DAILY GAIN (RADG)

Residual Average Daily Gain (RADG)

RADG - HD 50K Enhanced Accuracy



Residual Average Daily Gain (RADG)

RADG - HD 50K Enhanced EPD

