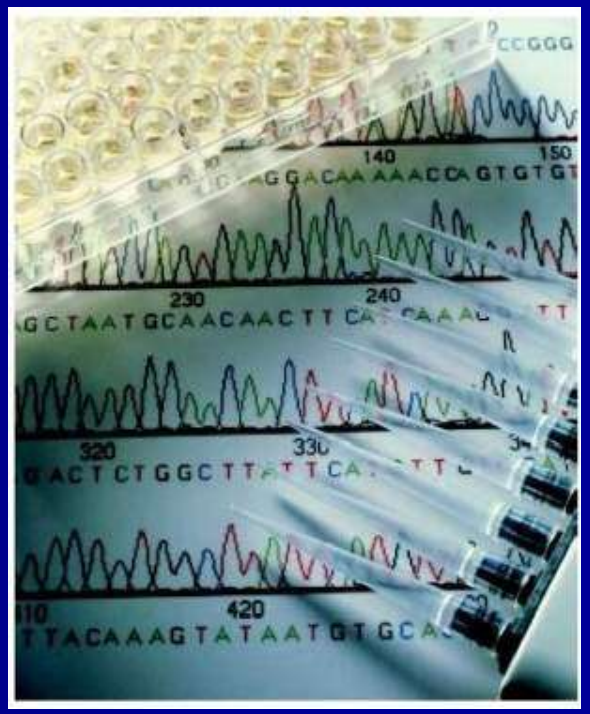
What is the value of DNA testing?

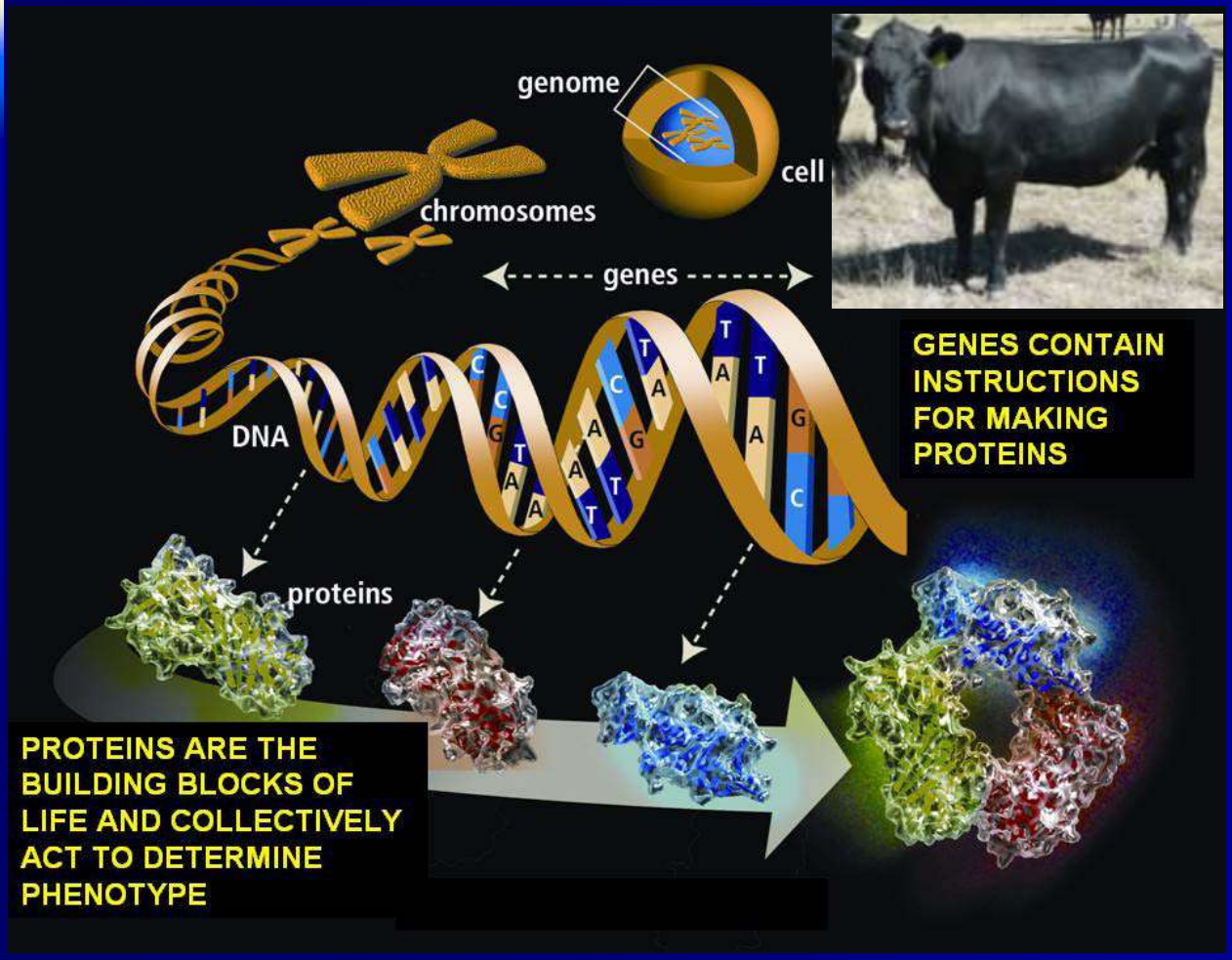
Alison Van Eenennaam, Ph.D.

Cooperative Extension Specialist
Animal Biotechnology and Genomics
University of California, Davis
alvaneenennaam@ucdavis.edu
(530) 752-7942



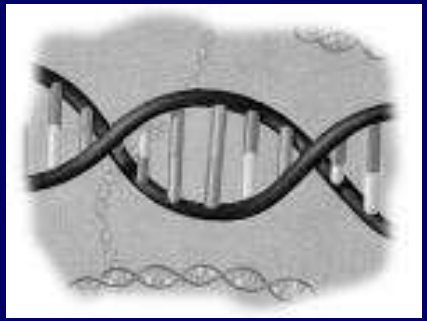
animalscience.ucdavis.edu/animalbiotech

The bovine genome is similar in size to the genomes of humans, with an estimated size of 3 billion base pairs.

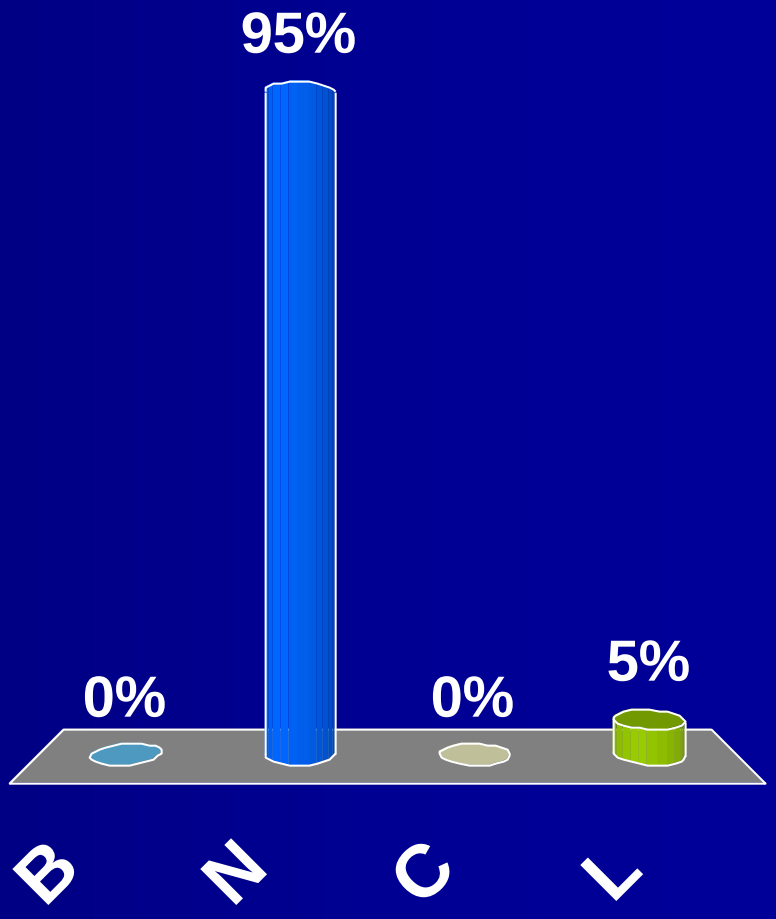


50K SNP chip assays 50,000 SNPS spread throughout genome

? This is a picture of D _ A.



1. B
2. N
3. C
4. L

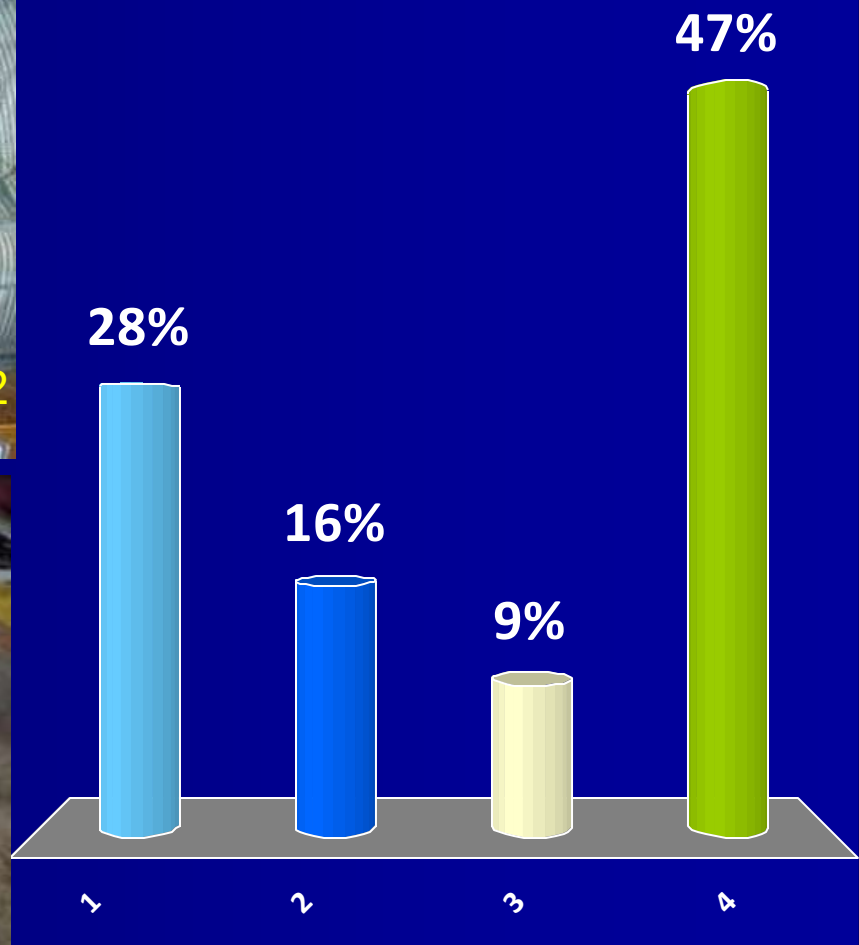


Given this information……



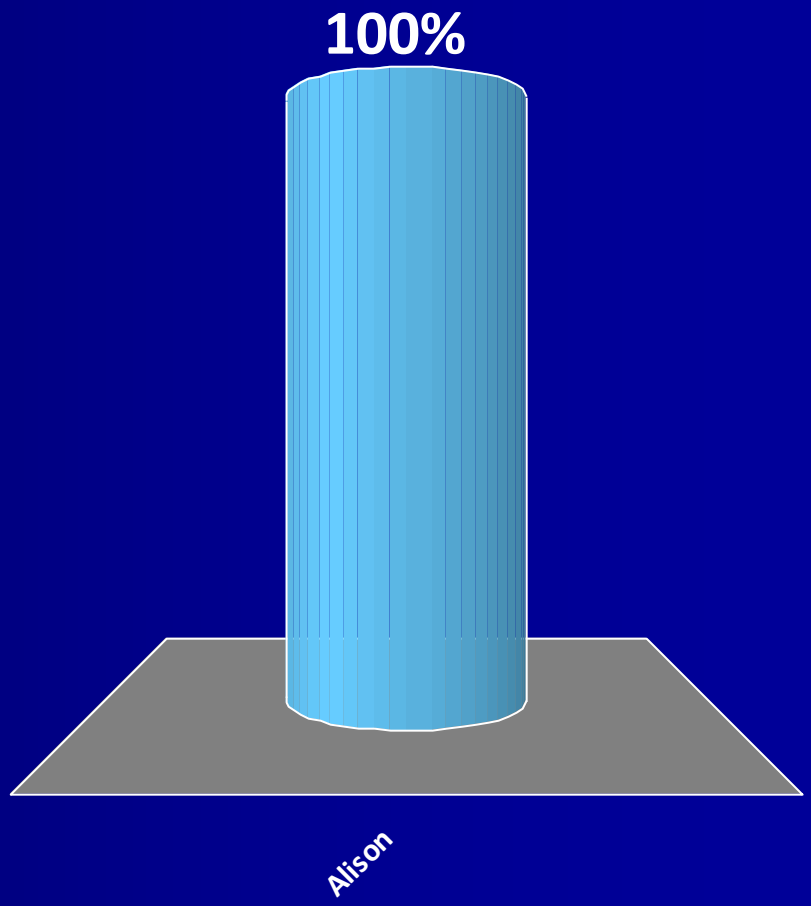



? Which do you think is my dog?



? Who would you prefer to give this talk?

1. Alison
2. Wayne

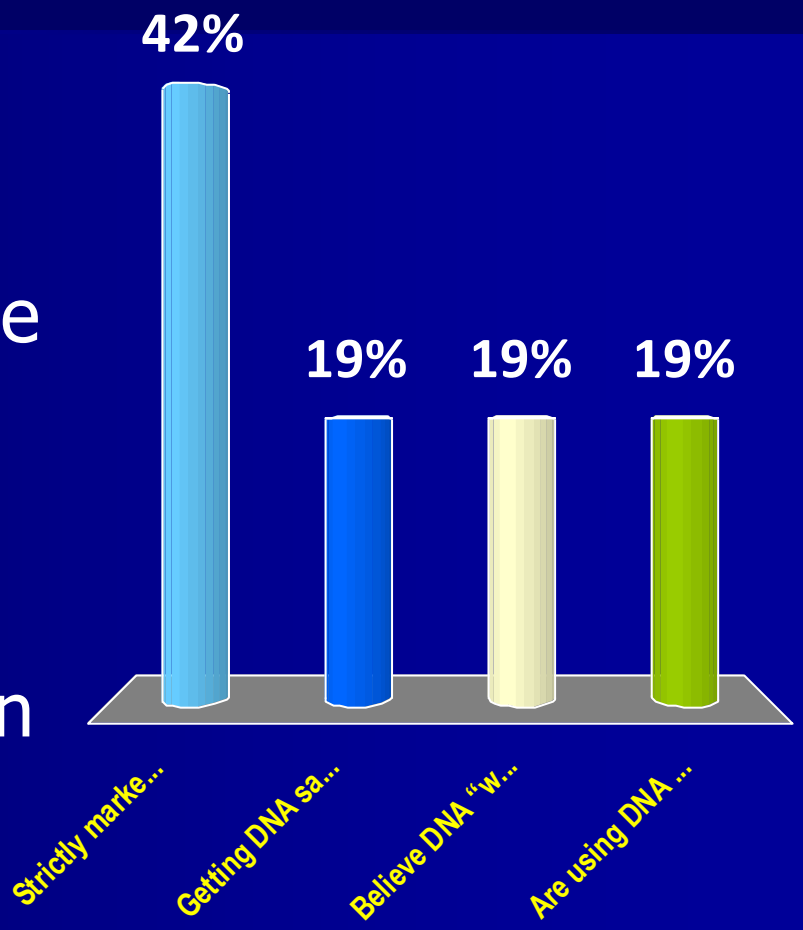


DNA testing has been successfully used to test for simple (qualitative) traits – genetic defects, coat color, polled/horned

TRAIT	Igenity "Profile"	Pfizer "50K"	MMI "Breed-Tru"
Average Daily Gain	X	X	X
Net Feed Intake		X	
Dry matter intake		X	
Residual feed intake	X		
Tenderness	X	X	X
Calving Ease (Direct)		X	
Birth weight		X	
Weaning Weight		X	
Yearling Weight	X		
Calving ease (maternal)	X	X	
Milking Ability		X	
Heifer pregnancy rate	X		
Docility	X		
Stayability	X		
Carcass weight		X	
Backfat thickness	X	X	X
Ribeye area	X	X	X
Marbling score	X	X	X
Yield Grade	X		X
Percent Choice	X		
COST	**US$58-78**	**US$69-129**	**US$65/145**

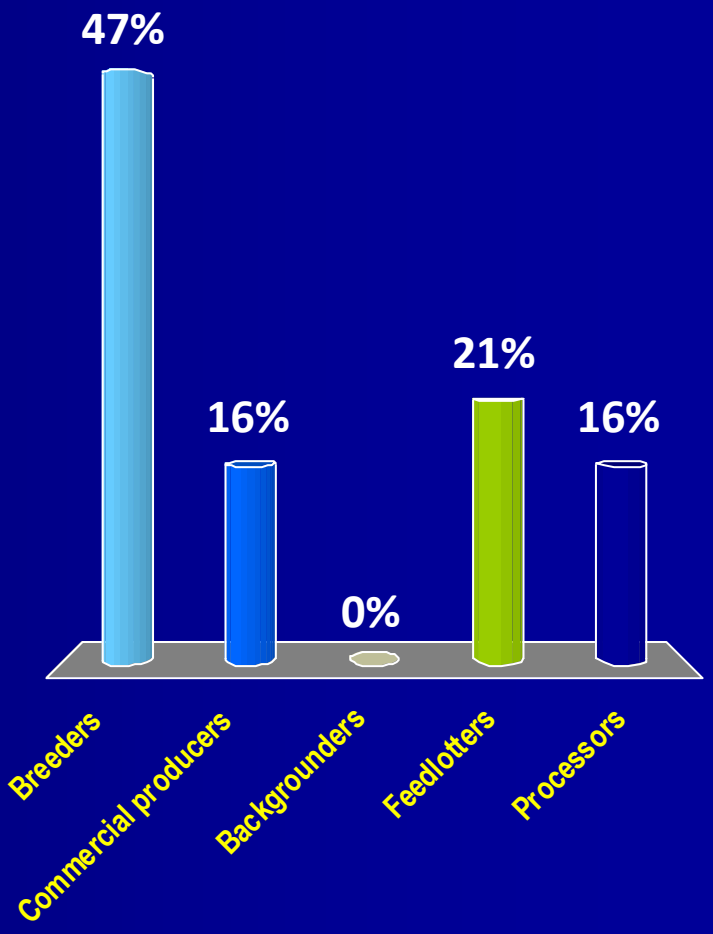
? Why do you think producers are currently using DNA tests?

1. Strictly marketing
2. Getting DNA sample is easier than performance recording
3. Believe DNA "works" better than EBVs
4. Are using DNA results in conjunction with other data (e.g. EBVs) for marker-assisted selection



? Which sector do you think stands to benefit the most from DNA testing?

1. Breeders
2. Commercial producers
3. Backgrounders
4. Feedlotters
5. Processors



igenity®

STAKEHOLDER	GOALS/NEEDS	VALUABLE INSIDE INFORMATION FROM AN IGENITY PROFILE
Seedstock	• Improve feed efficiency • Improve fertility and longevity • Avoid temperament problems • Differentiate breeding stock • Improve breed shortcomings • Enhance breed strengths • Select for antagonistic traits • Uncover new marketing opportunities • Increase weaning weights	• Residual feed intake • Heifer pregnancy rate • Stayability (longevity) • Calving ease • Docility • Carcass composition traits • Horned/polled • Coat color
Cow/calf	• Improve feed efficiency • Improve fertility and longevity • Confirm superior genetic potential in bulls • Select calving ease heifers and sires • Avoid temperament problems • Differentiate calves at market or select for retained ownership • Select replacement heifers with confidence • Validate management practices • Increase weaning weights and efficiently raise heavy calves • Improve carcass traits • Track sire performance	• Residual feed intake • Heifer pregnancy rate • Stayability • Calving ease • Docility • Carcass composition traits • BVD-PI status • Commercial Ranch Genetic Evaluation
Backgrounding	• Confident purchasing decisions • Most efficient sorting and management • Confirmation of superior genetics • Produce value-added and healthy calves for resale	• Residual feed intake • Carcass composition traits (for pass-along value) • BVD-PI status
Feeder	• Confident purchasing decisions • Optimize end points • Use effective sorting/management tools • Better sort for grid requirements • Consistent cattle • Manage antagonistic traits	• Residual feed intake • Carcass • Yield grade and quality grade components • Tenderness potential • BVD-PI status
Processor	• Confident purchasing decisions • Meet branded program guidelines • Sorting cattle based on individual traits prior to slaughter • Minimize waste and inefficiencies	• Carcass composition traits • Tenderness potential

Nothing communicates value throughout the production chain like IGENITY.

http://us.igenity.com/beef/Applications.aspx

IGENITY® Price Guide

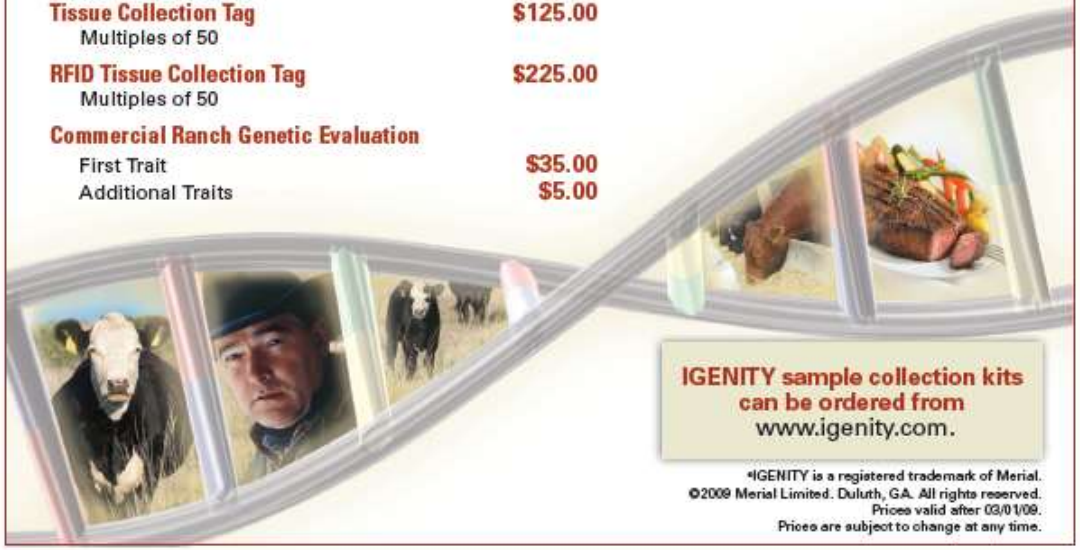
for beef

USD$

IGENITY® Profile	**$38.00**
Carcass Composition	
Tenderness, % Choice/Quality Grade, Yield Grade, Ribeye Area, Fat Thickness, Marbling.	
Maternal Traits	
Heifer Pregnancy Weight, Calving Ease, Stayability	
Docility	
Average Daily Gain	
Add BVD PI to the IGENITY Profile	**$3.00**
Available for tissue collectors only	
Add Coat Color to the IGENITY Profile	**$5.00**
Add Multi-Sire Parentage to the IGENITY Profile	**$10.00**
Add Myostatin to the IGENITY Profile	**$15.00**
Add Arthrogryposis Multiplex to the IGENITY Profile	**$26.00**
Add Feed Efficiency to IGENITY Profile	**$20.00**
Available for Bos indicus and Bos taurus.	
Add Horned/Polled to IGENITY Profile	**$50.00**
See the IGENITY Order Form for breed specifications.	
IGENITY Multi-Sire Parentage *without* the IGENITY Profile	**$25.00**
IGENITY Arthrogryposis Multiplex *without* the IGENITY Profile	**$26.00**
Tissue Collection Tag Multiples of 50	**$125.00**
RFID Tissue Collection Tag Multiples of 50	**$225.00**
Commercial Ranch Genetic Evaluation	
First Trait	**$35.00**
Additional Traits	**$5.00**

The IGENITY profile.

Inside information to help you achieve goals faster.



IGENITY sample collection kits can be ordered from www.igenity.com.

Lead Today with 50K

1. Birth weight
2. Weaning weight
3. Weaning maternal (milk)
4. Calving ease direct
5. Calving ease maternal
6. Marbling
7. Backfat thickness
8. Ribeye area
9. Carcass weight
10. Tenderness
11. Postweaning average daily gain
12. Daily feed intake
13. Feed efficiency (net feed intake)

Pfizer Animal Health
Animal Genetics

Lead Today with 50K

Take selection and marketing decisions to the next level by taking advantage of HD 50K, the first commercially available predictions utilizing a High-Density panel of more than 50,000 markers. Available initially for Angus owners, a one-time sample submission provides the opportunity for ongoing access to MVPs for future unique traits and technology advancements. The suite of 14 genomic trait predictions, including the beef industry's first DNA-based economic index, provides MVPs for economically important traits not available as EPDs like average daily gain, dry matter intake, net feed intake and tenderness, as well as many that complement EPDs.

For more information about HD 50K:

HD 50K Overview

HD 50K Customer Reporting Overview

FAQs

HD 50K Television Ad

Post a Question

Order a Test Kit

Cost per test

1-24	US$129
25 +	US$119

Existing samples reanalyzed

1-24	US$ 79
25+	US$ 69

Users need to know:

- Does it work?
- Is it useful?
- Does it pay?

How can we begin to think about the value associated with DNA testing?

What is it being used for?

DNA-assisted **sorting** to enable management of groups to decrease costs or increase income from sorted groups or target specific markets

OR

DNA-assisted **selection** to improve accuracy of traits already in selection objective, or to enable inclusion of new difficult-to-measure traits

VanEomics™

- **GENDER BENDER™ TEST**

USE : Sort pens into steers and heifers using the DNA-gender test – 100% accurate!!!!

- Does it work?
- Is it useful?
- Does it pay?

VanEomics™

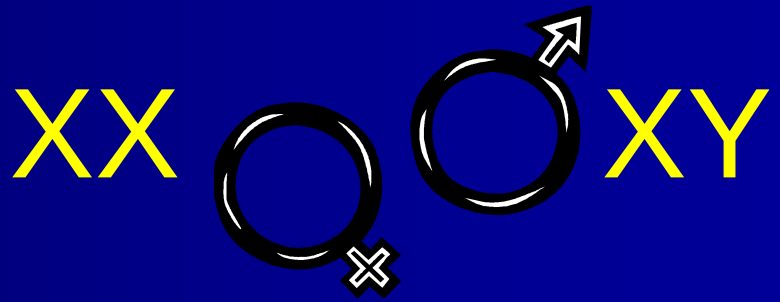
NEW!

GENDER BENDER™ TEST

Do you have information to determine

–Does it Work?

- Independent validation studies carried out in three countries have found that this Y-chromosome-based test is 100% accurate



VanEomics™

GENDER BENDER® TEST

Do you have information to determine

–Is it Useful?

Would it be a useful to sort heifers and steers into separate pens?

VanEomics™

GENDER BENDER® TEST

USE: Sort pens into steers and heifers using the DNA-gender test – 100% accurate!!!!!

Do you have information to determine

–Does it Pay?

VanEomics™

PRO-CHOICE® TEST

USE: Lets you sort cattle into different marbling score groups

Do you have information to determine

- Does it work?
- Is it possible?
- Does it pay?

VanEomics™

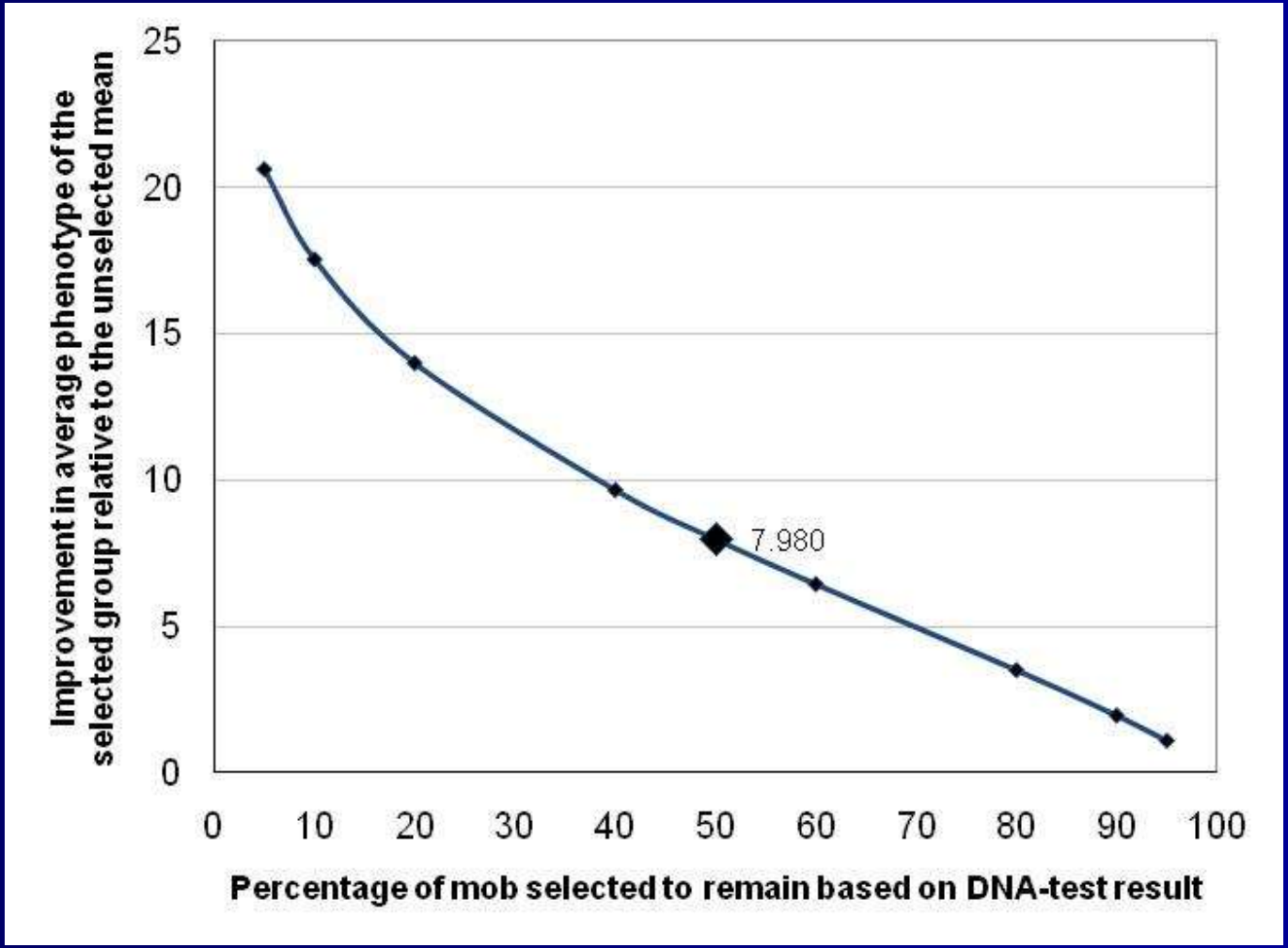
PRO-CHOICE® TEST

Does it work?

Independent validation studies carried out in three countries have reported significant association of MBV with trait

1. Variance of the **MBV** (σ^2_{MBV}) = 100
2. Regression coefficient of phenotype on MBV (b) = 1

Hypothetical example σ_{MBV}=10, Regression coefficient (b) = 1



Home > DNA markers > Australian beef DNA results

Australian beef DNA results

As part of its role in delivering DNA markers to the Australian beef industry, Beef CRC has agreed to independently test new panels of DNA markers as they are commercialised by companies such as Pfizer Animal Genetics, Igenity /Merial and Metamorphix Inc.

Results of all independent testing of commercially-available DNA markers undertaken by Beef CRC will be presented on this site, outlining the size and direction of effect and the amount of genetic variation that is accounted for by each panel of markers for the different traits (e.g. marbling, feed efficiency, tenderness etc).

Additional information is provided to help beef businesses interpret the results for themselves to determine the value to their own businesses from an investment in the particular panel of DNA markers.

Those decisions very much depend on the individual business' attitude to risk and can only be made effectively by the individual business.

It is possible that the panel of markers has also been independently evaluated in North American herds by the US National Beef Cattle Evaluation Consortium, so for further information on the size and direction of effect of the markers in those populations, please visit http://www.ansci.cornell.edu/nbcec/

Pfizer GeneStar results

Pfizer interpretation

Success Stories

Beef CRC project aimed at improving beef industry profitability gains national recognition

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			Phenotypic parameters						Genetic Parameters		
Test	Trait	Data	N	σ^2_P	b (se)	P	r_P	r_P^2	h^2 (se)	r_g (se)	r_g^2
Pfizer MVP Marbling	IMF	1	Phenot = 3,594 MVP = 703	2.035 0.035	0.255 (0.30)	0.20	0.033 (0.04)	0.001 (0.003)	0.39 (0.06)	0.054 (0.06)	0.003 (0.007)
		2	Phenot = 3,524 MVP = 668	0.978 0.027	0.231 (0.24)	0.17	0.038 (0.04)	0.001 (0.003)	0.37 (0.06)	0.064 (0.07)	0.004 (0.009)
		3	Phenot = 876 MVP = 253	0.767 0.026	0.028 (0.33)	0.47	0.005 (0.06)	0.000 (0.001)	0.23 (0.10)	0.011 (0.13)	0.000 (0.003)
		4	Phenot = 878 MVP = 225	0.717 0.022	0.415 (0.39)	0.14	0.072 (0.07)	0.005 (0.010)	0.37 (0.11)	0.121 (0.11)	0.015 (0.027)
Pfizer MVP Marbling	MSA MS	1	Phenot = 1,454 MVP = 710	0.281 0.035	0.218 (0.20)	0.14	0.077 (0.07)	0.006 (0.011)	0.35 (0.09)	0.131 (0.12)	0.017 (0.031)
		2	Phenot = 1,808 MVP = 670	0.236 0.027	0.171 (0.15)	0.13	0.057 (0.05)	0.003 (0.006)	0.37 (0.08)	0.096 (0.08)	0.009 (0.015)
		3	Phenot = 594 MVP = 253	0.211 0.026	0.024 (0.22)	0.46	0.009 (0.08)	0.000 (0.001)	0.31 (0.13)	0.016 (0.14)	0.000 (0.004)
		4	Phenot = 636 MVP = 225	0.229 0.022	0.262 (0.23)	0.13	0.080 (0.07)	0.006 (0.011)	0.19 (0.11)	0.189 (0.17)	0.036 (0.064)
Pfizer MVP Tenderness	LDSF	1	Phenot = 3,322 MVP = 659	0.433 0.088	0.240 (0.20)	0.11	0.049 (0.04)	0.002 (0.004)	0.08 (0.04)	0.170 (0.14)	0.029 (0.048)
		2	Phenot = 3,254 MVP = 585	0.612 0.160	0.662 (0.20)	<0.001	0.154 (0.04)	0.024 (0.012)	0.30 (0.06)	0.283 (0.08)	0.080 (0.045)
		3	Phenot = 785 MVP = 253	0.658 0.142	0.304 (0.35)	0.19	0.064 (0.07)	0.004 (0.009)	0.26 (0.10)	0.126 (0.14)	0.016 (0.035)
		4	Phenot = 762 MVP = 225	0.871 0.142	1.658 (0.40)	<0.001	0.302 (0.07)	0.091 (0.042)	0.31 (0.10)	0.547 (0.13)	0.299 (0.142)
Pfizer MVP Feed Effi.	NFI	1	Phenot = 785 MVP = 706	0.840 0.079	0.300 (0.13)	0.01	0.092 (0.04)	0.008 (0.007)	0.14 (0.11)	0.248 (0.15)	0.062 (0.074)
		2	Phenot = 687 MVP = 671	0.687 0.056	0.366 (0.15)	0.01	0.104 (0.04)	0.011 (0.008)	0.21 (0.13)	0.232 (0.11)	0.054 (0.051)
		3	Phenot = 254 MVP = 253	1.110 0.082	-0.074 (0.27)	0.81	-0.020 (0.07)	0.000 (0.003)	0.21 (0.25)	-0.044 (0.16)	0.002 (0.014)
		4	Phenot = 215 MVP = 225	0.958 0.056	-0.131 (0.33)	0.86	-0.032 (0.07)	0.001 (0.004)	0.37 (0.26)	-0.053 (0.14)	0.003 (0.015)

VanEomics™

PRO-CHOICE® TEST

USE: Lets you sort cattle into different marbling score groups

– Is it Useful

Possible Management Options

- Different days on feed
- Different cost rations
- Different implant strategy
- Target different markets

VanEomics™

PRO-CHOICE® TEST

USE: Lets you sort cattle into different marbling score groups

Does it Pay?

If a DNA marker test is $10/head - to break even, the management measures implemented based on the DNA test results need to either save $10/head in costs or result in an extra $10/head

MMI GENOMICS, INC.

BREED TRU

DNA VERIFIED

FEATURES

- Contains 128 DNA markers where each marker is highly associated with expression of marbling score
- Measures the cumulative effects of all 128 markers associated with marbling
- Results are expressed as the Molecular Genetic Value (MGV) which can be utilized to rank animals by their genetic potential
- Animals can be tested at any age
- Validated in Angus (validation in other breeds is underway)

BENEFITS

- The most powerful and comprehensive DNA selection tool currently available for marbling
- Accounts for a significant proportion of total observed genetic variation for marbling
- Results are easy to utilize and incorporate into any existing breeding program
- Can be used to make early selection and breeding decisions
- Provides accurate and reliable results for ranking and/or selection of animals

Work in Your Best Genes

TRU-MARBLING™

One in a series of break-through products that will advance breeding practices in the cattle industry, *Tru-Marbling*™ is a powerful and comprehensive DNA selection tool that can determine the genetic potential of animals to express marbling. In a collaborative research program between Cargill and MMI Genomics, an innovative scientific approach was used on over 4000 feedlot animals to identify the majority of regions throughout the bovine genome that have an effect on this economically important trait.

Tru-Marbling™ is a DNA-based genetic test that contains a panel of 128 unique DNA markers, each one highly associated with the expression for marbling score and quality grade. By measuring the cumulative effects for each of these 128 markers, *Tru-Marbling*™ accounts for a significant proportion of the total genetic variation for this complex metabolic trait—the first DNA-based product to do so!

Tru-Marbling™ is an advanced and revolutionary tool that will allow cattle producers to make early breeding decisions that **increase the accuracy** of selection and **decrease the age** at which animals can be selected.

The results? Rapid improvement of marbling within herds and the ability to determine the "Tru" genetic potential of animals.

PROVEN RESULTS

Tru-Marbling™ has been validated in both commercial cross-bred feeder cattle populations and in Angus cattle.

The validation in Angus was conducted using samples from the National Carcass Merit Project, representing Angus sires bred to Angus-based commercial cows. While this is a small population of animals, the data indicate that *Tru-Marbling*™ **accounts for 70% of the genetic variation** observed in this population.

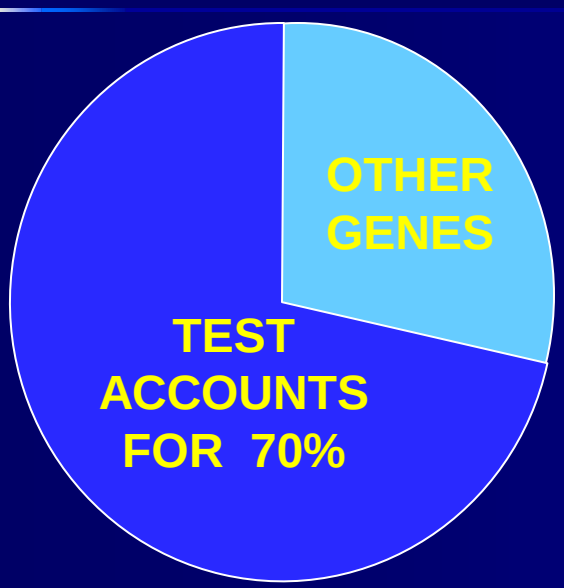
No. of samples:	**414**
Heritability*:	**0.36**
No. of markers:	**128**
Phenotypic variation explained (R^2):**	**0.25**
As a percent of Heritability	**70%**

** Angus National Cattle Evaluation, Spring 2007*
*** estimated from a model that included contemporary group and MGV*

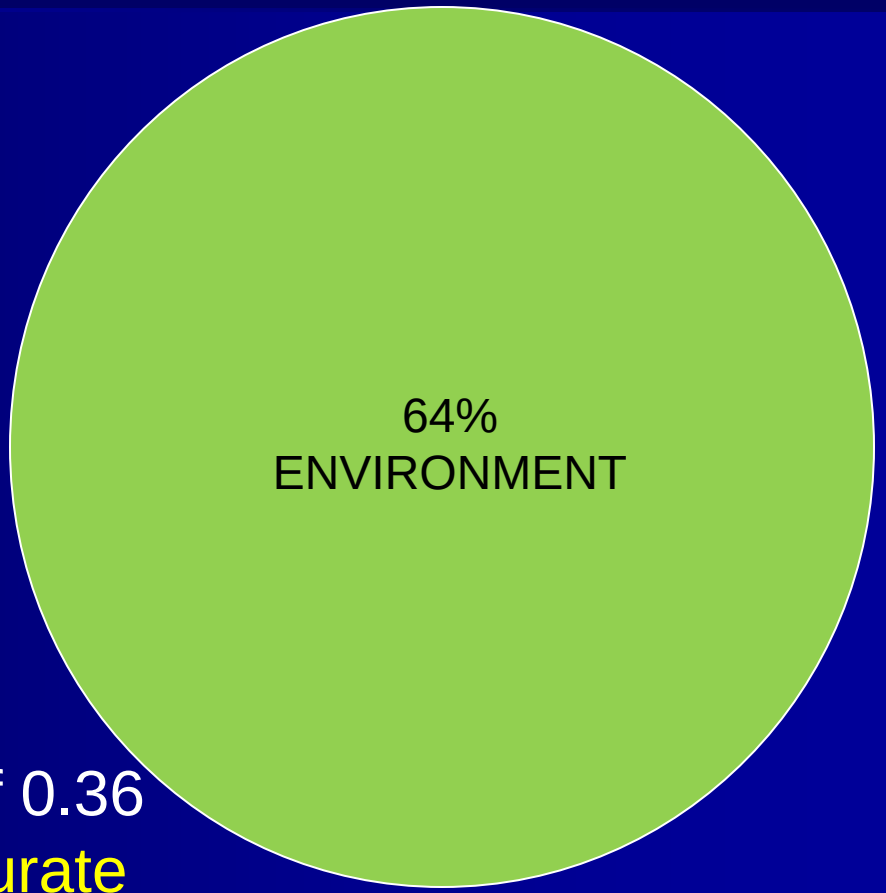
Tru-Marbling™ has also been validated against commercial cross-bred feeder cattle populations.

Explains 25% of the phenotypic variation (70% of the genetic variation) in marbling with 128 markers

"TRU-MARBLING" EXPLAINS ~25% of PHENOTYPIC MARBLING SCORE VARIATION



36%
GENETICS



Marbling has a heritability (h^2) of 0.36
So even a test that is 100% accurate
will only explain 36% of the phenotypic variation

Characteristics of the four marker-assisted management sort groups

Table 1. Reimplant and Carcass Characteristics of the four sort groups.

	Group 1	Group 2	Group 3	Group 4
Reimplant				
Weight	1109	1071	987	1096
Level of Fatness	+++	++	Avg.	+++
MS MGV	2.9	1.48	-1.59	23.0
Carcass				
HCW	831	883	908	863
REA	13.2	14.1	14.6	13.2
BF	0.47	0.45	0.43	0.53
MS	398	407	418	486
Yield	63.0	63.9	64.8	63.8
YG	3.0	2.9	2.8	3.3
% Choice	40.0	42.7	45.7	77.4

Data is based on 88,090 head.

Data presented by Bill Kolath, Cargill Meat Solutions, BIF 2009

Friday, October 30, 2009

Biotech

Lost contract takes major bite out of MetaMorphix

Washington Business Journal - by Vandana Sinha Staff Reporter

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A Calverton maker of genetic tests for animals has lost a contract with its largest partner, causing the company to pull back its spending reins and look for replacement revenue.

MetaMorphix Inc., whose genetic tests can be used to determine everything from a mutt's parentage to a cow's proclivity for tender meat, said Minneapolis multibillion-dollar agricultural player **Cargill Inc.** will stop using one of the local company's key genetic tests at its cattle feedlots.

After agribusiness giant Cargill canceled a contract, MetaMorphix CEO Ed Quattlebaum is focused on cutting expenses and adding clients.

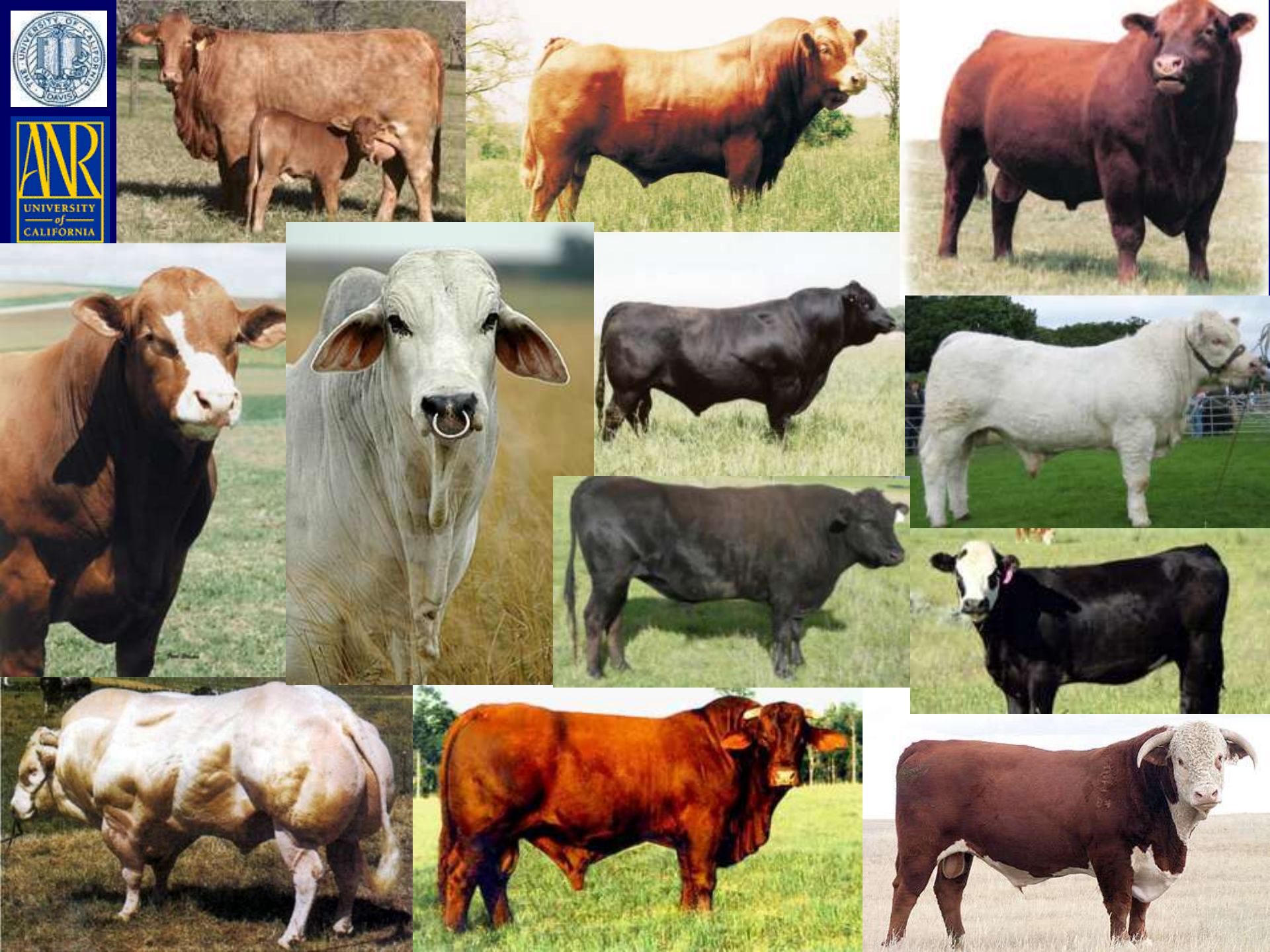
View Larger

MetaMorphix officials said Cargill, billed as the country's third-largest feedlot operator, told them the test was too expensive to justify in a recession.

The genetic test predicted which cows among the approximately 700,000 entering Cargill's feedlots each year would yield the most high-quality beef.

SUMMARY: Information needed to determine the value of DNA tests for marker-assisted management

1. Variance of the MBV (σ^2_{MBV})
2. Regression coefficient of phenotype on MBV (b)
3. How the group is to be sorted (e.g. sort into two halves; or remove bottom 5%)
4. Average phenotype of the group prior to sorting
5. Cost savings or extra value associated with the grouping /culling
6. Cost of the test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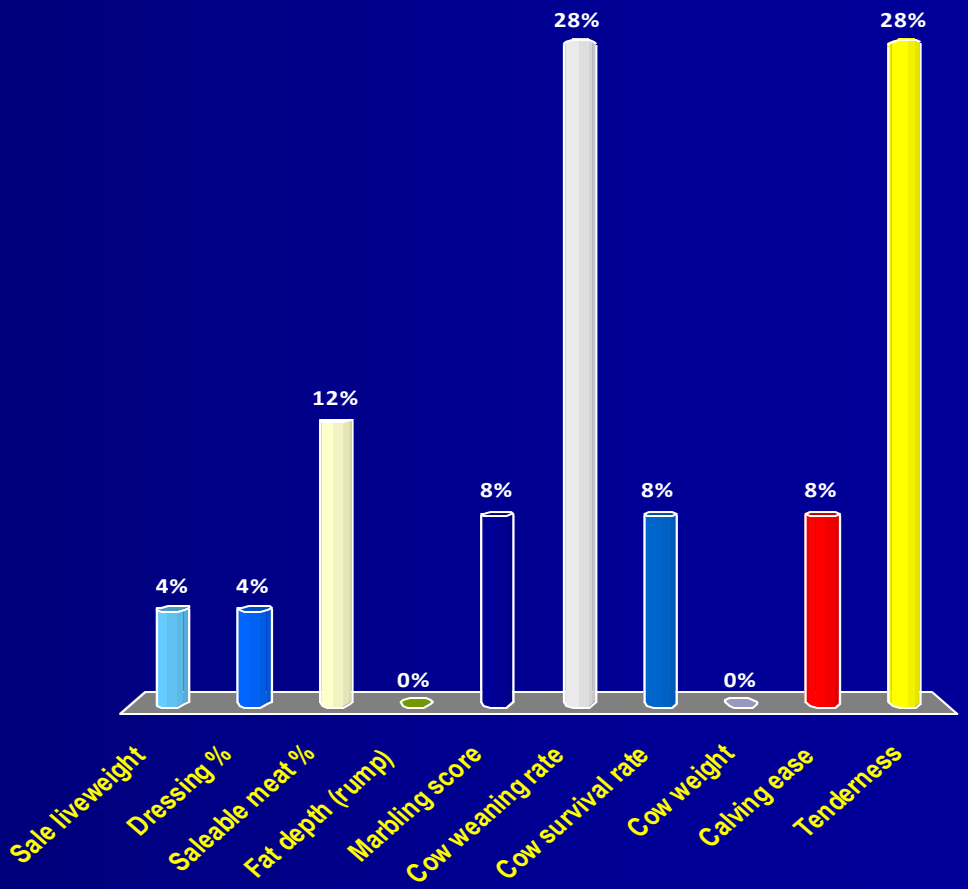
Marker-assisted selection (MAS)

The process of using the results of DNA testing to assist in the selection of individuals to become parents in the next generation. The genotypic information provided by DNA testing should help to **improve the accuracy** of selection and increase the rate of genetic progress by identifying animals carrying desirable genetic variants for a given trait at an earlier age.

? For which objective trait do you think marker-assisted selection would have the greatest value?

1. Sale liveweight
2. Dressing %
3. Saleable meat %
4. Fat depth (rump)
5. Marbling score
6. Cow weaning rate
7. Cow survival rate
8. Cow weight
9. Calving ease
10. Tenderness



VanEomics™

PRO-CHOICE® TEST

USE: Lets you more accurately **select** those animals carrying good genes for marbling!

Do you have information to determine

Does it work?

- What is the accuracy of the test (i.e. genetic correlation between MBV and the trait)?

FEATURES

- Contains 11 DNA markers where each marker is highly associated with expression of tenderness in meat products
- Measures the cumulative effects of all 11 markers associated with meat tenderness
- Results are expressed as the Molecular Genetic Value (MGV) which can be utilized to rank animals by their genetic potential
- Animals can be tested at any age
- Validated in Angus (validation in other breeds is underway)

BENEFITS

- The most powerful and comprehensive DNA selection tool currently available for tenderness
- Accounts for a significant proportion of total observed genetic variation for tenderness
- Results are easy to utilize and incorporate into any existing breeding program
- Can be used to make early and accurate selection and breeding decisions
- Provides accurate and reliable results for ranking and/or selection of animals

MMI Genomics, Inc.
BREED TRU
DNA VERIFIED
PROVEN TECHNOLOGY
PROVEN RESULTS
PROVEN PROFITS

1756 Picasso Avenue
Davis, CA 95618
1.800.311.8808
www.breedtru.com

Work in Your Best Genes

TRU-TENDERNESS™

One in a series of break-through products that will advance breeding practices in the cattle industry, *Tru-Tenderness*™ is a powerful and comprehensive DNA selection tool that can determine the genetic potential of animals to produce tender meat. In a collaborative research program between Cargill and MMI Genomics, an innovative scientific approach was used on over 4000 feedlot animals to identify the majority of regions throughout the bovine genome that have an effect on this valuable consumer trait.

Tru-Tenderness™ is a DNA-based genetic test that contains a panel of 11 unique DNA markers, each one highly associated with expression for tender meat. By measuring the cumulative effects for each of these 11 markers, *Tru-Tenderness*™ accounts for a substantial proportion of the total genetic variation for this complex metabolic trait.

Since tenderness can only be measured in harvested cattle it is difficult, time consuming and expensive to make genetic progress for this trait using traditional genetic improvement tools. *Tru-Tenderness*™ changes this paradigm by allowing producers to accurately assess the genetic potential of their breeding stock to produce tender meat. In addition, *Tru-Tenderness*™ also shortens the interval for making genetic progress because it can be used to test animals of any age.

Tru-Tenderness™ is an advanced and revolutionary tool that will allow cattle producers to make early breeding decisions that **increase the accuracy** of selection and **decrease the age** at which animals can be selected.

The results? Rapid improvement of tenderness within herds and the ability to determine the "Tru" genetic potential of animals.

PROVEN RESULTS

Tru-Tenderness™ has been validated in Angus using samples from the National Carcass Merit Project, representing Angus sires bred to Angus-based commercial cows. While this is a small population of animals, the data indicate that *Tru-Tenderness*™ accounts for 100% of the genetic variation observed in this population as measured by Warner-Bratzler shear force.

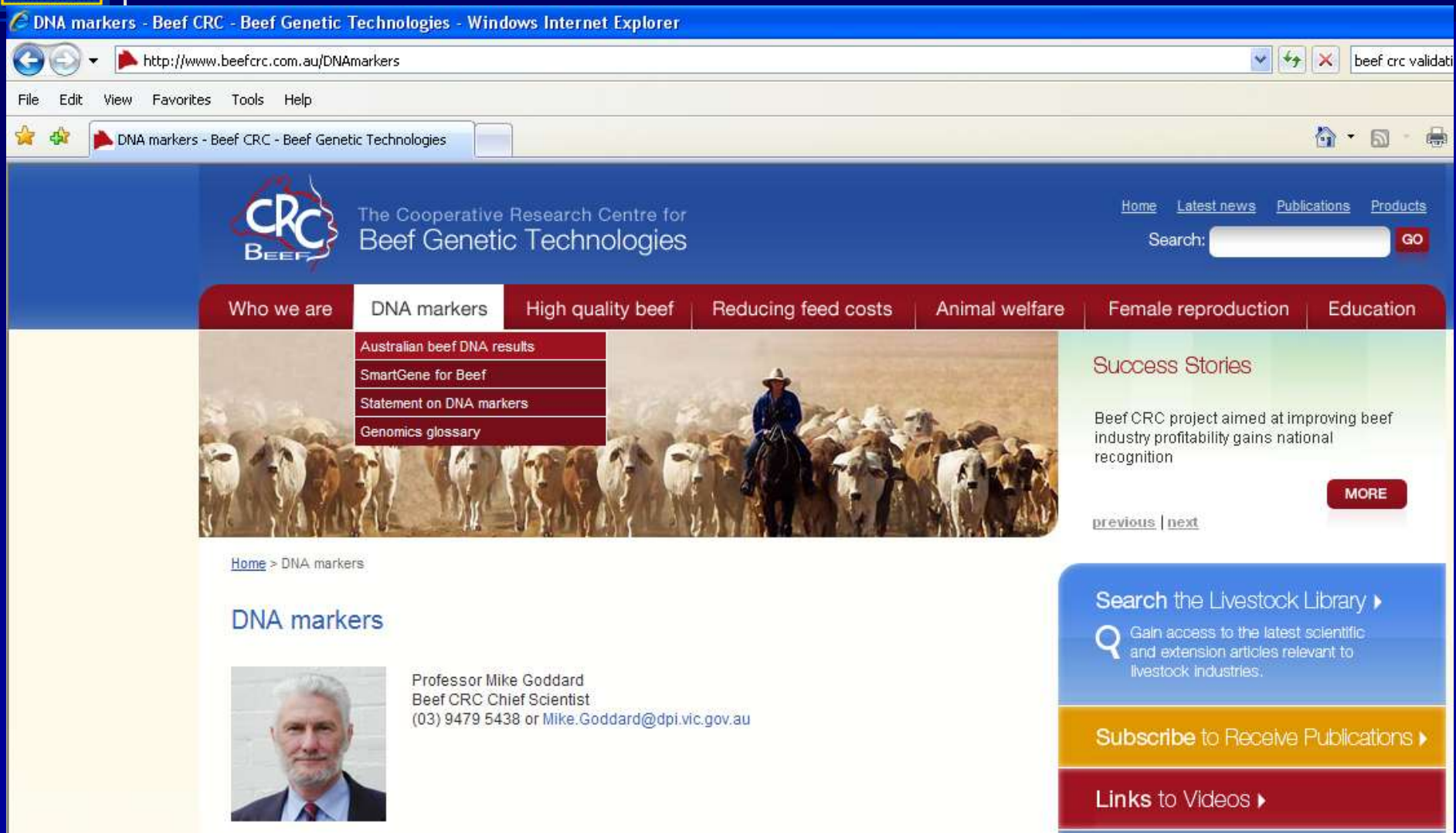
No. of samples:	**407**
Heritability*:	**0.35**
No. of markers:	**11**
Phenotypic variation explained (R^2):**	**0.38**
As a percent of Heritability	**100%**

* as estimated in Minick et al, 2004, Can. J. Anim. Sci. 84:599

100% accurate

Explains 100% of the genetic variation in marbling with 11 markers

The beef CRC website in Australia is directly reporting accuracy and proportion of the additive genetic variation accounted for by the test



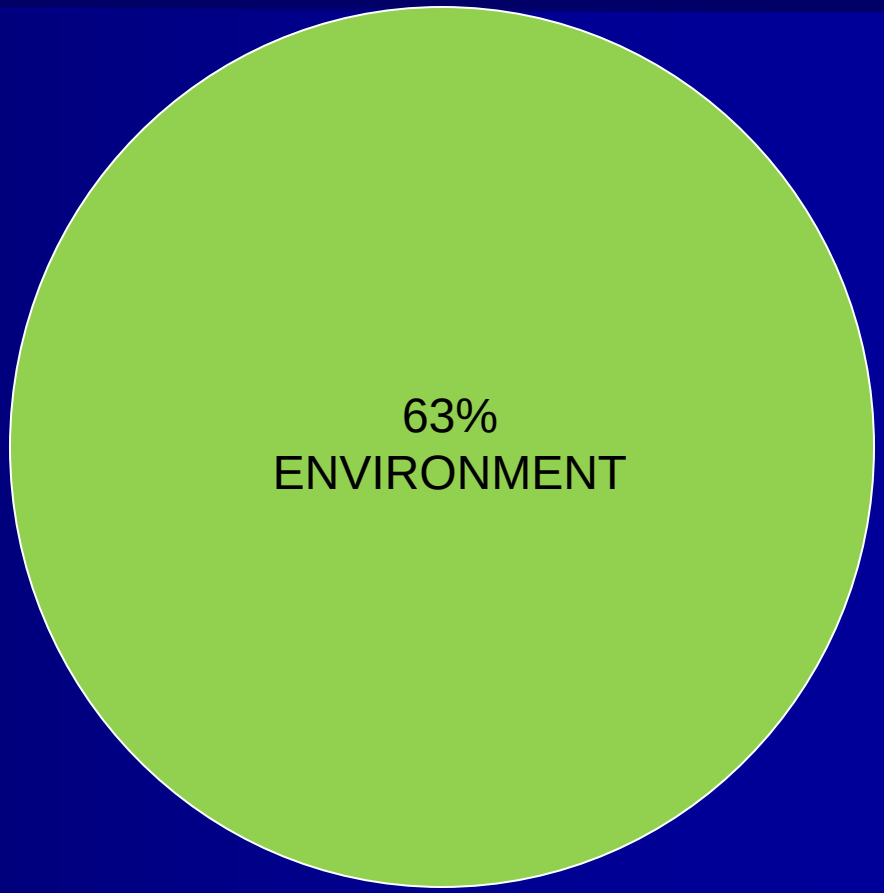
			Phenotypic parameters						Genetic Parameters		
Test	Trait	Data	N	σ^2_P	b (se)	P	r_P	r_P^2	h^2 (se)	r_g (se)	r_g^2
Pfizer MVP Marbling	IMF	1	Phenot = 3,594 MVP = 703	2.035 0.035	0.255 (0.30)	0.20	0.033 (0.04)	0.001 (0.003)	0.39 (0.06)	0.054 (0.06)	0.003 (0.007)
		2	Phenot = 3,524 MVP = 668	0.978 0.027	0.231 (0.24)	0.17	0.038 (0.04)	0.001 (0.003)	0.37 (0.06)	0.064 (0.07)	0.004 (0.009)
		3	Phenot = 876 MVP = 253	0.767 0.026	0.028 (0.33)	0.47	0.005 (0.06)	0.000 (0.001)	0.23 (0.10)	0.011 (0.13)	0.000 (0.003)
		4	Phenot = 878 MVP = 225	0.717 0.022	0.415 (0.39)	0.14	0.072 (0.07)	0.005 (0.010)	0.37 (0.11)	0.121 (0.11)	0.015 (0.027)
Pfizer MVP Marbling	MSA MS	1	Phenot = 1,454 MVP = 710	0.281 0.035	0.218 (0.20)	0.14	0.077 (0.07)	0.006 (0.011)	0.35 (0.09)	0.131 (0.12)	0.017 (0.031)
		2	Phenot = 1,808 MVP = 670	0.236 0.027	0.171 (0.15)	0.13	0.057 (0.05)	0.003 (0.006)	0.37 (0.08)	0.096 (0.08)	0.009 (0.015)
		3	Phenot = 594 MVP = 253	0.211 0.026	0.024 (0.22)	0.46	0.009 (0.08)	0.000 (0.001)	0.31 (0.13)	0.016 (0.14)	0.000 (0.004)
		4	Phenot = 636 MVP = 225	0.229 0.022	0.262 (0.23)	0.13	0.080 (0.07)	0.006 (0.011)	0.19 (0.11)	0.189 (0.17)	0.036 (0.064)
Pfizer MVP Tenderness	LDSF	1	Phenot = 3,322 MVP = 659	0.433 0.088	0.240 (0.20)	0.11	0.049 (0.04)	0.002 (0.004)	0.08 (0.04)	0.170 (0.14)	0.029 (0.048)
		2	Phenot = 3,254 MVP = 585	0.612 0.160	0.662 (0.20)	<0.001	0.154 (0.04)	0.024 (0.012)	0.30 (0.06)	0.283 (0.08)	0.080 (0.045)
		3	Phenot = 785 MVP = 253	0.658 0.142	0.304 (0.35)	0.19	0.064 (0.07)	0.004 (0.009)	0.26 (0.10)	0.126 (0.14)	0.016 (0.035)
		4	Phenot = 762 MVP = 225	0.871 0.142	1.658 (0.40)	<0.001	0.302 (0.07)	0.091 (0.042)	0.31 (0.10)	0.547 (0.13)	0.299 (0.142)
Pfizer MVP Feed Effi.	NFI	1	Phenot = 785 MVP = 706	0.840 0.079	0.300 (0.13)	0.01	0.092 (0.04)	0.008 (0.007)	0.14 (0.11)	0.248 (0.15)	0.062 (0.074)
		2	Phenot = 687 MVP = 671	0.687 0.056	0.366 (0.15)	0.01	0.104 (0.04)	0.011 (0.008)	0.21 (0.13)	0.232 (0.11)	0.054 (0.051)
		3	Phenot = 254 MVP = 253	1.110 0.082	-0.074 (0.27)	0.81	-0.020 (0.07)	0.000 (0.003)	0.21 (0.25)	-0.044 (0.16)	0.002 (0.014)
		4	Phenot = 215 MVP = 225	0.958 0.056	-0.131 (0.33)	0.86	-0.032 (0.07)	0.001 (0.004)	0.37 (0.26)	-0.053 (0.14)	0.003 (0.015)

PFIZER ANIMAL GENETICS Trait	h^2	% Genetic variation explained			
		Pfizer MVP (2009)	Australian Calibration (2009)	Pfizer 50K (2010)	Third party calibration?
Average Daily Gain	0.28			30%	?
Net Feed Intake	0.39	9%	6%	12%	?
Dry matter intake	0.39			11%	?
Tenderness	0.37	24%	3%*	26%	?
Calving Ease (Direct)	0.1			22%	?
Birth weight	0.31			28%	?
Weaning Weight	0.25			32%	?
Calving ease (maternal)	0.1			40%	?
Milking Ability	0.25			27%	?
Carcass weight	0.39			29%	?
Backfat thickness	0.36			40%	?
Ribeye area	0.4			29%	?
Marbling score	0.37	7%	1.7%*	34%	?

* The test was not significantly associated with the target trait

Let's assume "PRO-CHOICE" TEST DOES EXPLAIN 34% of GENETIC COMPONENT OF MARBLING

37%
GENETICS

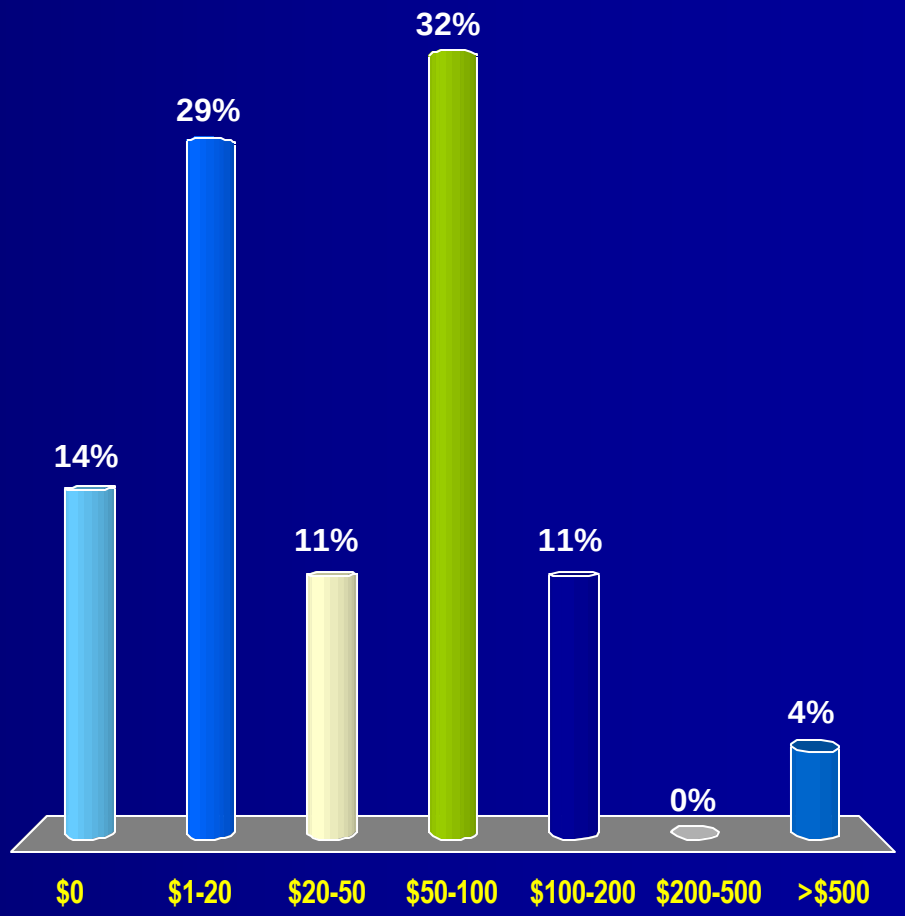


How much would a test that explains 34% of the additive genetic variation in marbling score improve the accuracy of MS EBVs?

Information available	Marbling Score Accuracy
Base phenotypic records available for use as selection criteria assumed to be those recorded by breeders including ultrasound on dam, sire, individual and 20 half-sib progeny	.36
DNA test information alone	.58
DNA test information + base phenotypic records	.69

? How much would you pay for a DNA test that increases marbling score accuracy from 0.36 to 0.69?

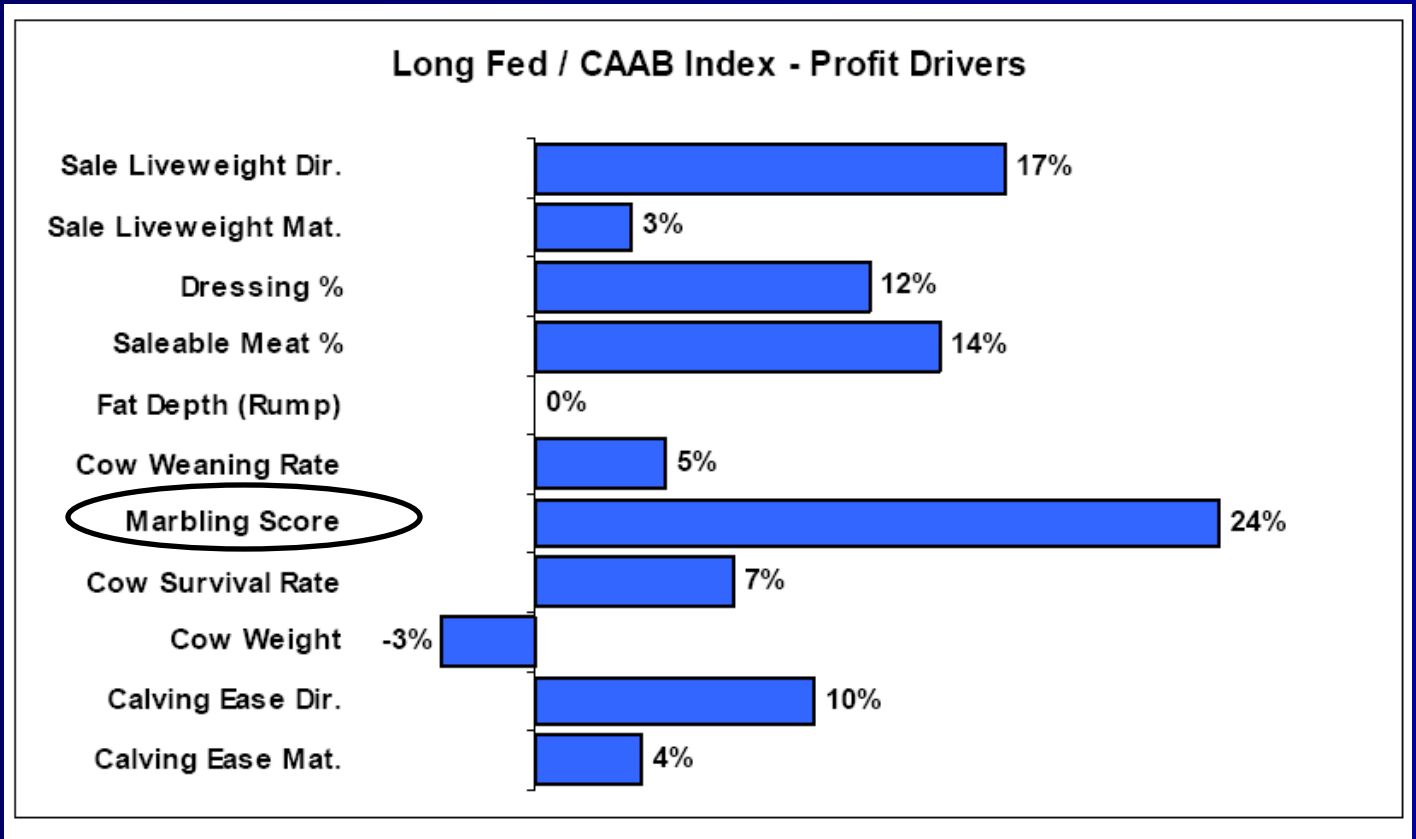
1. $0
2. $1-20
3. $20-50
4. $50-100
5. $ 100-200
6. $200-500
7. >$500



VanEomics™

PRO-CHOICE® TEST

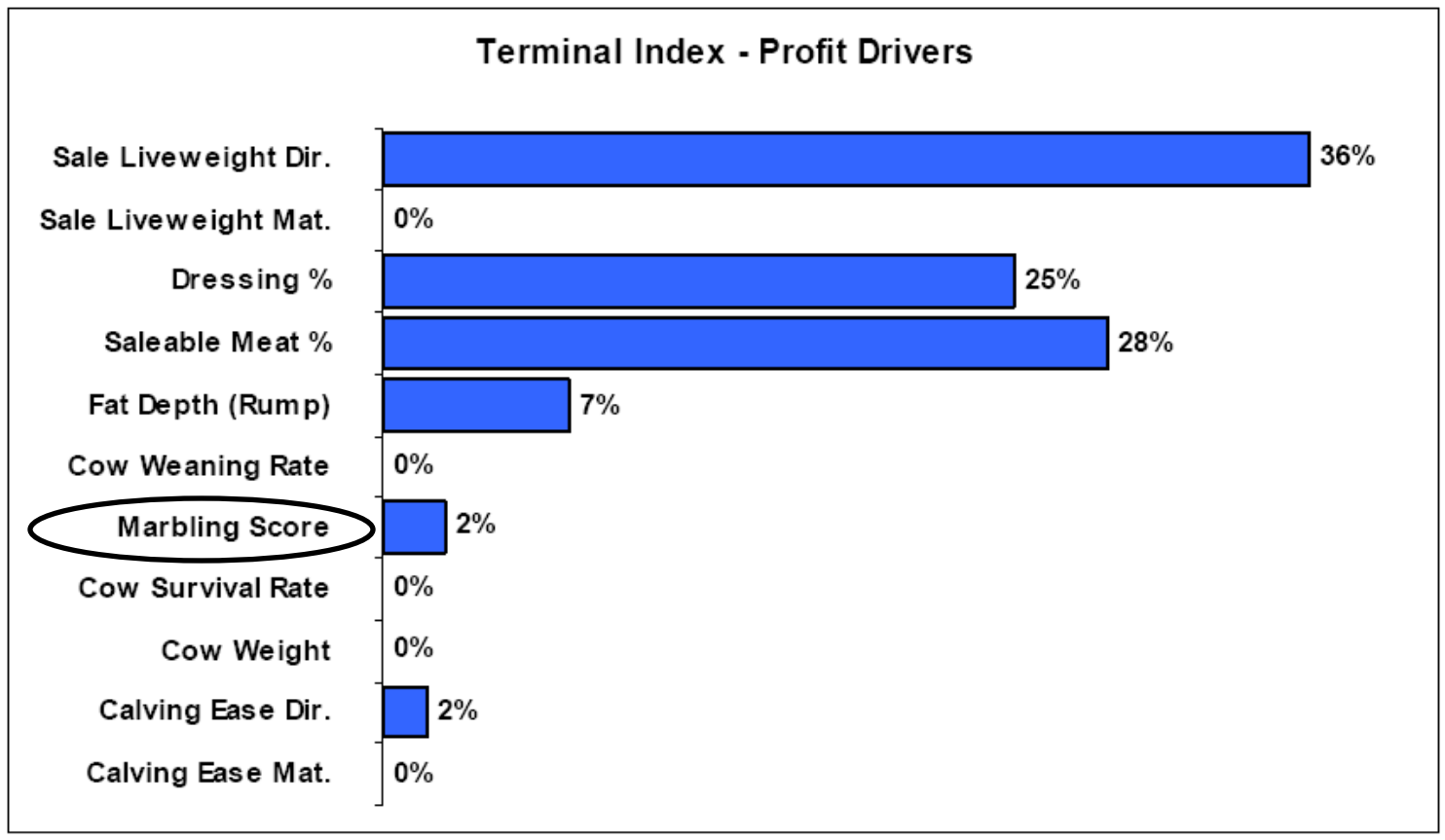
Is it useful?



VanEomics™

PRO-CHOICE® TEST

Is it useful?



VanEomics™

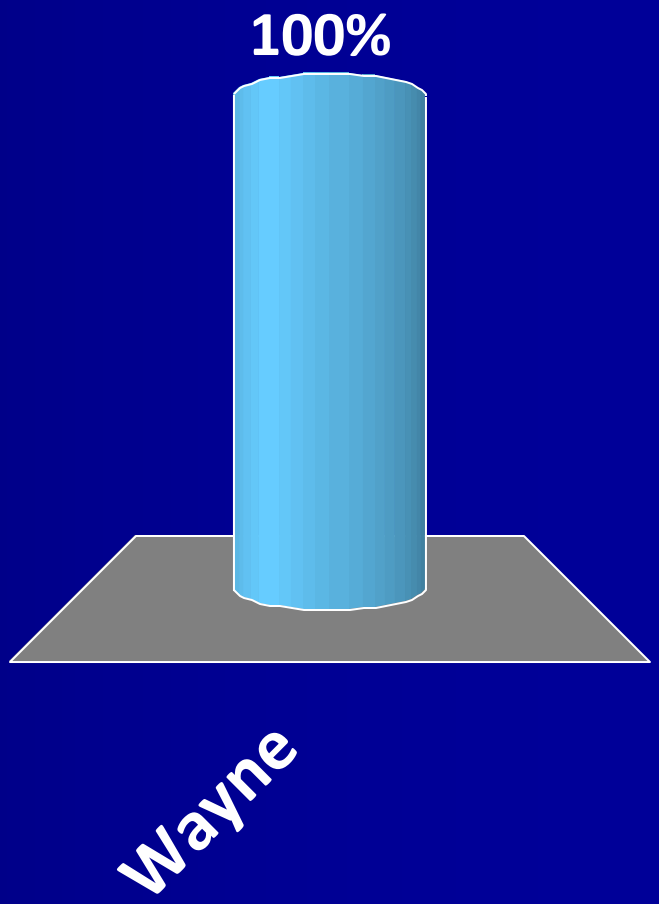
PRO-CHOICE® TEST

Does it pay?

1. Selection objective being targeted
2. Heritability of the analyzed trait (h^2)
3. Accuracy of genetic estimates already available to inform selection decisions
4. Genetic correlation between MVP and the trait (r_g)
5. Genetic variances and covariances for selection index calculations
6. Regression coefficient of phenotype on MBV (b)
7. Biological attributes and structure of stud and commercial herds
8. Selection intensity of replacement stud sires and bulls for sale (and females)
9. Number of calves per exposure
10. Type of herd (terminal, maternal)
11. Value derived from accelerated genetic progress
12. Sector where value is derived and how that is value is shared
13. Cost of test, and which animals are being tested
14. Planning horizon etc., etc., etc.

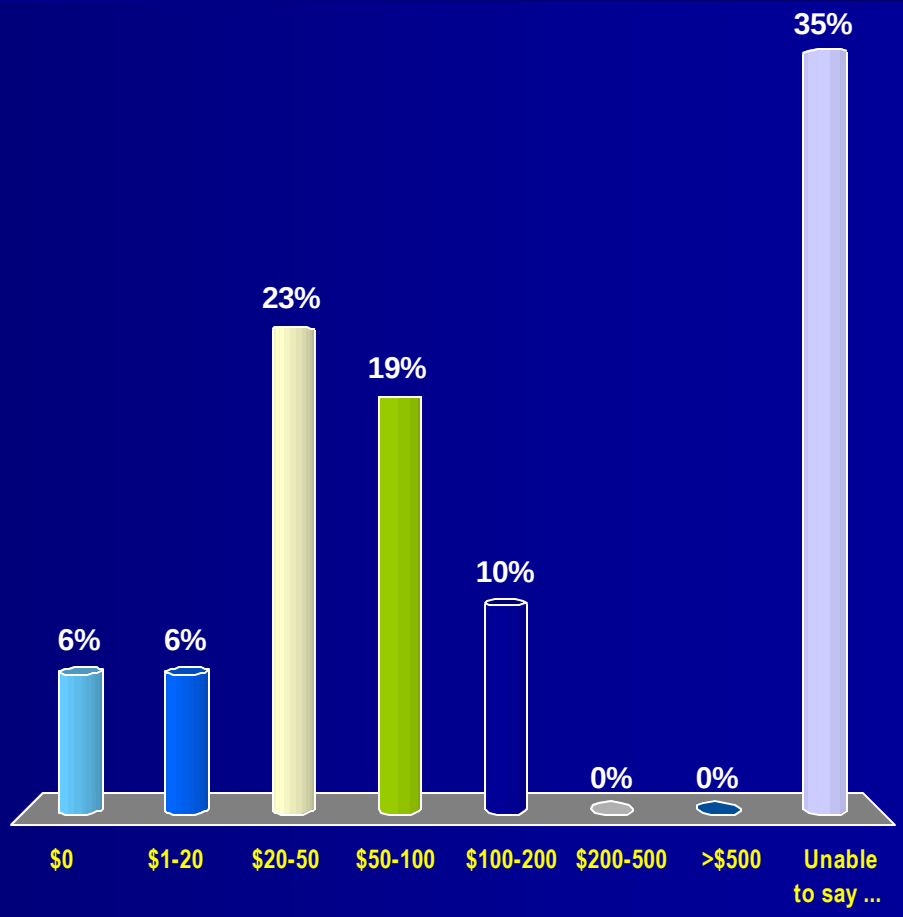
? Who are you now wishing had given this talk?

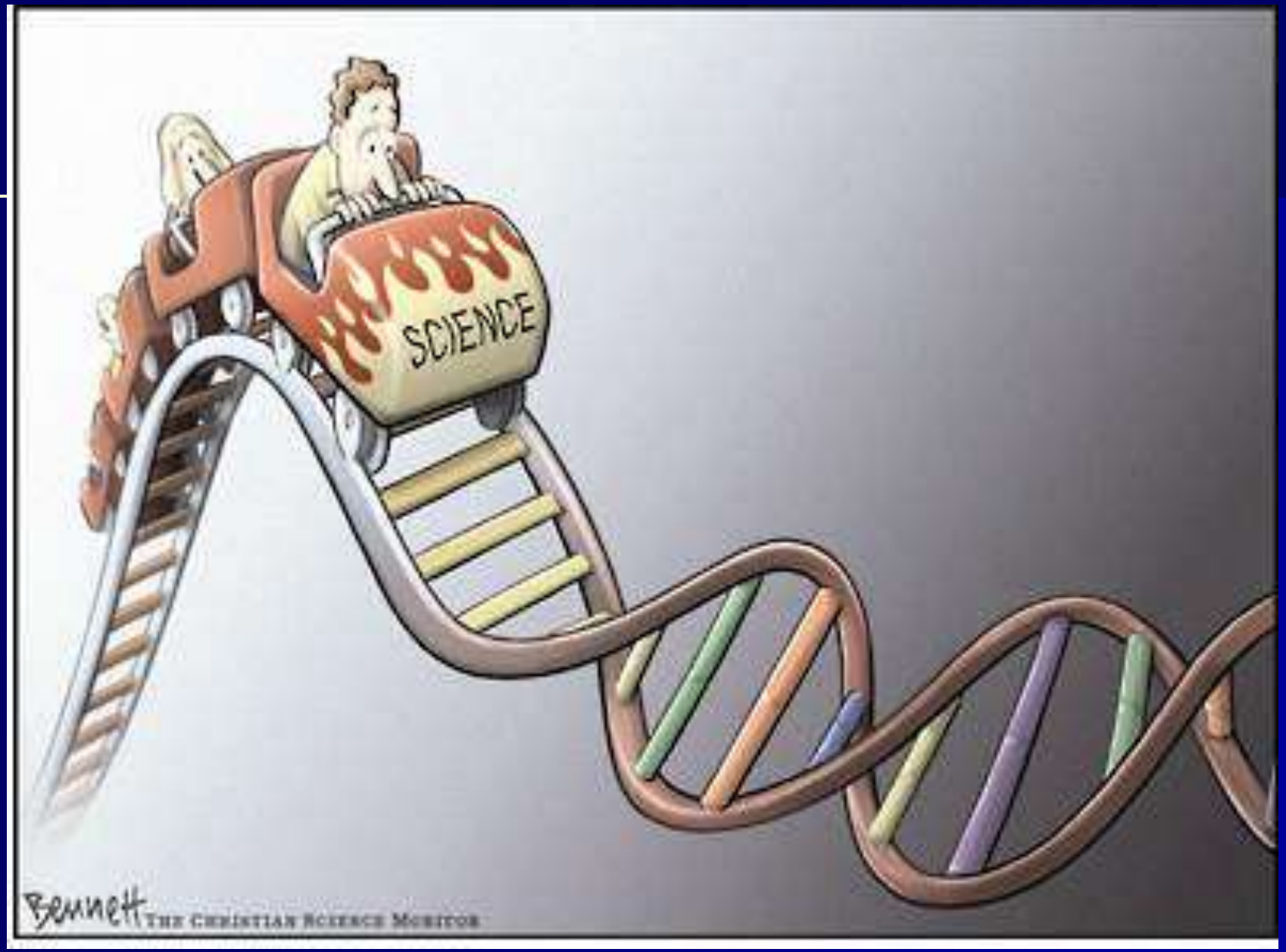
1. Wayne
2. Alison



? How much would you pay for a DNA test that increases $index accuracy from 0.25 to 0.5?

1. $0
2. $1-20
3. $20-50
4. $50-100
5. $ 100-200
6. $200-500
7. >$500
8. Unable to say with information provided

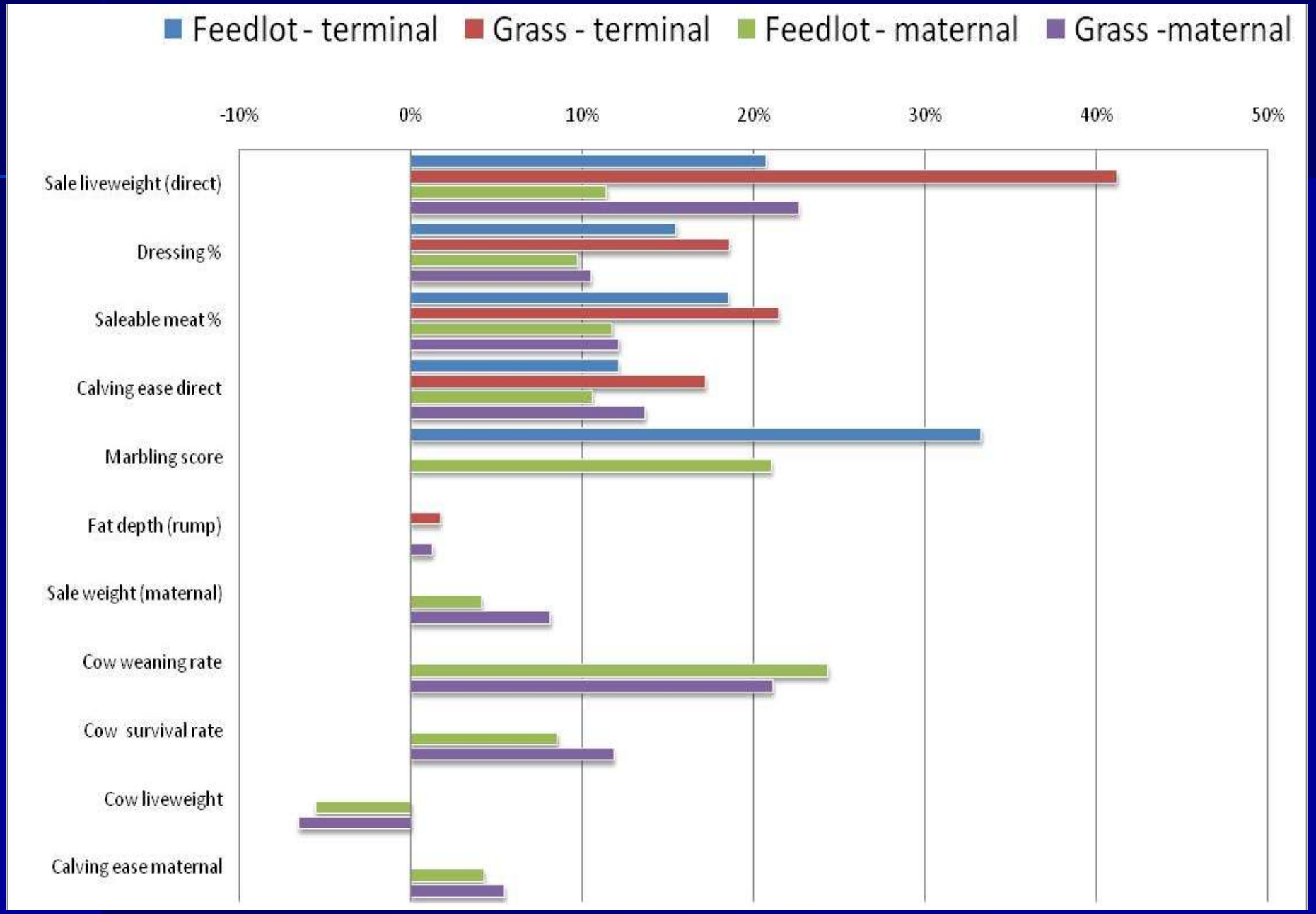



SCIENCE
Bennett
The Christian Science Monitor

Case study development

Parameter	Value
Stud Herd	
Number of live yearlings per exposure	0.89
Number of stud females per stud male	30
Number of cows	600
Number of bull calves available for sale/selection	267
Number of bull calves DNA tested	267
Number of stud bulls selected each year	8 (~3%; I = 2.27)
Number of bulls sold for breeding (annual)	125 (~50%; I = 0.8)
Maximum age of stud sire	4 (3 breeding seasons)
Average number of calves per stud sire surviving to sale/selection	65 (32.5 male; 32.5 female)
Planning horizon	20 years
Discount rate for returns	7%
Commercial Herd	
Maximum age of commercial sire	5 (4 breeding seasons)
Number of commercial females per male	100 (25 per year)

Relative importance of TRAITS IN THE BREEDING OBJECTIVES developed for terminal or self-replacing (maternal) herds targeting either the domestic Australian market where steers are finished on pasture (GRASS), or a high value market where steers are finished on concentrate rations in feedlots (FEEDLOT).



% Genetic Variation explained by DNA test

Objective Trait	Unit	% Variation
Sale liveweight – direct[A]	kg	**15.5%**
Sale liveweight – maternal[A]	kg	**2.0%**
Dressing %	%	**16.5%**
Saleable meat %	%	**28.0%**
Fat depth (rump)	mm	**20.5%**
Marbling score	score	**19.0%**
Cow weaning rate[A]	%	**2.5%**
Cow survival rate[A]	%	**1.5%**
Cow weight[A]	Kg	**20.5%**
Calving ease – direct	%	**5.0%**
Calving ease – maternal	%	**5.0%**

Criteria	Unit	% Variation
Birth weight	kg/d	**19.5%**
200 Day Growth	kg	**9.0%**
400 Day Weight	kg	**12.5%**
600 Day weight	kg	**15.5%**
P8 (♀)	mm	**20.5%**
P8 (♂)	mm	**14.0%**
RIB (♀)	mm	**17.0%**
RIB (♂)	mm	**11.5%**
Eye Muscle Area (♀)	cm2	**13.0%**
Eye Muscle Area (♂)	cm2	**13.5%**
Intramuscular Fat (♀)	%	**12.5%**
Intramuscular Fat (♂)	%	**6.0%**
Scrotal Size (♂)	cm	**19.5%**
Days to Calving	days	**3.5%**
Mature Cow Weight	kg	**20.5%**

Standard deviation of breeding objective (AU$), selection response (Index σ_i) and improvement (%) over performance recording alone, derived from DNA testing to increase the accuracy of sire selection in a closed seedstock breeding program. Values are unique for the assumptions and seedstock and commercial herd biological parameters modeled in this study.

Variable	Unit	Information available	DNA test used	Grass Index		Feedlot Index	
				Terminal	Maternal	Terminal	Maternal
SD of Breeding Objective	AU$			31.97	33.35	47.29	54.08
SD of Selection index standard deviation (σ_i)	AU$	Performance recording information	No DNA test	16.12	9.67	12.20	10.46
			½ h^2 of all traits	21.38 (+33%)	14.69 (+52%)	24.23 (+99%)	21.44 (+105%)

Standard deviation of breeding objective (AU$), selection response (Index σ_i) and improvement (%) over performance recording alone, **accuracy of index** derived from DNA testing to increase the accuracy of sire selection in a closed seedstock breeding program..

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Accuracy of Index		Performance recording information	None	.50	.29	.26	.19
			½ h^2 of all traits	.67	.44	.51	.40

Value of genetic gain in commercial and stud sires.

A gene flow model was used to assess the economic impact of improved accuracy resulting from the use a DNA marker panel to test all male calves, and select top 3% for stud replacement, and top 50% as sale bulls

Variable	Unit	Information available	DNA test used	Grass Index		Feedlot Index	
				Terminal	Maternal	Terminal	Maternal
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Value of ΔG in commercial sires selected from top half of stud herd	**AU$/bull**	Records	No DNA test	514	412	388	432
		Records + DNA test	½ h^2 of all traits	683	623	774	837
Value of ΔG in stud sires selected from top 3% of stud herd	**AU$/bull**	Records	No DNA test	29553	17728	22366	19176
		Records + DNA test	½ h^2 of all traits	39196	26931	44421	39298

Value of genetic gain on a per test basis – assuming a perfect market

Variable	Unit	Information available	DNA test used	Grass Index		Feedlot Index	
				Terminal	Maternal	Terminal	Maternal
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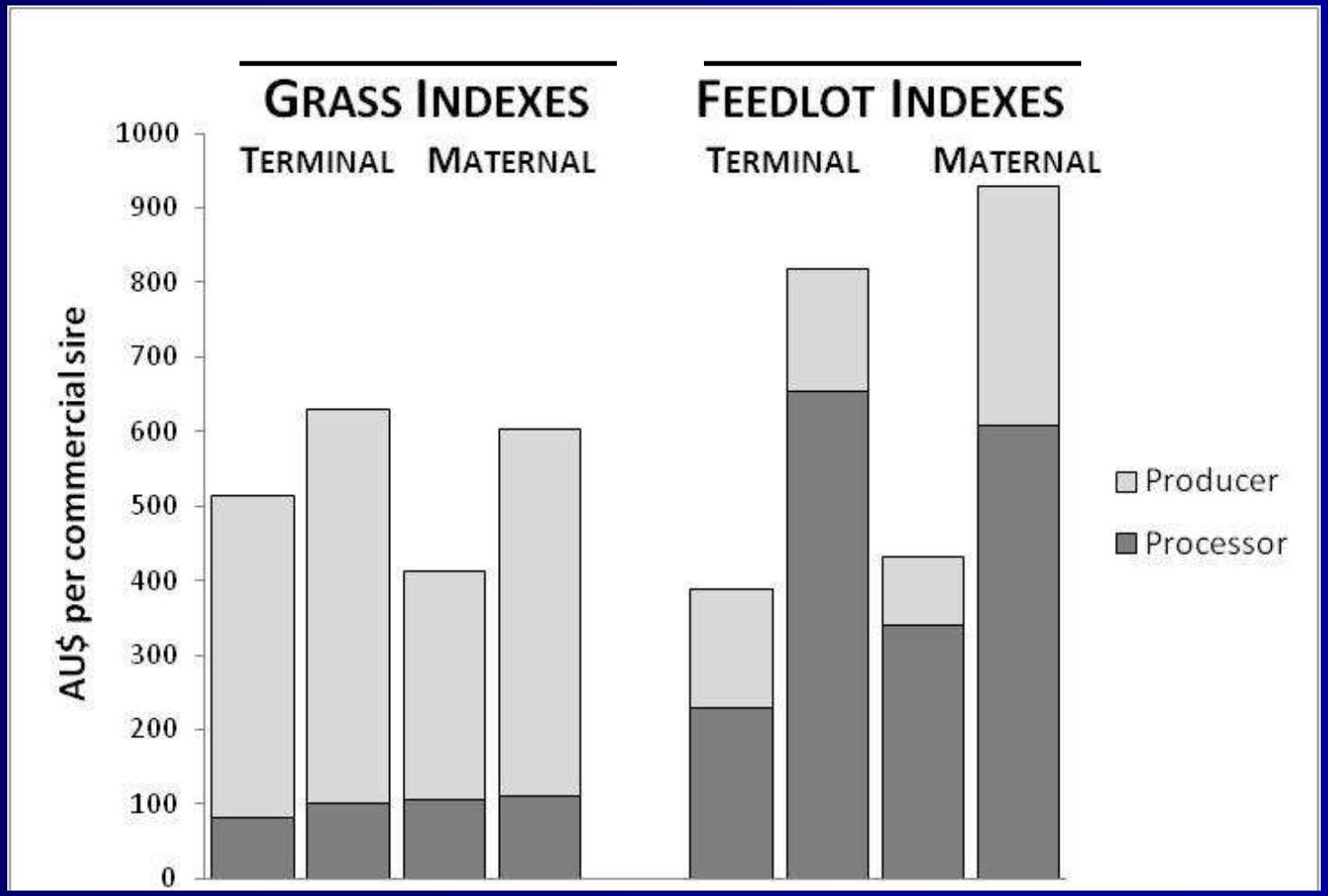
		Records + DNA test	½ h^2 of all traits	39196	26931	44421	39298
Increased value derived from ΔG in commercial sires	AU$/ DNA test	(AU$/ DNA test)	½ h^2 of all traits	85	105	193	203
Increased value derived from ΔG in stud sires	AU$/ DNA test	(AU$/ DNA test)	½ h^2 of all traits	289	276	661	603
Total value per test to seedstock operator	AU$/ DNA test	(AU$/ DNA test)	½ h^2 of all traits	374	381	854	806

Breakdown of beef industry sector benefits

Traits of direct benefit to the processing sector were assumed to be dressing (DP), saleable meat percentage (SMP), rump fat depth (FD), and marbling score (MS)



Summary points

- Need independent estimates of genetic and phenotypic parameters to determine **if it works**
- **Usefulness** will be enterprise-dependent
- Hard to determine **value** if DNA information is presented independently of genetic evaluations
- From an industry wide perspective DNA testing could be beneficial, but the commercial viability will strongly depend on price signaling throughout the production chain.

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- Mike Goddard
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The end