

NBCEC Symposium Summary: Industry Views on Adoption of Genomics

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Applications



$$y = X\beta + Za + e,$$

Estimates of US and Australia genetic testing costs (Angus)

	US	AUSTRALIA
AM	113,526	12,021
NH	77,067	9,936
CA	28,837	2,532
TOTAL NUMBER	294,054	34,991
COST (@ \$25/test)	7,351,350	874,775

Numbers kindly shared by Bryce Schumann, American Angus Association; and Carel Teseling, Angus Australia (current as of 5/2011)

Three General Approaches

- ☞ Molecular information can be included in NCE in three ways:
 - ☞ "Blending"
 - ☞ This is developing an index of MBV and EPD
 - ☞ Genomic relationship
 - ☞ Must have access to genotypes
 - ☞ Correlated trait
 - ☞ Context we are currently in and what AAA does

Adoption of Genomic Predictions

- ☞ AAA and ASA with others quickly following
- ☞ Efficacy of this technology is not binary
- ☞ The adoption of this must be centered on the gain in EPD accuracy
 - ☞ This is related to the proportion of genetic variation explained by a MBV
 - ☞ This is equal to the squared genetic correlation

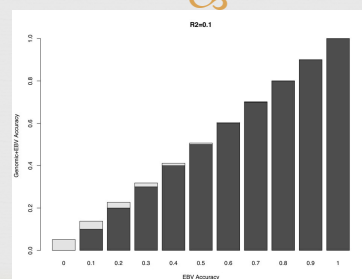
Current Angus Panels

Trait	Igenity (384SNP)	Pfizer (50KSNP)
Calving Ease Direct	0.47	0.33
Birth Weight	0.57	0.51
Weaning Weight	0.45	0.52
Yearling Weight	0.34	0.64
Dry Matter Intake	0.45	0.65
Yearling Height	0.38	0.63
Yearling Scrotal	0.35	0.65
Docility	0.29	0.60
Milk	0.24	0.32
Mature Weight	0.53	0.58
Mature Height	0.56	0.56
Carcass Weight	0.54	0.48
Carcass Marbling	0.65	0.57
Carcass Rib	0.58	0.60
Carcass Fat	0.50	0.56

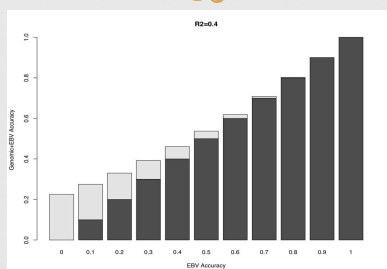
MBV BIF Accuracy

Genetic Correlation	% GV	BIF Accuracy
0.1	1	0.005
0.2	4	0.020
0.3	9	0.046
0.4	16	0.083
0.5	25	0.132
0.6	36	0.2
0.7	49	0.286

Impact on Accuracy-- %GV=10%



Impact on Accuracy-- %GV=40%



Increased Accuracy-- Benefits

- Mitigation of risk
- Faster genetic progress

$$BV / t = \frac{r_{BV,EBV} i_{BV}}{L}$$

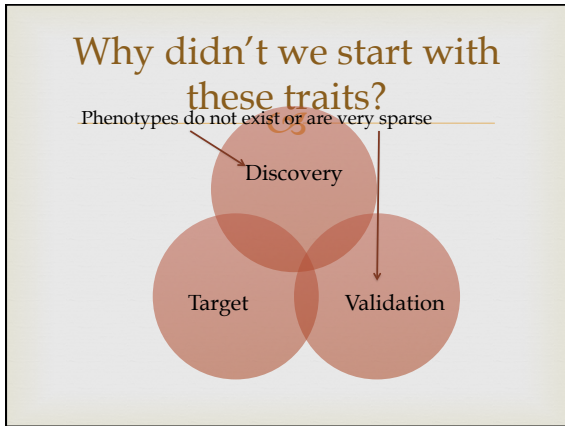
- Increased accuracy does not mean higher or lower EPDs!
- Increased information can make EPDs go up or down

Issues to Address Robustness

- Angus • Angus
- Angus • Charolais
- Angus • Bos indicus

Example of Robustness-- Breed

Breed	WW	YW
AN	0.36 (0.07)	0.51 (0.07)
AR	0.16 (0.16)	0.08 (0.18)



3 Fundamental Types of Discovery Populations

- ☞ Purebreds of a Single Breed
- ☞ Purebreds of Multiple Breeds
- ☞ Crossbreds

2 Fundamental Types of Discovery Data

- ☞ AI Sires with High Accuracy EPDs
- ☞ Individuals with Own Phenotypes

National Program for Genetic Improvement of Feed Efficiency in Beef Cattle - Mozilla Firefox

http://www.beefeconomy.org

National Program for Genetic Improvement of Feed Efficiency in Beef Cattle

USDA

About News Conferences For Scientists For Producers

Overview/Introduction

The sustainability of the beef industry continues to be a focal issue in agriculture today. Will the industry be able to survive high feed and land prices? A \$5 million USDA/NIFA Agriculture and Food Research Initiative grant has been awarded to a multi-disciplinary group of researchers from eight institutions to conduct DNA-based technology to predict genetic merit for feed efficiency.

"Currently, we have no high yielding ways to improve feed efficiency, which can lead to agriculture's greenhouse gas emissions and demand for additional land to produce feed," said Jerry Taylor, Wisconsin Chair in Animal Genomics in the University of Missouri College of Agriculture, Food and Natural Resources, and project director. "Historically, the only way we have improved the efficiency of cattle growth was by selectively breeding cattle that grow up. While this reduced the time it took to bring beef cattle to market, it did not tackle the fundamental issue of improving the efficiency of converting nutrients from feed into beef."

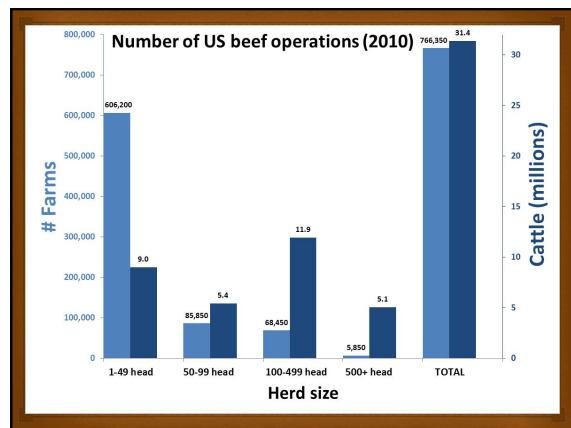
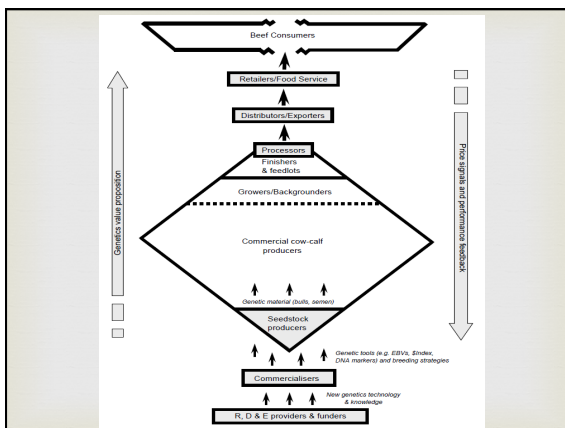
In this study, phenotypic data will be collected on 10,000 cattle representing eight breeds, including Angus, Red Angus, Simmental, Gelstein, Charolais, Hereford, Limousin and Wagyu. Researchers will evaluate intake, performance and carcass traits. In addition, they will collect DNA samples for gene mapping. After the data are compiled, the team's goal is to deliver tools and knowledge which enable genetic selection for feed efficiency.

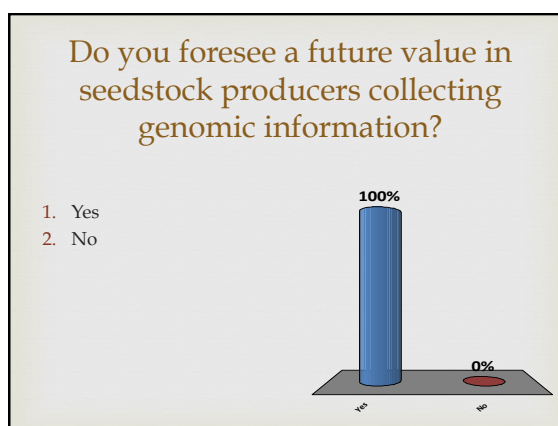
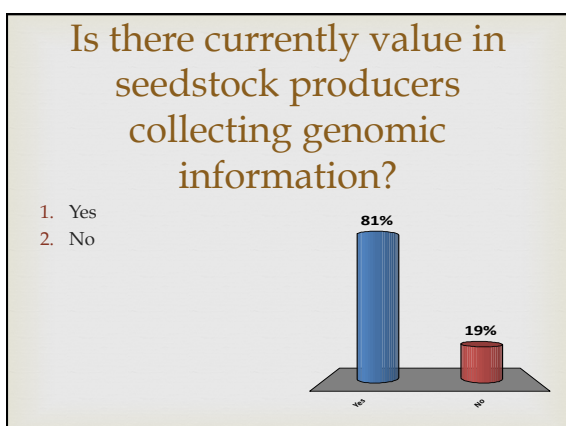
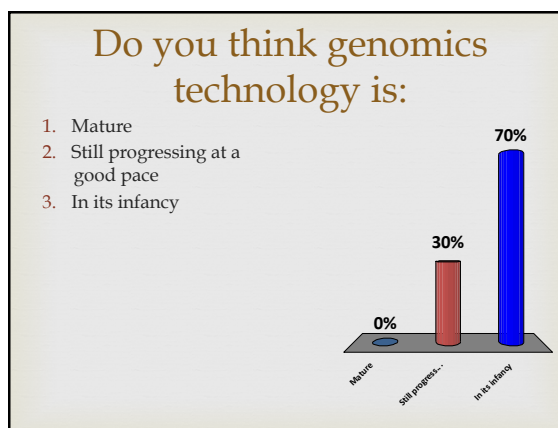
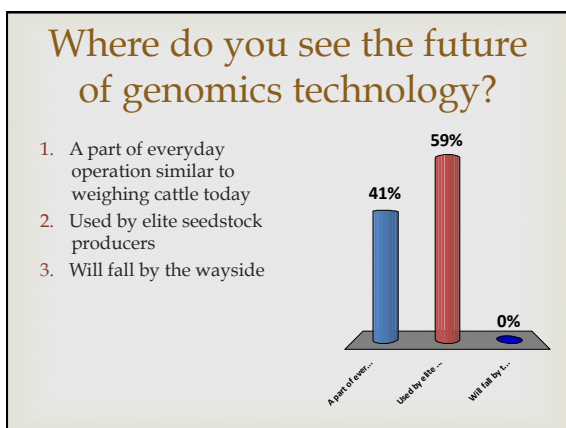
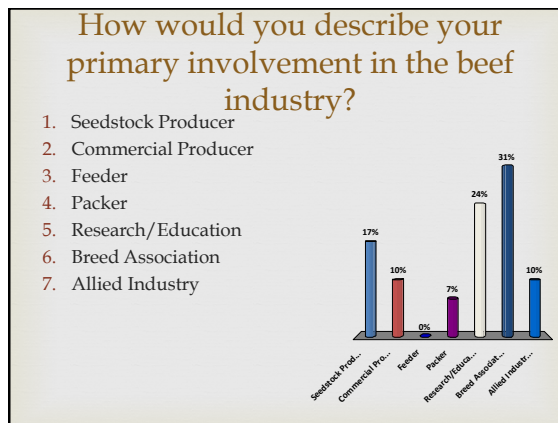
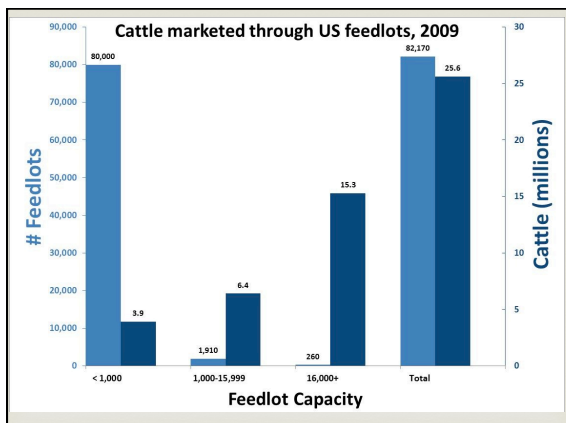
http://www.beefeconomy.org/homepage.html

News Articles

- BE: Five Year National Feed Efficiency Study
- Healthier and More Efficient Cows
- USDA, Other Universities Out Out Feed Efficiency Research Grant
- USDA: USDA grant targets feed efficiency in beef cattle
- Iowa State Faculty Part of Feed Efficiency Study of Beef Cattle

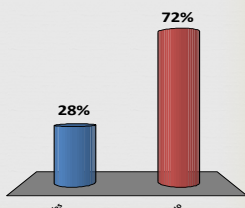
Watch for more information from Iowa State University Beef Center





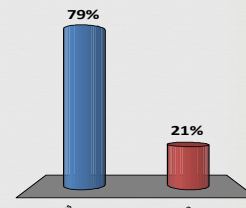
Is there currently value in commercial producers collecting genomic information?

1. Yes
2. No



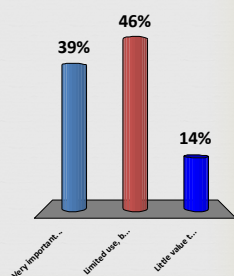
Do you foresee a future value in commercial producers collecting genomic information?

1. Yes
2. No



How do you see MAM being used in the future?

1. Very important with widespread adoption
2. Limited use, but used in niche situations
3. Little value to the industry with little adoption



Key Traits of Interest

☞ Cow/calf – FERTILITY

☞ Feedlot – FEED EFFICIENCY



Summary



- ☞ All industry segments are optimistic
 - ☞ All are becoming engaged at varying levels
 - ☞ Critical traits tend to be "high hanging fruit"
- ☞ For commercial bull buyers the fundamentals are still in place
- ☞ Genomic information has the potential to increase accuracy
 - ☞ Proportional to %GV
 - ☞ Impacts inversely related to EPD accuracy
 - ☞ Value proposition is the crux of adoption
- ☞ Multiple trait selection is critical and could become more cumbersome
 - ☞ Economic indexes help alleviate this
 - ☞ Use index values that meet your breeding objective