Genetic Evaluation and Selection: Lost opportunities for improving profit

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National Beef Cattle Evaluation Consortium

The mission of BIF

- Uniformity
  - *To work for establishment of accurate and uniform procedures for measuring, recording and assessing data concerning the performance of beef cattle….*
- Development
  - *To assist member organizations …in developing their individiual beef improvement and quality management programs*
- Cooperation
  - *To develop cooperation among all segments of the beef industry in the compilation and utilization of performance records to improve efficiency, profitability and sustainability of beef production*
- Education
  - *To encourage the Federations' membership organizations to develop education programs emphasizing the use and interpretation of performance data….in improving the efficiency, profitability and sustainability of beef production*
- Confidence
  - *To develop the increased confidence of the beef industry in the economic potential available from performance measurement and assessment*

For today

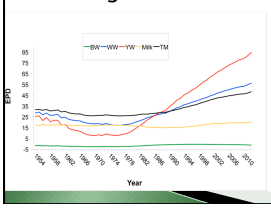
- Cooperation
  - To develop cooperation among all segments of the beef industry in the compilation and utilization of performance records to improve efficiency, profitability and sustainability of beef production.
- Confidence
  - To develop the increased confidence of the beef industry in the economic potential available from performance measurement and assessment

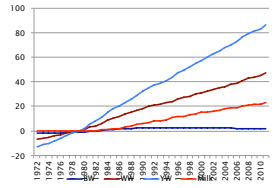
Overview

- Beef industry has historically adopted technology
  - EPD
  - Ultrasound
- Key areas where we have been slow to adopt available technology

Adoption of EPD

- EPD delivered to the industry for "wide" use in the late 1970's/early 1980's
- The result since has been rapid change in the genetic merit of the beef animal

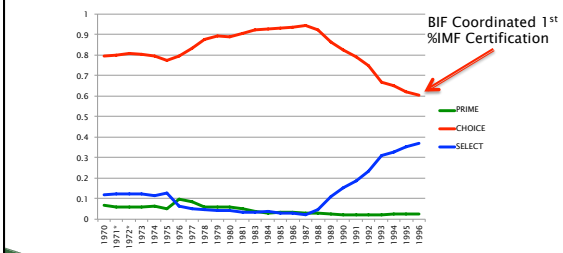




Use of ultrasound

- Pregnancy diagnosis
- Carcass
  - First Certification for REA and FT in January 1989 using BIF-developed guidelines
  - Early 1990's BIF certifications through universities offered more certifications
  - First certification for %IMF conducted in 1996
  - Annual Proficiency Testing and Certification Committee established in 2001
  - Name changed to Ultrasound Guidelines Council in 2003

Trends for Percent Choice
(as a percentage of total graded)



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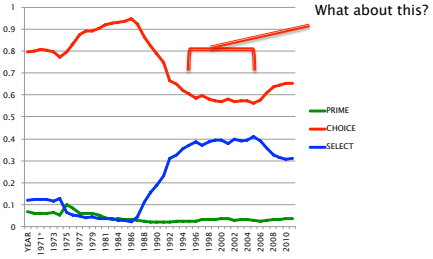

BIF role

- In 2006 at BIF Annual Meeting, Dr. Dan Moser
  - "Why haven't we seen an improvement in quality grade? A Genetic improvement perspective"
- A number of factors involved
  - Time to achieve high accuracy (US or carcass)
  - Long generation interval and genetic lag

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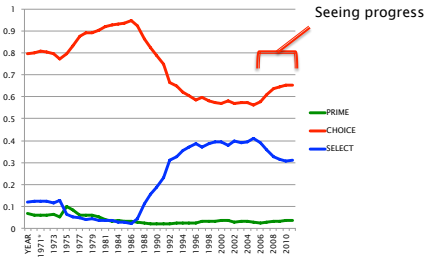


So what are we leaving on the table?

Dilbert.com, 2013

What technologies are available for implementation now?

- Key areas:
- Feed utilization
- New trait development resulting from whole herd reporting
  - Fertility/Longevity
    - Heifer, Cow, Bull
- Vertical data capture
- DNA technologies for early-life selection decisions with improved accuracy

Feed utilization

- Technology for measuring feed intake is well proven
- Genetic relationships with other traits are increasingly well estimated
- Potential savings:
  - EPD for dry matter intake ranged from -2.9 lb/day to 2.4 lb/day
  - 150 days on feed
  - >$75/head

Feed utilization

- Needs implementation and use in a multiple trait setting!
- A technology that is available now.
- Needs to be more than phenotypic information for marketing—EPD
- Data is being collected and there is potential for considerably more data for feedlot systems
- Need more work on the cow side of feed utilization

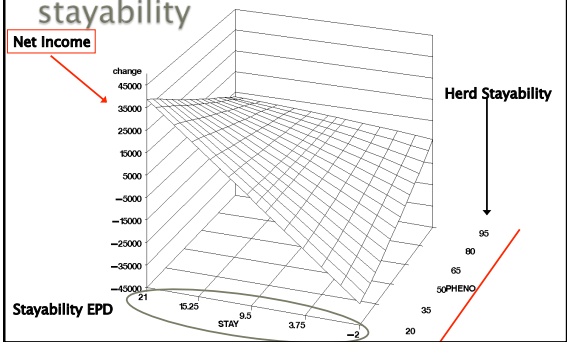
Fertility/Longevity: The tools

- Most associations have whole-herd reporting programs
- Let's use the data!
- Stayability
  - Technology proven
  - Good evaluation requirements
    - Best data includes culling reasons
  - Not a perfect evaluation
    - Time required for high accuracy
    - Failure to credit cows surviving past 6 years of age
    - Alternatives?

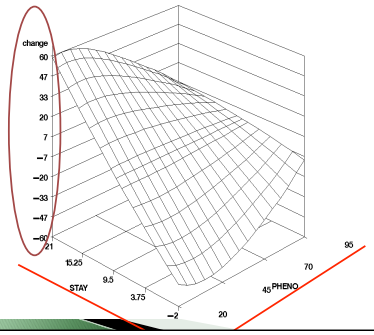
How important is reproductive ability?

- The largest contributor to profitability of the cow/calf operation.
  - Ponzoni and Newman, 1989; Melton, 1995
  - 2:1:1 Reproduction : Growth : End Product
    - Weaber cited today

Change in net income ($) per 1000 base cow herd -- stayability



Change in number of mature cows- stayability



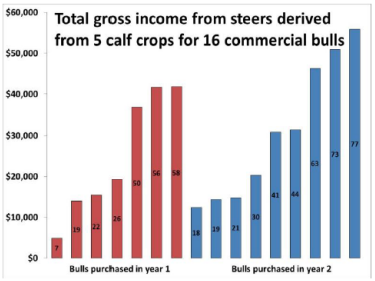
Female Fertility/Longevity

- An important contributor to profit
- How do daughters perform in a commercial operation?
  - Goals of the seedstock breeder and the commercial cow/calf operator are different
  - Commercial information has value
    - Pig industry uses commercial data
- In the meantime we have the technology (and data) to evaluate fertility/longevity from the seedstock perspective

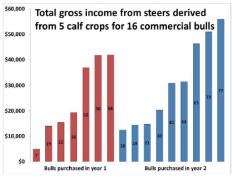
Bull fertility

A. Van Eenennaam from "Commercial Ranch Project"

- DNA technologies are readily available for parentage identification
- Multi-sire pastures in a commercial operation
- 2 groups of yearling bulls purchased in succeeding years



Gross returns on these bulls ranged from $4,881 to $55,889
Primarily due to differences in number of progeny produced



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To evaluate bull fertility this requires additional data transfer from commercial producer

Additional potential benefit to commercial producer in the form of within herd evaluation

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    - Heifer, Cow, Bull
- Vertical data capture would greatly increase our accuracy of selection and ability to evaluate new economically relevant traits

Improving accuracy of selection

- Factors influencing rate of genetic progress
  - Genetic variability
  - Generation interval
  - Selection intensity
  - Accuracy of selection

Vertical data capture

- Increased data "pass-back" from the commercial sector (cow/calf, feedlot, etc) to the seedstock sector with the goal of genetic improvement.
  - Commercial Ranch Project (Van Eenennaam, et al) model could result in EPD for genetic evaluation of commercial herds (www.nbcec.org)
  - Combined with data pass-back would improve accuracy of selection in seedstock herds

The argument is often "too hard" to get data pass back

Vertical data capture

- Walmart
  - From 1993 to 2001 Walmart grew from $1 billion in business each week to $1 billion every 36 hours
  - In 2011, $1.22 billion worth of merchandise every day.
  - System requires extensive data tracking and supply chain management
    - Use RFIDs that can be scanned from a distance and smart tags
- They share data with their partners

Arkansas Business, 2012

Beef cattle industry

- Pass-through of data would increase our ability to select superior animals
- Enable considerable new trait development
  - Ability to select for improved animal health

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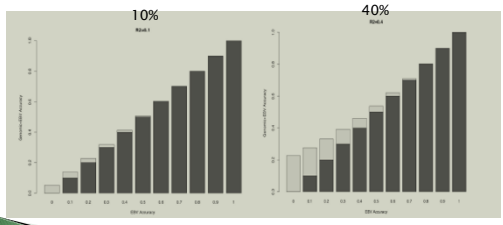
DNA technologies

- Serve to increase accuracy at younger ages than previously possible



Spangler,

DNA marker technologies

- The marker panels are predictive
  - Add varying levels of accuracy but they work
  - What is the value of increased accuracy?
    - A little harder to quantify from a profit standpoint
- Provides opportunities for both the seedstock and commercial breeders

The key areas

- Use of data collected
  - Cow longevity
  - Feed utilization
    - Economic selection indexes
- Increased accuracy with DNA marker technologies
- Improved transfer of data between sectors
  - Value-added/branded programs likely provide a starting point
  - Other technologies not addressed:
    - Sexed semen

Questions?