New Trait Development and Economic Relevance in National Cattle Evaluation

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We are in a changing environment

- World food production must increase by 50% by 2030 to meet the increasing demand. (United Nations Secretary– General Ban Ki-moon)

- Yet North American cow numbers continue to decline. (USDA, 2008; Alberta Agriculture and Rural Development, 2008)

The Challenging Environment for Beef Production

- Fuel prices
  - Recorded 27 record highs for gasoline in 28 days in May.
- Costs to raise a calf from cow/calf through feedlot have risen 56% in the last 3 years (Cattle-Fax, 2008)

- Predictions are for continued change
  - Costs of production will rise
    - Corn –26%
    - Barley—25%
    - Soybeans—32%
      - (Doane Advisory Services, 2008)
    - Assumed oil would go from $67 to $94 by 2020!

The question

- How can we become more profitable?
  - Management changes
  - Marketing changes
    - Value-added
  - Genetic improvement

- Our challenge—
  How do we transition from today to "someday"? (J. Pollak)

- From a genetic improvement standpoint:
  - The low hanging fruit has been harvested
    - Birth, weaning, and yearling weight
    - Milk and total maternal
    - Scrotal circumference

    - Most of our current EPD focus on income or output traits

- There is already a lot of information available to make selection decisions
  - In some instances we have EPD for both economically relevant traits and indicator traits.
  - As we move forward with new traits we must avoid increased confusion or increased difficulty of making a good selection decision

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Terminology

- *Economically Relevant Traits (ERT):* traits that are directly associated with a revenue stream or cost of production of a commercial operation.
  - Seedstock breeders who ignore their customer…"are doomed to the trash can of history" Dave Nichols, 2008

- *Indicator Traits:* traits that add accuracy to the EPD for the ERT because of their genetic relationships to the ERT
  - Accuracy increases are dependent upon the strength of the genetic relationship with the ERT

Determining the ERT

- Commercial producer perspective:
  - Does selecting on a trait **directly** effect your income or cost of production?

- Seedstock producer perspective:
  - Focus should be on your customers' needs—does changing a particular trait directly effect their income or costs of production?

Why the distinction between ERT and Indicators?

- Trying to select for both is counterproductive
  - The more traits selected for, the slower the progress in any one trait
    - Not an endorsement of single trait selection!

- The concept helps us focus our selection efforts
  - Example:
    - Birth weight versus calving ease EPD

The Guiding Principle for New Trait Development

- Focus on the Economically Relevant Traits (ERT)

- Traits related to income
  - Sale weight
    - weaning, yearling, carcass, milk production, mature weight
  - Reproduction (number of animals available for sale)
    - Heifer pregnancy and length of productive life (stayability)
    - Calving ease (cost trait as well)
    - Bull fertility
  - End product traits

- Traits related to costs of production
  - Cow feed requirements (Maintenance energy)
  - Feed requirements of growing animals (background and feedlot phases)
  - Reproductive traits
  - Health/survival traits

In the development of new traits for selection must remember

- Genetic improvement is long-term
  - We must look ahead 20+ years

- Results can be sustainable

Another component of development

- Accuracy
  - For many of these "new" traits (and many old ones), there are accuracy issues
    - Heifer pregnancy
      - Do not get observations on bulls until a minimum of 3 years of age, but likely 4 if calving information is used rather than preg test data
    - Stayability (length of productive life)
      - If we use stayability to 6 years of age as the target, bulls are 8 years of age before a daughter can have an observation!
    - Cow feed requirements (maintenance energy)

- Why important?
  - One of the 4 factors influencing rate of genetic change
    - Accuracy
    - Intensity of selection
    - Generation interval
    - Genetic variability

Within the realm of new traits...

- From my perspective, the traits for immediate focus:
  - Feed intake
    - Cow/calf sector
    - Background/Feedlot
      - Days on feed
  - Health/survival traits
    - ~1.1 million cattle with an estimated value of over $692 million were lost to respiratory causes in 2005 (USDA, 2006).
  - Consumer acceptance traits
    - Eating quality
    - Nutritional content
  - Regionalized "adaptability" traits
    - Resistance to High Altitude Disease (Brisket Disease)
    - Heat tolerance
  - Male fertility traits

- By 2025????

How are we going to address these?

- Remember these are the "hard to evaluate" traits but that have potential for large increases in product value or substantial reductions in costs of production.

- Allocate resources for
  - collection of data
    - In many cases, collection of data will be problematic
  - Identification of appropriate indicator traits
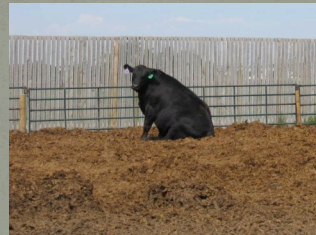 - Development and utilization of genomic information

Physical resources required

- Phenomics
    - The study of optimum animal phenotypes that can be used to elucidate information from genomics research and gene discovery
    - Results ultimately lead to tools used in genetic improvement programs.

- Evaluation of these new traits will require
  - detailed collection of performance information from research and industry partner populations
  - commercial operations that will collect genomic/marker information on a wider scale—Dr. Crews will discuss further in the next presentation
  - Improved data tracking systems

Summary

- Purpose was to develop the perspective that new traits should be developed through a process that starts with the identification of the ERT
  - This should account for the time associated with making genetic improvement

- Should not be done in isolation. Determining the value and priorities for development requires extensive input from producers

It's time to move!

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