Evaluation of Beef Cattle Performance Data

Major Production Traits
- Reproductive performance
- Mothering ability
- Growth rate
- Efficiency of gain
- Carcass merit
- Both individual and herd performance records are important

Herd Performance
- Overall productivity and direction
- Relate to profitability
- Percentage calf crop
  - Number calves weaned
  - Number cows exposed to AI or bull
  - All females considered
- Calving distribution
  - 21-day periods
- Weaning weight per cow exposed
  - Weaning weight and % calf crop

Individual Records: Reproductive Performance
- Assist in selection and culling decisions within herd
- Calving Interval
  - # days from when cow calves until she calves again
  - 365 days or less Ideal
  - > 385 days
- Birth weight
  - 60-90 lbs
  - Adjusted for age of dam

Individual Records: Reproductive Performance
- Calving Ease Code (CE)
  - 1 (No assistance) – 5 (Abnormal presentation)
- Pelvic area
  - Measured on bulls and replacement females
  - Indicator of calving ease
- Scrotal Circumference (SC)
  - Measured at one year of age
  - Adjusted to 365 days and for breed
  - Indicator of fertility (bulls and his daughters)

Individual Records: Mothering Ability
- Weaning Weight
  - Measure of cow’s mothering ability
    - Highly correlated with milking ability
  - Measured at or adjusted to 205 days
  - Avg: 500 lbs (heavier for bull calves)
  - Adjusted for age of dam
    - 5-10 yr old cow as base
Individual Records

- Yearling Weight
  - Measured at or adjusted to 365 days
  - Avg: 850 lbs (heavier for bulls)

- Hip Height
  - Used with age to calculate frame score
  - Weaning: adjusted to 205 days
    - Adjust for age of dam also
  - Yearling: adjusted to 365 days

Individual Records: Growth Rate and Feed Efficiency

- Weight per Day of Age (WDA)
- Average Daily Gain (ADG)
  - Feedlot: 2.5-3.0 lbs/day
  - Heifer development: 2.0 lbs/day
  - Bulls on test: 3.0+ lbs/day
- Feed Efficiency (F:G)
  - Feedlot: 7 lbs feed: 1 lb gain

Individual Records: Carcass Merit

- Seedstock and cow-calf producers
  - Ultrasound measurements and carcass EPDs
  - Ultrasound measurements of both bulls and replacement females
    - Ribeye area
    - 12th rib fat
    - Marbling
    - Adjusted to 365 days

Ratios

- Ratios calculated for:
  - Birth weight
  - Weaning weight
  - Yearling weight
- Indexes utilized for performance testing
  - Normally include WDA, ADG, and F:G

Expected Progeny Differences (EPDs)

- Expressions of relative genetic merit
- Allows comparison between 2 or more animal to predict progeny performance
- Comparison must be between animals of the same breed
- Expressed in unit that the trait is measured in
- Can be used by commercial and purebred producers

EPDs to Predict Calving Ease

- Birth weight (BW)
  - Expressed in pounds
  - More problems generally associated with heavier calves at birth
- Calving Ease (CE)
  - Expressed as percent unassisted births
  - Direct
    - How easily bull's calves will be born
  - Maternal
    - How easily bull's daughters will deliver calves
Birth Weight (BW) EPD

Bull A  -3.0
Bull B  +5.0

Bull A's calves would be expected to be 8 lbs lighter at birth compared to Bull B.

Calving Ease (CE) EPDs

<table>
<thead>
<tr>
<th></th>
<th>Direct</th>
<th>Maternal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bull A</td>
<td>+3.0</td>
<td>-1.0</td>
</tr>
<tr>
<td>Bull B</td>
<td>-1.0</td>
<td>+2.0</td>
</tr>
</tbody>
</table>

Bull A's calves should be born with 4% fewer assisted births than Bull B's calves.
Bull B's daughters should have 3% fewer assisted births than Bull A's daughters.

EPDs to Predict Maternal Ability

- Milk
  - Expressed as pounds of calf at weaning due to milk (not pounds of milk)
  - Differences in weaning weight due to daughter's milking ability

Milk EPD

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Bull A</td>
<td>+15.0</td>
</tr>
<tr>
<td>Bull B</td>
<td>+ 7.0</td>
</tr>
</tbody>
</table>

Bull A's daughters can be expected to wean 8 more lbs of calf due to milking ability compared to Bull B.

EPDs to Predict Maternal Ability

- Total Maternal
  - Also known as Maternal Weaning Weight or Milk and Growth
  - Pounds of calf weaned by the daughters of a given bull or female
  - Reflects an individual's ability to transmit both milk and growth rate
  - Calculated by adding an animal's Milk EPD to ¾ of its WW EPD

EPDs to Predict Growth Rate

- Weaning Weight (WW)
  - Pounds of calf at 205 days of age
  - Predicts differences in weight due to growth genetics, not mother's milking ability
- Yearling Weight (YW)
  - Pounds of weight at 365 days of age
  - Best indicator of pure growth
**WW and YW EPDs**

<table>
<thead>
<tr>
<th></th>
<th>WW</th>
<th>YW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bull A</td>
<td>+30</td>
<td>+60</td>
</tr>
<tr>
<td>Bull B</td>
<td>+10</td>
<td>+20</td>
</tr>
</tbody>
</table>

Compared to Bull B, Bull A's calves can be expected to be 20 lbs heavier at 205 days of age and 40 lbs heavier at one year of age.

**EPDs to Predict Carcass Traits**

- **Ribeye Area (REA)**
  - Square inches of loin muscle area
- **Backfat (BF)**
  - Inches of fat at the 12th rib
- **% IMF or Marbling (IMF or Marb)**
  - Breed differences in this EPD
  - Difference in adjusted 365-day IMF score, based on ultrasound
  - Marbling Score, estimated from actual carcass data
- **Percent Retail Product (%RP)**
  - Angus Association
  - Combines HGW, fat thickness, REA, and KPH into composite
  - Estimate of carcass cutability, predicts difference in cutability

**Carcass Trait EPDs**

<table>
<thead>
<tr>
<th></th>
<th>BF</th>
<th>REA</th>
<th>%IMF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bull A</td>
<td>+.05</td>
<td>+.50</td>
<td>+.25</td>
</tr>
<tr>
<td>Bull B</td>
<td>-.05</td>
<td>+.10</td>
<td>-.25</td>
</tr>
</tbody>
</table>

When comparing the feedlot cattle sired by Bull A and Bull B, Bull A's progeny should have:
- +.10 in more backfat
- +.40 sq in more REA
- Higher amount of IMF (50% more when mated to average cow)

**Other EPDs for Beef Cattle**

- **Scrotal Circumference**
- **Gestation Length**
- **Yearling Hip Height**
- **Mature Daughter Height and Weight**
- **Stayability**
  - Predicts the probability that a bull's daughter will remain in the herd until 6 yrs of age, given she calved as a 2-yr old
Beef Cattle Performance Data: Interpreting Scenarios

Beef Breed Importance
- British Breeds (Angus, Hereford, and Shorthorn)
  - Generally maternal
  - Cowherd base
  - Improved marbling

Beef Breed Importance
- Continental Breeds (Charolais, Simmental, Limousin, Maine-Anjou, Gelbvieh, etc.)
  - Generally terminal
  - Improved growth rate and efficiency
  - Improved cutability (less fat, more muscle)

Beef Breed Importance
- Bos indicus ("Earred cattle")
  - Known for heat and insect tolerance
  - Meat tenderness problems with more than ¼ Bos indicus blood

British Breeds
- Angus (Black or Red)
  - Most predominant breed in U.S. (Black)
  - Very maternal with excellent marbling ability
- Hereford (Horned and Polled)
  - Crossed with Angus to produce "black baldy's"
  - Hearty and efficient
British Breeds

- Shorthorn
  - Fewest of the British breeds
  - Good maternal and marbling ability

Continental Breeds

- Limousin
  - Extremely muscular and lean

- Simmental
  - Fast growing and excellent milkers

- Charolais
  - Fast growing with good carcass traits

Bos Indicus Breeds

- Brahman
  - Most prevalent in U.S.
  - Crossed with Continental or British breeds to form other breeds

Brahman x Angus = Brangus
Brahman x Hereford = Braford
Brahman x Simmental = Simbrah

Bos Indicus Breeds

- Braford
- Brangus
- Simbrah

Beef Production Systems

- Rotational, Terminal, and Rotaterminal crossbreeding systems utilized
- Purebred/Registered
  - Over 70 breeds in U.S.
- Composites
  - Genetically designed crossbreed
  - Maintain heterosis while utilizing complimenting breeds
  - Examples: Lim-Flex, Simbrah, Santa Gertrudis, many more

Interpreting Scenarios

- Situation Statements
- Outlines intended use for animals
- Different types of information included

- Some traits may be superior under one set of circumstances, but could be a liability under another
  - Purpose
  - Conditions
  - Selection Priorities
Interpreting Beef Cattle Scenarios

- **Marketing Plan**
  - Calves sold at weaning: WW important
  - Replacement females kept: growth and maternal traits important
  - Calves maintained in feedlot: YW, ADG, and carcass traits important

---

Simmental Bulls

Rank these bulls to be used in a 3-breed rotation with Hereford and Angus females. Heifer calves are not retained and all male offspring will be sold as feeders. Feed and labor minimal.

Priorities:
- Average frame size and milk production
- Preweaning growth
- Calving ease

<table>
<thead>
<tr>
<th>Breed</th>
<th>CED</th>
<th>BW</th>
<th>WW</th>
<th>YW</th>
<th>Milk</th>
<th>Frame</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>CED</th>
<th>BW</th>
<th>WW</th>
<th>YW</th>
<th>Milk</th>
<th>Frame</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+6.5</td>
<td>-1.5</td>
<td>+33</td>
<td>+60</td>
<td>+3.0</td>
<td>6.5</td>
</tr>
<tr>
<td>2</td>
<td>+6.1</td>
<td>+1.0</td>
<td>+30</td>
<td>+58</td>
<td>+3.8</td>
<td>7.0</td>
</tr>
<tr>
<td>3</td>
<td>-1.0</td>
<td>+3.1</td>
<td>+35</td>
<td>+62</td>
<td>+6.0</td>
<td>8.0</td>
</tr>
<tr>
<td>4</td>
<td>+5.9</td>
<td>+1.5</td>
<td>+56</td>
<td>+56</td>
<td>+4.5</td>
<td>6.2</td>
</tr>
</tbody>
</table>

Angus Heifers

Rank these heifers to be used in a purebred herd. Females are retained and bulls are sold in the state bull test. All other offspring are sold at weaning. Feed and labor are average.

Priorities:
- Balanced trait
- Calving ease

<table>
<thead>
<tr>
<th>Breed</th>
<th>CED</th>
<th>BW</th>
<th>WW</th>
<th>YW</th>
<th>Milk</th>
<th>SC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>CED</th>
<th>BW</th>
<th>WW</th>
<th>YW</th>
<th>Milk</th>
<th>SC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+2</td>
<td>+5.6</td>
<td>+38</td>
<td>+68</td>
<td>+10</td>
<td>+.15</td>
</tr>
<tr>
<td>2</td>
<td>+5</td>
<td>-0.9</td>
<td>+36</td>
<td>+65</td>
<td>+20</td>
<td>+.21</td>
</tr>
<tr>
<td>3</td>
<td>+3</td>
<td>+1.5</td>
<td>+30</td>
<td>+55</td>
<td>+18</td>
<td>+.20</td>
</tr>
<tr>
<td>4</td>
<td>+4</td>
<td>+2.3</td>
<td>+45</td>
<td>+72</td>
<td>+19</td>
<td>+.30</td>
</tr>
<tr>
<td>Breed</td>
<td>+3</td>
<td>+2.4</td>
<td>+35</td>
<td>+68</td>
<td>+17</td>
<td>+.20</td>
</tr>
</tbody>
</table>
Limousin Bulls

Rank these bulls to be used in an Angus based cowherd. All offspring are fed out in retained ownership.

Priorities:
Growth
Muscle (Ultrasound or visual)

<table>
<thead>
<tr>
<th></th>
<th>BW</th>
<th>WW</th>
<th>YW</th>
<th>Milk</th>
<th>REA</th>
<th>BF</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>+1.0</td>
<td>+32.1</td>
<td>+70</td>
<td>+20</td>
<td>12.8</td>
<td>.40</td>
</tr>
<tr>
<td>2</td>
<td>-0.8</td>
<td>+40</td>
<td>+74.2</td>
<td>+19</td>
<td>13.4</td>
<td>.38</td>
</tr>
<tr>
<td>3</td>
<td>+2.0</td>
<td>+45</td>
<td>+81.3</td>
<td>+19.5</td>
<td>15.6</td>
<td>.33</td>
</tr>
<tr>
<td>4</td>
<td>+2.3</td>
<td>+42.1</td>
<td>+79.4</td>
<td>+15</td>
<td>14.5</td>
<td>.25</td>
</tr>
<tr>
<td>Avg</td>
<td>+2.1</td>
<td>+38.8</td>
<td>+73.1</td>
<td>+19.2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>