Heterosis = Hybrid Vigor

Types of Heterosis

Individual Heterosis
The degree to which crossbred calves deviate from the average of calves of the parental breeds.

Individual Heterosis

Heterosis Levels for Selected Traits

<table>
<thead>
<tr>
<th>Trait</th>
<th>Individual Heterosis</th>
<th>Maternal Heterosis</th>
<th>Total Heterosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cow lifetime productivity</td>
<td>25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cow longevity</td>
<td>38</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calving rate</td>
<td>0</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Calf weaning wt/exposed cow</td>
<td>0</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Weaning rate</td>
<td>0</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Weaning weight</td>
<td>5</td>
<td>6</td>
<td>11</td>
</tr>
<tr>
<td>Yearling weight</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>% reaching puberty at 15 months</td>
<td>15</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Days on feed</td>
<td>-4</td>
<td>-4</td>
<td></td>
</tr>
<tr>
<td>Carcass weight</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>USDA carcass grade</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>
Types of Heterosis

3

Individual

Maternal

Maternal Heterosis

From using crossbred cows.

- effects directly associated with the crossbred cow
- Usually greater than individual heterosis for maternal traits

Heterosis levels for selected traits

<table>
<thead>
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<td>6</td>
</tr>
<tr>
<td>Calf weaning wt/exposed cow</td>
<td>18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weaning rate</td>
<td>0</td>
<td>8</td>
<td>8</td>
</tr>
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</tr>
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<td></td>
<td>3</td>
</tr>
<tr>
<td>USDA carcass grade</td>
<td>2</td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>

Paternal Heterosis

Traits most influenced
- Calf weaning weight/cow exposed

Paternal Heterosis

Traits most influenced
- Calf weaning weight/cow exposed

Maternal Heterosis

Three breed cross progeny
(25% A, 25% B, 50% C)
Market for traits

Bull of breed C
(Terminal sire)

Bull of breed A (100%)

Cow of breed B (100%)

F1 AB female progeny
(50% A × 50% B)

Market all F1 AB male progeny. F1 AB females can be bred on the property or brought in from properties using two breed crosses (50% to 50%).
## Heterosis levels for selected traits

<table>
<thead>
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<td>3</td>
<td>3</td>
</tr>
<tr>
<td>USDA carcass grade</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

## Heritability vs. Heterosis

## Heritability (h²) and Total heterosis by trait class

<table>
<thead>
<tr>
<th>Trait</th>
<th>Heritability</th>
<th>Total Heterosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carcass</td>
<td>High (0.4 – 0.6)</td>
<td>Low (0 – 5%)</td>
</tr>
<tr>
<td>Growth</td>
<td>Medium (0.2 – 0.4)</td>
<td>Moderate (5 – 10%)</td>
</tr>
<tr>
<td>Reproduction</td>
<td>Low (&lt; 0.2)</td>
<td>High (10 – 30%)</td>
</tr>
</tbody>
</table>

Few traits have h² > 0.6

## Heritability Estimates

<table>
<thead>
<tr>
<th>Trait</th>
<th>Heritability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>0.85</td>
</tr>
<tr>
<td>REA</td>
<td>0.70</td>
</tr>
<tr>
<td>Tenderness</td>
<td>0.60</td>
</tr>
<tr>
<td>Birth weight</td>
<td>0.45</td>
</tr>
<tr>
<td>Feedlot gain</td>
<td>0.34</td>
</tr>
<tr>
<td>Weaning weight</td>
<td>0.24</td>
</tr>
<tr>
<td>Fertility</td>
<td>0.10</td>
</tr>
<tr>
<td>Calving interval</td>
<td>0.08</td>
</tr>
<tr>
<td>Conception rate</td>
<td>0.07</td>
</tr>
</tbody>
</table>

## Breed Complementarity

~60% Choice

~85% Choice

[Cundiff et al., 2004]
Breed Complementarity

F1 offspring

~72.5% Choice

Quality Grade; % Choice

Cundiff et al., 2004

~2.35 YG

Yield Grade

Cundiff et al., 2004

~3.5 YG

Yield Grade

Cundiff et al., 2004

Breed Complementarity

F1 offspring

~72.5% Choice

Quality Grade; % Choice

Cundiff et al., 2004

~2.9 YG

Yield Grade

Cundiff et al., 2004

Lost Opportunities

Quality Grade - $25.25
Yield Grade - $5.77
Carcass Weight - $6.75
Offal - $5.15
Hide/Branding - $0.74
Total - $43.66

USDA Quality and Yield Grade Distribution

<table>
<thead>
<tr>
<th>USDA Yield Grade</th>
<th>Prime, %</th>
<th>Choice, %</th>
<th>Select, %</th>
<th>Other, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.0</td>
<td>3.6</td>
<td>7.3</td>
<td>1.4</td>
</tr>
<tr>
<td>2</td>
<td>0.4</td>
<td>22.8</td>
<td>15.3</td>
<td>2.4</td>
</tr>
<tr>
<td>3</td>
<td>1.8</td>
<td>25.9</td>
<td>8.0</td>
<td>1.5</td>
</tr>
<tr>
<td>4</td>
<td>0.5</td>
<td>6.3</td>
<td>1.4</td>
<td>0.4</td>
</tr>
<tr>
<td>5</td>
<td>0.1</td>
<td>1.3</td>
<td>0.1</td>
<td>0.1</td>
</tr>
</tbody>
</table>

NBQA 2011
Table 1. Example Grid, as Presented by a Packer ($/dressed cwt.)

<table>
<thead>
<tr>
<th>Choice YG3 550-950 lbs.</th>
<th>Base Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prime-Choice Price Spread</td>
<td>+6.00</td>
</tr>
<tr>
<td>Choice-Select Price Spread</td>
<td>-6.00</td>
</tr>
<tr>
<td>Select-Standard Price Spread</td>
<td>-10.00</td>
</tr>
<tr>
<td>Yield Grade 1</td>
<td>+5.00</td>
</tr>
<tr>
<td>Yield Grade 2</td>
<td>+3.00</td>
</tr>
<tr>
<td>Yield Grade 4</td>
<td>-20.00</td>
</tr>
<tr>
<td>Yield Grade 5</td>
<td>-25.00</td>
</tr>
<tr>
<td>Dark Cutters</td>
<td>-20.00</td>
</tr>
<tr>
<td>Light Carcasses (&lt;550 lbs.)</td>
<td>-10.00</td>
</tr>
<tr>
<td>Heavy Carcasses (&gt;950 lbs.)</td>
<td>-20.00</td>
</tr>
</tbody>
</table>

USDA Yield and Grade Distribution

<table>
<thead>
<tr>
<th>USDA Yield Grade</th>
<th>Prime, %</th>
<th>Choice, %</th>
<th>Select, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$11</td>
<td>$5</td>
<td>-$1</td>
</tr>
<tr>
<td>2</td>
<td>$9</td>
<td>$3</td>
<td>-$3</td>
</tr>
<tr>
<td>3</td>
<td>$6</td>
<td>$0</td>
<td>-$6</td>
</tr>
<tr>
<td>4</td>
<td>-$14</td>
<td>-$20</td>
<td>-$26</td>
</tr>
<tr>
<td>5</td>
<td>-$19</td>
<td>-$25</td>
<td>-$31</td>
</tr>
</tbody>
</table>

Dark Cutter = $20; Light Carcass (<550 lbs) = $10; Heavy Carcass (>1000 lbs) = $20

Match cow to Environment

Function efficiently in **My** environment

**Climate**

**Management**

**Forage base**

**Terrain**

**Pasture size**

**Distance to water**

Function efficiently in... **My** environment

Cow Size

Milk production

Nutrient Requirements

<table>
<thead>
<tr>
<th>1100# Cow</th>
<th>vs</th>
<th>1300# Cow</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry Matter, lbs</td>
<td>25.4</td>
<td>29.1</td>
</tr>
<tr>
<td>CP, lbs</td>
<td>2.75</td>
<td>3.06</td>
</tr>
<tr>
<td>TDN/Energy, lbs</td>
<td>15.3</td>
<td>17.3</td>
</tr>
</tbody>
</table>

Average Milk

<table>
<thead>
<tr>
<th>Calving to Breeding</th>
<th>Breeding to Weaning</th>
<th>Weaning to Last 1/3</th>
<th>Last Trimester</th>
</tr>
</thead>
<tbody>
<tr>
<td>12% ↑ DMI</td>
<td>25.3</td>
<td>28.5</td>
<td>21.4</td>
</tr>
</tbody>
</table>

7/17/2018
**Nutrient Requirements**

**1100# Cow**

<table>
<thead>
<tr>
<th>Average Milk vs Superior Milk</th>
<th>Calving to Breeding (80 d)</th>
<th>Breeding to Weaning (160 d)</th>
<th>Weaning to Last 1/3 (30 d)</th>
<th>Last Trimester (95d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry Matter, lbs</td>
<td>26.4</td>
<td>29.2</td>
<td>25.5</td>
<td>27.25</td>
</tr>
<tr>
<td>CP, lbs</td>
<td>2.75</td>
<td>3.66</td>
<td>2.18</td>
<td>2.82</td>
</tr>
<tr>
<td>TDN/Energy, lbs</td>
<td>15.5</td>
<td>18.7</td>
<td>14.5</td>
<td>16.70</td>
</tr>
</tbody>
</table>

**Match cow and environment**

8% more grazing pressure during the growing season

**Weaning a calf is 5x more important than growth**

A cow’s ability to wean a calf (reproductive performance) is directly related to how well she fits my environment.

**Capturing Heterosis**

<table>
<thead>
<tr>
<th>Generation</th>
<th>Breed A Fraction</th>
<th>Breed B Fraction</th>
<th>Individual Heterosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1/2</td>
<td>1/2</td>
<td>100 %</td>
</tr>
<tr>
<td>2</td>
<td>3/4</td>
<td>1/4</td>
<td>50 %</td>
</tr>
<tr>
<td>3</td>
<td>7/8</td>
<td>1/8</td>
<td>25 %</td>
</tr>
<tr>
<td>4</td>
<td>15/16</td>
<td>1/16</td>
<td>12.5 %</td>
</tr>
<tr>
<td>5</td>
<td>31/32</td>
<td>1/32</td>
<td>6.25 %</td>
</tr>
</tbody>
</table>
Match bull to the market

Use EPD’s to your advantage

Heifers  Birth  Weight  Milk  Total  Scrotal  Circumference  Carcass

Retained  ownership  Yearling  Weight  IMF  Back Fat  REA

Terminal  program  Birth  Weight  Weaning  Weight  Yearling  Weight

Economics of Heterosis

- What does it cost?
- It depends.
- Cow size
  - About 6 % increase/100 lbs BW
- Milk production
  - ~1.5 % increase in energy/lb of milk
  - ~2.7 % increase in CP/lb of milk
- Make sure she fits your environment
  - Stocking rate
  - Supplemental feed
Economics of Heterosis - Angus cow x Terminal bull

**Original Scenario:**
- 100 cows; Angus cow x Angus Bull
- 525 lb weaning weight
- Average weaning rate 82%
- 43,050 lbs marketed

**Switch to**
- Angus cow x Bull Breed B
- Individual heterosis (+5%)
  - 551 lb weaning weight F1 calf
  - 45,203 lbs marketed
  - +2152 lbs/year * $1.67 = +$3,594/year

---

Economics of Heterosis - F1 cow x Terminal bull

**Original Scenario:**
- Angus cow x Angus bull
- 525 lb weaned calf
- Average weaning rate 82%
- 43,050 lbs marketed

**Switch to**
- F1 cow x (Terminal Bull Breed C)
  - +WW total heterosis +25% (↑ Weaning rate (90%) & weight(11%))
  - 656 lb calf
  - +131 lbs
  - 59,040 lbs
  - +15,990 lbs * $1.48 = +$23,665

---

Capturing Heterosis

<table>
<thead>
<tr>
<th>System</th>
<th>% Max Heterosis</th>
<th>% Increase in Calf Wt./Cow Exposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pure breeds</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2 breed rotation</td>
<td>67</td>
<td>16</td>
</tr>
<tr>
<td>3 breed rotation</td>
<td>86</td>
<td>20</td>
</tr>
<tr>
<td>2 breed composite</td>
<td>50</td>
<td>12</td>
</tr>
<tr>
<td>3 breed composite</td>
<td>63</td>
<td>15</td>
</tr>
<tr>
<td>Term. Sire/purch. F1 female</td>
<td>100</td>
<td>23-28</td>
</tr>
</tbody>
</table>

---

Economics of Heterosis - F1 cow x Terminal bull

**Original Scenario:**
- Angus cow x Angus bull
- 525 lb weaned calf
- Average weaning rate 82%
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  - +131 lbs
  - 59,040 lbs
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---

Parting Thoughts

- Must be able to manage for the benefits
- Heterosis will not make up for poor animal husbandry/management
- Heterosis will not make up for poor bull selection
Parting Thoughts

- Heterosis works
  - Makes you money
- Match cows to their environment
- Match bulls to your market
- Educate yourself to benefits of crossbreeding

Develop Regional Marketing Alliances

OVERVIEW

- Consultation basics for cattle production
  - Best Management Practices
  - Designed to simplify cow/calf producer management decisions
  - Uniform protocols for animal health and production, pasture and range management, and record keeping
- Value-added principle
  - Increase marketability of calves
  - Improve pasture and range quality
  - Utilize records to identify strengths and weaknesses of operation
OBJECTIVES

- Develop production and marketing processes to:
  - Implement industry BMPs for cattle, pastures, and financials
  - Wean and sell a healthier, heavier calf
  - Improve production and marketing efficiencies
  - Increase product quality and uniformity
  - Provide sustainable production

COW: Less than 1/2 Brahman influence
CALF: less than ¼ Brahman influence

Top 20% of the breed for weaning and yearling EPDs
- Angus
- Beefmaster
- Brangus
- Charolais
- Gelbvieh
- Hereford
- Red Angus

OBJECTIVES

- Collectively though the Integrity Beef Alliance
  - Wean and sell a healthier, heavier calf
  - Create a large set of uniform “feedlot-ready” cattle
  - Increase marketing opportunities
  - Increased profitability
INCREASED WEANING WEIGHT

529 lbs.  National average
63 lbs.  Increase over national average

- Not uncommon to hear feedback of +75 lbs increase
- Over 5 years 25 hd herd = 7,875 lbs increase

Preconditioning Value vs. Cost of Gain

Preconditioning Profit, $/lb

CoG, $/lb
VoG, $/lb

Weaning and Sale Weight, ADG

Weaning and Sale Weight; 591 lbs avg
Sale Weight; 739 lbs avg
ADG; 2.23 lbs avg

Drought

Put all the pieces together.
+63 lbs * $1.25 * 25 hd = $1968.75

2.23 lbs * $0.84/lbs * 60 d = $2,809.80

$1,968.75 + $2,809.80 = $4,778.55 annually

Participation in a “VALUE STACKED” Program
- VAC-60 program
- Preconditioned
- Superior genetics
- Quality health protocol
- Increased uniformity
- Marketing assistance
- Certification letter

www.integritybeef.org
https://www.facebook.com/IntegrityBeef/

Robert Wells, Ph.D.
rswells@noble.org
580-224-6432
www.integritybeef.org
Understanding and Using EPD’s

Robert S. Wells, Ph.D. PAS
Livestock Consultant

What is a bull worth?

$3,500

Does he look like this?

Or like this???

$7,000

$3,500
It Depends…

• How Good is he really?
  – How much information do you have and how accurate is it?
• How will you market his calves?
• How good are the cows?
• How much genetic progress can be made?

The Cow Should Fit Her Environment

The Bull Should Fit the Market

Pedigree

Breed

Performance

Age

EPDs

Mr. Perfect 001 ET

Phenotype

Develop a Plan

How You are Going to Get There!
Know Your Cow Herd

What Kind of Bull Will You Need?
One to Compliment the Cow Herd!

Black Calves?

Smoky Calves?

Know Where You Want to Go…
And How You are Going to Get There!

Sell at Weaning…
Expected Progeny Difference (EPD)

An Estimate of how future progeny of each sire are expected to perform relative to the progeny of other sires listed in the database.

Why Use EPD's

Things are not always what it appears to be
EPD’s are Breed Specific

Contemporary Group
A set of animals that have had an equal opportunity to perform: same sex, managed alike, and exposed to the same environmental conditions and feed resources in the same location.

Contemporary Group
It must contain Reference Sires and have a minimum number of progeny to be valid.

Accuracy: Possible Change
0 = very low  1 = very high

Increase in Accuracy
**EPD Accuracy: Variability**

<table>
<thead>
<tr>
<th>Accuracy</th>
<th>BW EPD</th>
</tr>
</thead>
<tbody>
<tr>
<td>.10</td>
<td>2.55</td>
</tr>
<tr>
<td>.20</td>
<td>2.45</td>
</tr>
<tr>
<td>.30</td>
<td>2.35</td>
</tr>
<tr>
<td>.40</td>
<td>2.20</td>
</tr>
<tr>
<td>.50</td>
<td>2.00</td>
</tr>
<tr>
<td>.60</td>
<td>1.80</td>
</tr>
<tr>
<td>.70</td>
<td>1.60</td>
</tr>
<tr>
<td>.80</td>
<td>1.40</td>
</tr>
<tr>
<td>.90</td>
<td>1.20</td>
</tr>
</tbody>
</table>

Accuracy Increases Variability Decreases

**Take Home Message**

<table>
<thead>
<tr>
<th>BW EPD (Acc.)</th>
<th>Acc. Change</th>
<th>BW EPD Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bull A</td>
<td>2.0 (.20)</td>
<td>± 2.1</td>
</tr>
<tr>
<td>Bull B</td>
<td>2.0 (.90)</td>
<td>± 0.26</td>
</tr>
</tbody>
</table>

**Age/Accuracy vs. Your Back Pocket**

- Sale Price vs. Age/Accuracy
- Younger vs. Older
- Accuracy vs. Back Pocket

**EPD Accuracy**

- EPD (Accuracy)
- Bull A: 2.0 (.20)
- Bull B: 2.0 (.90)
### 2018 Across Breed EPD Table (Selected Breeds)

<table>
<thead>
<tr>
<th>Breed</th>
<th>BW</th>
<th>WW</th>
<th>YW</th>
<th>MM</th>
<th>Marb</th>
<th>REA</th>
<th>Fat</th>
<th>Carc wt</th>
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</thead>
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<tr>
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<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
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<td>6.9</td>
<td>23.2</td>
<td>5.5</td>
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<td>1.21</td>
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<td>Gelbvieh</td>
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<td>-32.1</td>
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<td>Red Angus</td>
<td>2.3</td>
<td>-28.3</td>
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<td>-0.13</td>
<td>0.06</td>
<td>-0.017</td>
<td>-16.6</td>
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</table>

### Compare Hereford vs. Charolais

#### 50% for Breed for BW and 20% for WW and YW

<table>
<thead>
<tr>
<th>Breed</th>
<th>EPD (Registration Papers)</th>
<th>Across Breed Adjustment (sale)</th>
<th>Adjusted EPD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hereford</td>
<td>3.1</td>
<td>1.6</td>
<td>4.7</td>
</tr>
<tr>
<td>Charolais</td>
<td>.4</td>
<td>6.9</td>
<td>7.3</td>
</tr>
<tr>
<td>Charolais Difference</td>
<td>2.6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

When mating bulls to cows of a third, unrelated breed.

### Compare Hereford vs. Charolais

#### 50% for Breed for BW and 20% for WW and YW

<table>
<thead>
<tr>
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<tbody>
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<tr>
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<td>6.9</td>
<td>7.3</td>
</tr>
<tr>
<td>Charolais Difference</td>
<td>2.6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

When mating bulls to cows of a third, unrelated breed.

### Compare Hereford vs. Charolais

#### 50% for Breed for BW and 20% for WW and YW

<table>
<thead>
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</thead>
<tbody>
<tr>
<td>Hereford</td>
<td>3.1</td>
<td>1.6</td>
<td>4.7</td>
</tr>
<tr>
<td>Charolais</td>
<td>.4</td>
<td>6.9</td>
<td>7.3</td>
</tr>
<tr>
<td>Charolais Difference</td>
<td>2.6</td>
<td></td>
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When mating bulls to cows of a third, unrelated breed.

### Comparing Angus vs. Charolais

<table>
<thead>
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<th>Breed</th>
<th>EPD (Registration Papers)</th>
<th>Across Breed Adjustment (sale)</th>
<th>Adjusted EPD</th>
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</thead>
<tbody>
<tr>
<td>Angus</td>
<td>3.1</td>
<td>18.2</td>
<td>50.9</td>
</tr>
<tr>
<td>Charolais</td>
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<td>Charolais Difference</td>
<td>2.6</td>
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When mating bulls to cows of a third, unrelated breed.
Comparing Angus vs. Hereford

<table>
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<th>Breed</th>
<th>BW</th>
<th>WW</th>
<th>YW</th>
<th>Adjusted BW</th>
<th>Adjusted WW</th>
<th>Adjusted YW</th>
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<tbody>
<tr>
<td>Angus Bull</td>
<td>1.4</td>
<td>62</td>
<td>108</td>
<td>1.4</td>
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<td>108</td>
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<tr>
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<td>62</td>
<td>108</td>
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<tr>
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<td>-42.1</td>
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<td>50.9</td>
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<td></td>
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<tr>
<td>Hereford Difference</td>
<td>3.3</td>
<td>-22.2</td>
<td>-57.1</td>
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</table>

Hybrid Vigor will increase the spread.
When mating bulls to cows of a third, unrelated breed.

Comparing Angus vs. Charolais

<table>
<thead>
<tr>
<th>Breed</th>
<th>BW</th>
<th>WW</th>
<th>YW</th>
<th>Adjusted BW</th>
<th>Adjusted WW</th>
<th>Adjusted YW</th>
</tr>
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<tbody>
<tr>
<td>Angus Bull</td>
<td>1.4</td>
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<td>1.4</td>
<td>62</td>
<td>108</td>
<td></td>
<td></td>
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<td>Charolais Bull EPD (Registration Papers)</td>
<td>.4</td>
<td>36.1</td>
<td>65.7</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Across Breed Adjustment (table)</td>
<td>6.9</td>
<td>32.5</td>
<td>23.2</td>
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<td>88.9</td>
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<td>6.6</td>
<td>-19.1</td>
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</table>

Hybrid Vigor will increase the spread.
When mating bulls to cows of a third, unrelated breed.

Comparison of several breeds using Across Breed EPD Adjustments

<table>
<thead>
<tr>
<th>Breed</th>
<th>BW</th>
<th>WW</th>
<th>YW</th>
<th>Marb</th>
<th>REA</th>
<th>FAT</th>
<th>Carc WL</th>
</tr>
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<tbody>
<tr>
<td>Hereford vs Angus</td>
<td>3.3</td>
<td>-22.2</td>
<td>-57.1</td>
<td>-0.87</td>
<td>-0.28</td>
<td>-0.078</td>
<td>-50.4</td>
</tr>
<tr>
<td>Charolais vs Angus</td>
<td>5.9</td>
<td>6.6</td>
<td>-19.1</td>
<td>-0.85</td>
<td>1.29</td>
<td>-0.197</td>
<td>-16.5</td>
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<tr>
<td>Charolais vs Hereford</td>
<td>2.6</td>
<td>28.8</td>
<td>38</td>
<td>0.02</td>
<td>1.57</td>
<td>-0.119</td>
<td>33.9</td>
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<tr>
<td>Red Angus vs Angus</td>
<td>-1.1</td>
<td>-24.3</td>
<td>-38.4</td>
<td>-0.33</td>
<td>-0.44</td>
<td>-0.025</td>
<td>-34.6</td>
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<tr>
<td>Red Angus vs Charolais</td>
<td>-7</td>
<td>-30.9</td>
<td>-19.3</td>
<td>0.52</td>
<td>-1.73</td>
<td>0.172</td>
<td>-18.1</td>
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<tr>
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<td>-4.4</td>
<td>-2.1</td>
<td>18.7</td>
<td>0.54</td>
<td>-0.16</td>
<td>0.053</td>
<td>15.8</td>
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Reading EPD’s

<table>
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<td>0.54</td>
<td>-0.16</td>
<td>0.053</td>
<td>15.8</td>
</tr>
</tbody>
</table>

Reading EPD’s

Smaller Number is Better:
- Birth weight
- Back fat

Larger Number is Better:
- Weaning Weights
- Yearling Weights
- Calving Ease
- Maternal traits
- Milk
- Calving Ease Maternal
Reading EPD’s

Larger Number is Better:
- Carcass weight
- Rib Eye Area
- Marbling

Unintended consequences if we don’t look at the big picture

Which EPD’s should I use????

- IT DEPENDS……
  - When do you market your cattle?
  - Do you retain heifers as replacements?
  - Do you have an interest in retaining ownership?
  - The good of the industry?
  - How much can you afford to spend?

Retained ownership selling live

Feed Efficiency ADG $W, $F, $G, $B Values

Retained ownership sell on grid

Carcass Quality Yield IMF Back Fat
Weight Grade Grade REA

After weaning or graze out

Birth Weight Weaning Yearling
Weight Weight Weight

Values

Efficiency ADG

$W, $F, $G, $B

Feed

Carcass

Quality

Yield

IMF

Back

Fat

Retained

ownership

on

grid
DNA Enhanced EPD

- Use Igenity® or Pfizer® genomic results to increase the accuracy of an EPD

- Calculated as:
  - Genetic correlation = GC
  - Percent of additive genetic variance accounted for by the test = GC²
  - The more genetic variance = more impact on the EPD accuracy

- Continue to use EPD’s for selection decisions

- EPD & accuracies account for all sources of information – pedigree, physiological or genomic

- Using both is redundant

Genomic results are a way to enhance current selection tools to achieve more accuracy on predictions for younger animals, and to characterize genetics for traits where it’s difficult to measure phenotype.

--Sally Northcutt, AAA/AGI

Summary

- Use EPD’s as a tool and in conjunction with other information

- Familiarize yourself with terms that are breed specific

- Extremes may not be the answer
Summary

- EPDs are not static, keep up to date
- Use accuracies accordingly
- Don’t forget about visual appraisal, disposition, etc.
- Too much of one thing can be hazardous

Quality is NEVER an accident but a result of intelligent and endless efforts…

Questions?

Robert S. Wells, Ph.D., PAS
580-224-6434
rswells@noble.org
Comparison of owning a bull vs. AI for producers of various sizes

Robert Wells, Ph.D., PAS
Livestock Consultant
Noble Research Institute

Why AI?
- More early calves
- Uniform calf crop
- Higher quality genetics than you could afford to buy in the bull.
- Reduce time for genetic progression
- Can select for calving ease
- Strategically plan matings
- Increased marketability of calves
- Sexed semen

Cow Gestation Length: 283 days
Days in a year: 365 days
Difference: 82 days
Goal: 1 calf every year...

Systems
- Progressive terminal cross breeding
- Replacement heifers
- Registered producers

Multiple Bull Herds; ≥ 50hd

Tighten Up Calving Season
Not So Ideal Reproduction Performance
(50 hd herd)

Day 1
Day 30
Day 60
Day 90

Day 1
Day 30
Day 60
Day 90

Ideal Reproduction Performance
(50 head herd)

Day 1
Day 30
Day 60
Day 90

A.I. will Increase in Calf Quality
(weaning weight)

• Assume same breeding seasons as before but increased potential for weaning weight.

• Using a high quality terminal cross bull to maximize weaning weight, add 105 lbs (+.5 lb ADG) to Al sired calves.

• Increases total revenue by another $2,707

Weaning Projections
(Not So Ideal Scenario)

<table>
<thead>
<tr>
<th>No. Head</th>
<th>Days to Weaning</th>
<th>ADG</th>
<th>Total LBS.</th>
<th>Calf wt, lbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1-30</td>
<td>19</td>
<td>2.1</td>
<td>9,859</td>
<td>519</td>
</tr>
<tr>
<td>Day 31-60</td>
<td>16</td>
<td>2.1</td>
<td>7,294</td>
<td>456</td>
</tr>
<tr>
<td>Day 60-90</td>
<td>12</td>
<td>2.1</td>
<td>4,715</td>
<td>393</td>
</tr>
</tbody>
</table>

Total lbs: 21,688
Total $ @ $1.38/lb $30,260

Difference $1,202

Weaning Projections
(Ideal Scenario)

<table>
<thead>
<tr>
<th>No. Head</th>
<th>Days to Weaning</th>
<th>ADG</th>
<th>Total LBS.</th>
<th>Calf wt, lbs</th>
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</thead>
<tbody>
<tr>
<td>Day 1-21</td>
<td>30</td>
<td>2.1</td>
<td>15,567</td>
<td>519</td>
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<tr>
<td>Day 31-60</td>
<td>12</td>
<td>2.1</td>
<td>5,471</td>
<td>456</td>
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<tr>
<td>Day 61-90</td>
<td>5</td>
<td>2.1</td>
<td>1,965</td>
<td>393</td>
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</tbody>
</table>

Total lbs: 23,002
Total $ @ $1.37/lb $31,829

Difference $1,202

Weaning Projections
(Ideal Scenario)

<table>
<thead>
<tr>
<th>No. Head</th>
<th>Days to Weaning</th>
<th>ADG</th>
<th>Total LBS.</th>
<th>Calf wt, lbs</th>
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</thead>
<tbody>
<tr>
<td>Day 1-30 (AI)</td>
<td>26</td>
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<td>16,208</td>
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<tr>
<td>Day 1-30 (bull)</td>
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<td>Day 31-60</td>
<td>11</td>
<td>2.1</td>
<td>5,015</td>
<td>456</td>
</tr>
<tr>
<td>Day 60-90</td>
<td>1</td>
<td>2.1</td>
<td>1,965</td>
<td>393</td>
</tr>
</tbody>
</table>

Total lbs: 26,286
Total $ @ $1.30/lb $34,170

Difference $34,170-$30,260 = $3,910

A.I. will Increase in Calf Quality
(weaning weight)

• Assume same breeding seasons as before but increased potential for weaning weight.

• Using a high quality terminal cross bull to maximize weaning weight, add 105 lbs (+.5 lb ADG) to Al sired calves.

• Increases total revenue by another $2,707

Better Genetics + ideal calving distribution:
st = 580 lbs; hfr = 560 lbs; Not ideal calving distribution:
st = 535 lbs; hfr = 515 lbs


• Increased weights by shifting to more earlier born calves = $1,202
• Increase in weights by better genetics = $2,707
• Only need one bull rather than 2 = $3,500
  – Depreciated over the life of the bull = $700/yr
  – Maintenance cost on the one bull not needed = $500
• Annual Gross Profit of A.I. = $5,109

• Annual Gross Profit of A.I. = $5,109
• Cost of A.I. of 50 hd = $2,413 ($48.25*50)

Annual net profit of A.I. = $2,697 per 50 hd of calves

<25 hd, A.I. is difficult to justify
  • Must own a bull anyway
  • clean up remaining open cows
  • Bull $3,500 over 5 yrs = $700
  • Bull maintenance $500
  • Cost of A.I. (not including chute labor) $1,205
  • Total annual breeding cost $2,405
  • Gross Profit estimate (half of the 50 hd, previous slide) = $1,348
  • -$1,058 estimated loss (does not include chute labor)

Replacement Heifers
• Use sexed semen from maternal bulls to produce replacement heifers.
  – Will be older calves of the calving season
  – Bred to the ‘right bull’ and the ‘right cow’
• Use sexed semen from low BW bulls to breed to heifers.
  – Get bull calves from the heifers – worth more at marketing
• Potentially add $100-150 more to the value of the cow

5-day CO-Synch + CIDR®

Costs of Timed AI

<table>
<thead>
<tr>
<th>Component</th>
<th>Unit Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIDR</td>
<td>$10.25</td>
</tr>
<tr>
<td>GnRH + PG</td>
<td>$8.00</td>
</tr>
<tr>
<td>Semen</td>
<td>$20.00</td>
</tr>
<tr>
<td>Technician</td>
<td>$10.00</td>
</tr>
</tbody>
</table>
| **AI Cost/Cow** | **$48.25*|}

*Does not include labor costs
Select Synch+CIDR®
(Heat Detect & Timed AI)

CIDR®
GnRH
PG
GnRH

72-84 hrs
Heat detect & Al
Treatment day

0
10

Questions

Estrus: Standing Heat

Robert S. Wells, Ph.D., PAS
580-224-6434
rswells@noble.org

Figure 7.2. Stages of the estrous cycle. Proestrus is characterized by a significant rise in estradiol (E2). When estradiol reaches a certain level, the female enters oestrus. Following ovulation, cells of the follicles are transformed into a corpus luteum during diestrus. Diestrus is characterized by a fully functional CL and high progesterone (P4).
The cow should fit her environment

The Bull should fit the Market

Develop a Plan

Easy fleshing

Make ‘em all one color
**Breed Complementarity Heterosis**

**Use Registered Bulls**

**Things are not always what it appears to be**

**Required EPD’s**
- Top 20%
  - Weaning weight
  - Yearling weight

**Suggested EPD’s**
- Birth
  - Top 50%
- Carcass:
  - Top 50%
  - Rib Eye Area
  - Marbling
Suggested EPD’s

- Birth
  - Top 50%
- Carcass:
  - Top 50%
  - Rib Eye Area
  - Marbling

Value of Known Bull Genetics

Prepared by:
Steve Swigert
Economics Consultant
Noble Foundation

Average Annual Cattle Prices
Southern Plains

Data Source: USDA-AMS, Compiled and Forecasts by LMIC
Livestock Marketing Information Center

Bull # 1

Purchase price $2500
Salvage weight of Bull 1850 lbs
Salvage price of bull $0.80 / lb
Salvage value of bull $1465.20
(1% death loss)
Cost of bull, yr $(5 yr life span in herd) $ 206.96

Cost of bull (5 yr life span in herd) $206.96
Cash maintenance cost, /yr $400.00
Total cash cost of bull, /yr $606.96
Cows/yr bred 25
Cash cost, /cow/yr $ 24.28
**Integrity Beef Bull # 2**

- Reputable Breeder
- Individual Performance
- Information & EPD's

---

**Integrity Beef Bull, # 2**

- Purchase price: $4500
- Salvage weight of Bull: 2000 lbs
- Salvage price of bull: 0.80/ lb
- Salvage value of bull: (-1% death loss) $1584.00
- Cost of bull (5 yr life span in herd): $583.20

---

**Yearly Per Cow Bull Cash Costs**

<table>
<thead>
<tr>
<th></th>
<th>Bull # 1</th>
<th>Bull #2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bull Purchase Price</td>
<td>$2500</td>
<td>$4500</td>
</tr>
<tr>
<td>Total Annual Bull Cash</td>
<td>$24.28</td>
<td>$43.33</td>
</tr>
<tr>
<td>Costs/cow</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bull #1/Cow Advantage</td>
<td>XX</td>
<td>($19.05)</td>
</tr>
</tbody>
</table>

---

**Increased Value at Weaning**

<table>
<thead>
<tr>
<th></th>
<th>Bull #1 520 lbs @ Weaning</th>
<th>Bull #2 585 lbs @ Weaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selling price, $/lb</td>
<td>$1.4374</td>
<td>$1.3634</td>
</tr>
<tr>
<td>Value of calf</td>
<td>$754.64</td>
<td>$818.04</td>
</tr>
<tr>
<td>Bull #1/Cow Advantage</td>
<td>XX</td>
<td>($19.05)</td>
</tr>
<tr>
<td>Adjusted Calf Value</td>
<td>$754.64</td>
<td>$798.99</td>
</tr>
<tr>
<td>Difference</td>
<td>XX</td>
<td>$44.35</td>
</tr>
<tr>
<td>Increased Revenue $/25 cows/yr</td>
<td>XX</td>
<td>$1,108.75</td>
</tr>
<tr>
<td>Net increase revenue $/bull (5 yr)</td>
<td>XX</td>
<td>$5,544.43</td>
</tr>
</tbody>
</table>
Increased Value after Backgrounding

<table>
<thead>
<tr>
<th></th>
<th>Bull #1 655 lbs @ Backgrounding</th>
<th>Bull #2 779 lbs @ Backgrounding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selling price, $/lb</td>
<td>$ 1.2536</td>
<td>$ 1.2036</td>
</tr>
<tr>
<td>Value of calf</td>
<td>$ 821.11</td>
<td>$ 937.30</td>
</tr>
<tr>
<td>Bull #1/Cow Advantage</td>
<td>XX</td>
<td>($ 19.05)</td>
</tr>
<tr>
<td>Adjusted Calf Value</td>
<td>$ 821.11</td>
<td>$ 918.25</td>
</tr>
<tr>
<td>Difference</td>
<td>XX</td>
<td>$ 97.14</td>
</tr>
<tr>
<td>Increased Revenue $/25 cows/yr</td>
<td>XX</td>
<td>$2,428.50</td>
</tr>
<tr>
<td>Net increase revenue $/bull (5 yr)</td>
<td>XX</td>
<td>$12,143.24</td>
</tr>
</tbody>
</table>

Now add the price you were willing to pay for the Neighbor’s bull ($2,500) to the increased revenue the better bull provides ($5,544.43) = **$8,044.43**

**Bull Breakeven price at weaning.**

Take Home Message

The more expensive bull that has high quality performance traits will typically make you more money in the long run.

Additional Value Considerations

- Uniformity of Calf Crop
- Uniformity of Color
- Potential Performance (Feedlot)

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