

## Cows and Bulls: Make Informed Beef Cattle Breeding Decisions

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## Principle is Simple



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## Where to Start?

- Start "SIMPLE"
  - Identify goals of your operation
  - Implement new changes slowly
- Selection Priorities
  - What do you have vs. what do you need
    - Muscle/Carcass traits
    - Maternal traits
    - Growth traits

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## Selection Methods

- Visual/Phenotype
- Genetic (EPDs, indexes, Genomic EPDs)
- Pedigree
- Performance

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## Basic Visual Traits

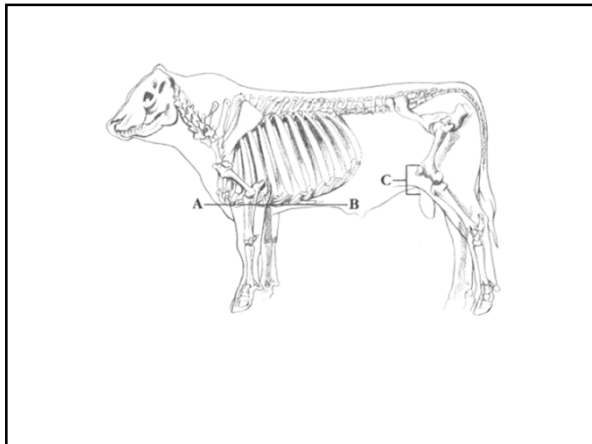
- Structure
- Rib shape/body
- Muscling
- Reproductive traits
- Udders

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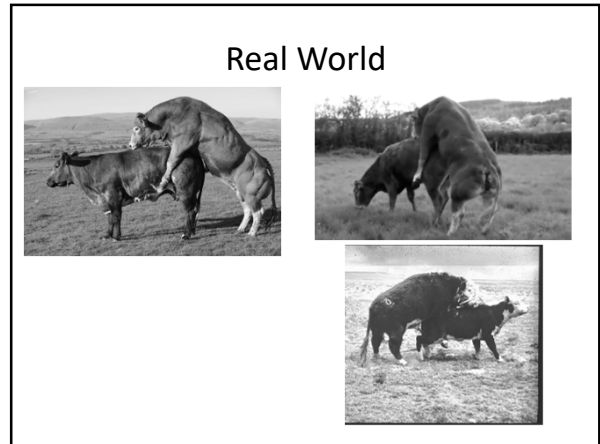
## Structure

- Improved comfort & efficiency
- Improved function
- Increased longevity
- Heritability in offspring?
  - Still important in terminal settings

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**Body Volume**

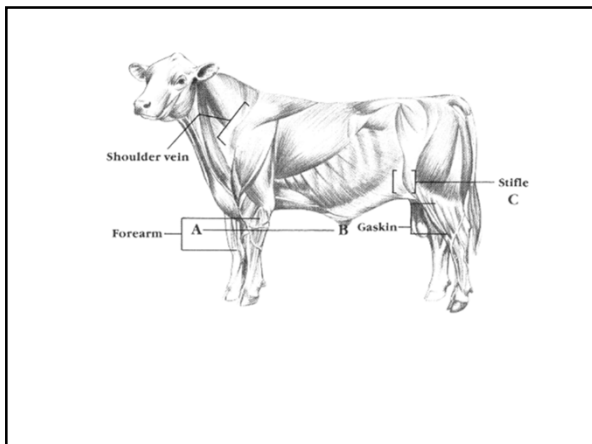
- Shape of rib cage
- Depth of fore rib
- Width of skeleton

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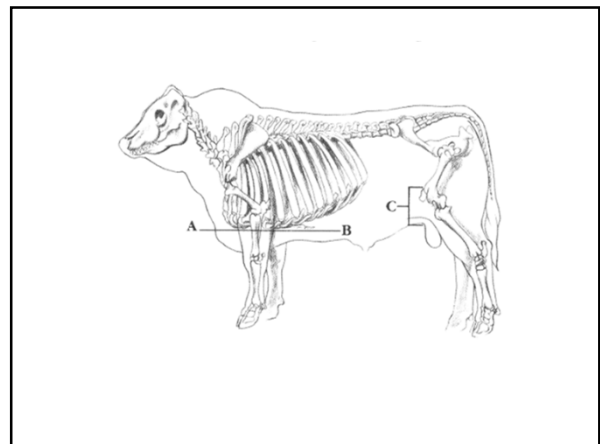
**Muscling**

- Carcass traits are highly heritable
- Rapid changes (+ & -) can be made
- Match muscle to sex type
- Important to differentiate from fat

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## Reproductive Traits/Udders

- Reproduction in general low heritability
  - More generation to make changes
- Direct impact on present production
  - Decreased pregnancies
  - More open cows
  - Decreased calf gains (udder issues)

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## Genetic Selection Tools

- EPDs
- Indexes/\$ Figures
- Genomic Enhanced EPDs

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## Phenotypic Performance

- $P = G + E$ 
  - Performance = Genetics + Environment

- Calf Yearling Weight =

Growth Genes + Management  
Milk  
Weather



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## Expected Progeny Differences

- Estimate genetic value of an animal as parent
- Predicts performance of progeny for animals in same breed
- Do not predict uniformity or variation of offspring

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## Interpretation of EPDs

| Bull              | Weaning Weight EPD | Avg Progeny Weaning Weight |
|-------------------|--------------------|----------------------------|
| A                 | +30                | 600 lbs                    |
| B                 | +10                | 580lbs                     |
| <b>Difference</b> |                    | <b>20lbs</b>               |

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## Breed Averages

- Are not 0
- Will differ across breeds
  - Challenge to compare across breeds
- Updated periodically
  - Changes based on newly submitted data

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## Maternal & Growth Traits

| Bull       | BW EPD | WW EPD | YW EPD | Milk EPD |
|------------|--------|--------|--------|----------|
| A          | 2.5    | 65     | 100    | 19       |
| B          | -1.5   | 50     | 80     | 22       |
| Difference | 3 lbs  | 15 lbs | 20 lbs | 3 lbs    |

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## Calving Ease vs. Birth Weight

- Calving ease – trait of interest
- BW – indicator trait
- The 2 are closely related



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## CE and CEM

- CE - % unassisted births
- CEM - % of daughters that calf unassisted



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## Other EPDs

- Carcass
  - REA, IMF, YG, Carcass weight
- Longevity
  - Stayability
- Reproduction
  - Daughter pregnancy
- Key is to determine what is right for you!

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## Challenge of EPD Use

- Balancing trait selection
  - Which traits? Proper weighting of traits?
- Economic relevance of the traits
  - Unit of change or importance in selection
- Single trait selection

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## Ratios (Indexes, \$ Values)

- Combination and weighting of multiple traits, and their relative economic impact, into one value that can be used to rank animals
  - Challenging to develop
  - Simple to use
  - Result in directional change in multiple traits

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### Example 1

- \$W (weaned calf value)
  - Predicts value based on advantages in BW, WW, Maternal milk, & Mature cow size

| Bull       | \$W Value |
|------------|-----------|
| A          | \$30      |
| B          | \$20      |
| Difference | \$10      |

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### Example 2

- Baldy maternal index (BMI\$)
  - Aims to maximize profit for commercial producers using Herford bulls on Angus X females
  - Assuming retained ownership and market on CHB grid

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### Value of Similar \$ Indexes

- Animals with similar \$ indexes are not equal

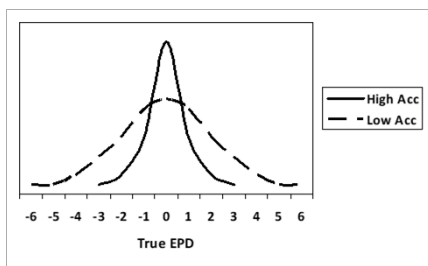
| Bull       | BW EPD  | WW EPD | YW EPD | Milk EPD | \$W  |
|------------|---------|--------|--------|----------|------|
| A          | 3.7     | 70     | 100    | 19       | \$40 |
| B          | -1.5    | 50     | 80     | 25       | \$40 |
| Difference | 4.2 lbs | 20 lbs | 20 lbs | 6 lbs    | -    |

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### Accuracy of EPDs

- Accuracy = correlation between actual breeding value (EPD) and estimated breeding value (EPD)
  - 1.0 perfect relationship
  - 0.0 no relationship
- Reliability of EPD
- Young or unused bulls have lower accuracy
- Accuracy improved through progeny records

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### Genomic Enhanced EPDs

- Use of DNA tests, performance, progeny data
  - Improves accuracy of younger animals
  - Does not replace need for traditional methods
- Benefits traits hard/expensive to measure
- Based on DNA relationship to other animals with known data

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## How to Use Genetic Data

- Identify the level of change desired
  - Identify specific traits of interest
- Know the unit of measure for that trait
  - Lbs, marb score, dollars etc
- Pay attention to accuracy

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## Now What?

- Should I use visual selection?
- Should I use EPDs?
- Should I use \$ Indexes?
- What about GE EPDs?

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## Short Answer

**YES!!!**

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## More Specifically

- Determine what your operation needs
- Traits of importance are situational
- Establish selection methods
  - Single traits
  - Tandem
  - Independent culling levels

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## Herd Evaluation

- Determine what traits are present
- Determine production goals
- Identify what traits are needed

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## Sire Selection

- Most if not all genetic progress through sire
- Sire accounts for 50+% of genetic changes
  - Improvements?



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## Sire Traits

- Generally provide terminal characteristics
  - Muscle
  - Carcass
  - Extra growth
- Do not overlook maternal traits
  - CE & BW

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## Sire Reproduction

- Scrotal circumference
  - Daily sperm output
  - Sperm quality
  - Onset of puberty in daughters
- Breeding soundness exam
  - Reproductive anatomy
  - Semen motility and morphology

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## Dam Selection

- Make progress through culling
  - Identification of problems
  - Requires accurate records
  - Clear selection (culling) criteria
  - “Stick to your guns”



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## Dam Traits

- Focus on maternal traits
- Balanced with carcass and terminal traits
- Udder quality is important

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## Example Scenarios

| Cow       | CED | BW  | WW | YW | Milk | Marb | RE   | \$G   |
|-----------|-----|-----|----|----|------|------|------|-------|
| A         | 7   | 2.0 | 50 | 87 | 21   | 0.40 | 0.34 | 29.76 |
| B         | 9   | 1.7 | 52 | 90 | 22   | 0.39 | 0.33 | 28.56 |
| C         | 10  | 2.5 | 57 | 88 | 25   | 0.38 | 0.37 | 27.65 |
| D         | 7   | 2.1 | 55 | 92 | 24   | 0.41 | 0.35 | 27.85 |
| Breed Avg | 5   | 1.5 | 47 | 83 | 24   | 0.49 | 0.40 | 32.41 |

\$G – Grid Value expressed in \$ per head  
Combines QG & YG

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## Increases in Performance

- May require additional inputs
- Be ready to provide this
  - Increased Milk/Weaning WT/etc
    - May need to feed more?

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## Moving Forward

- Utilize a “checklist” approach
- Identify genetics that “Fit”



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## Questions??



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