

# The Recipe for Combining Performance & Phenotype

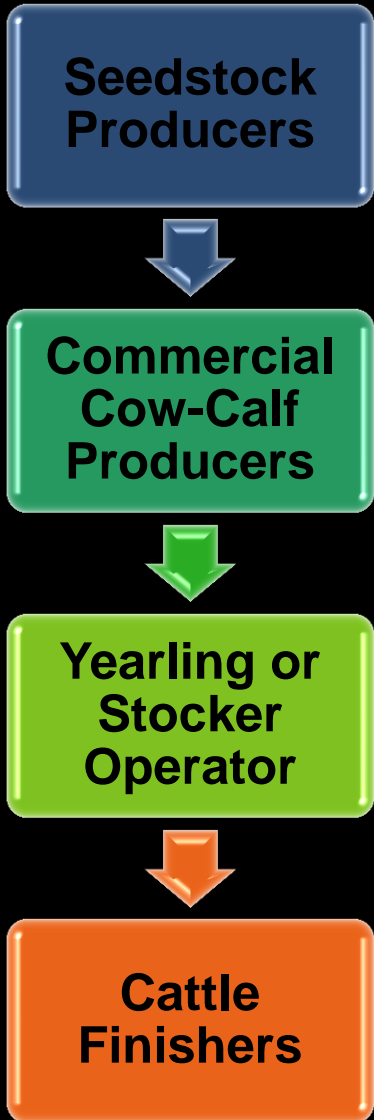
*Determining the most effective means to select for economically important traits based on your breeding program, management & marketing endpoints*

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## Segments of the Beef Industry

## Primary Product Produced/Marketed



Breeding Stock , primarily bulls of breeding age.

Calves (6-10 mos.), 300-700 lb.

Feeder steers & heifers (most of them 12 – 20 months old, weighing 500-900 lb.)

Market steers & heifers, 16-30 mos. 900-1400 lb.

# Characterized by:

- Many final markets & products
- Tremendous biological time lag
- Different traits of economic importance to each segment
- Segments are related & inter-twined but each has its own unique economic/management/marketing factors to consider, therefore.....
- Predatory relationships



# Who controls the selection of genetics of cattle?

- *Purebred breeders*
- Cow/calf operations

*PUREBRED BREEDERS HAVE AN IMMENSE RESPONSIBILITY TO MAKE GENETIC IMPROVEMENT IN ECONOMICALLY IMPORTANT TRAITS!*



Purebred Beef Cattle sell to a very diverse base of clients.

- Cow-calf operations (who may or may not retain ownership past weaning). Product purchased?
- Other purebred seedstock breeders looking to change/improve upon different traits in their operation. Product purchased?
- 4-H and FFA junior exhibitors. Product purchased?

These potential customers are the driving force for what creates value.



# Analyzing Your Production System

What is the best animal?

- ◉ What traits are economically relevant?
- ◉ What genotypes result in the phenotypes (level of performance) that are most profitable?

***The genotype of the animal is just one part of a much larger system !***



# The key to determining the traits of importance and optimal genotypes for those traits is:

- A thorough analysis of the entire system
- Understanding the interaction among the components of the system:
  - Animals (genotypes)
  - Physical Production Environment
  - Fixed Resources & Management
  - Economics (production inputs & marketing endpoints)

Which leads to BREEDING OBJECTIVES – the goal of the breeding program



# Identify Goals and Objectives of Your Breeding Plan

What genotypes/phenotypes fit your resources and intended marketing goals?

What are potential buyers looking for?

- when do they sell their calves?
- how do they sell their calves?

*The traits/performance levels that make \$ for your customers are the same ones that will make \$ for you*





# Master Breeders

1. Have a breeding program designed for the attainment of clearly defined breeding objectives.
2. Have a clear idea where their breed fits relative to other breeds and the industry as a whole. (Realize their breed can not be all things for all producers).
3. Have an identification and performance evaluation program including all Characteristics/Traits/Goals listed in breeding objectives.
4. Use all breeding Tools/Technologies available to pursue breeding objectives
5. Uncompromising (Stubborn?)
6. High Integrity of Records, contemporary groups, measurements, ancestry.
7. Their accomplishments and contributions are typically not recognized until they are very old or deceased.



# Selection and Breeding of Cattle

## Basic Concepts:

- Phenotype = Genotype + Environment

Phenotype can be measured two ways:

- Subjectively
- Objectively



- ◎ Objectively – quantified by numbers, usually measured by machine
- ◎ Subjective – evaluated with the naked eye & subject to the skill & opinion of the evaluator

*Which is better?*



◎ There are many economically important traits that can best be evaluated subjectively by the naked eye.

- Structural soundness (potential longevity)
- Body type (volume & capacity)
- Udder conformation
- Balance, kind & eye appeal



◎ There are many economically important traits that are most accurately measured objectively.

- Weights at birth, weaning & yearling
- Fertility (percent heifer pregnancy, rebreeding intervals, etc)
- Maternal performance (milk)
- Feed intake & conversion rate
- Carcass grades (Quality)



# Basis For Selection:

## Visual appraisal

- long been a means of determining animals breeding and market value
- requires a high degree of skill and experience – competence/accuracy requires the ability to make accurate and complete observations of animals as compared to an ideal
- can lead to error
- extremely important to evaluate many economically important traits that can't be evaluated objectively. For example: structural soundness, udder conformation, volume and capacity (body type), balance and kind.



# Basis For Selection:

Genetic Prediction – generating estimates of genetic merit (breeding value) by a statistical method for predicting random genetic effects. Prediction is based on:

- individual performance records
- progeny performance records
- all relatives performance records (all ancestors, sibs, cousins, grand progeny, etc)
- can also include genomic results





2016 American Royal  
Open & Junior Class Winner  
J&J Angelina 225







# EPDs after genomic typing

ID	BW	WW	YW	Milk	REA
225	2.4	27	48	6	0.46
235	4.0	30	49	4	0.58

At birth: 2.4    27    49    6    0.46

Which would you rather have as a cow?



# Genetic Prediction

- If a trait can be measured objectively & quantified by a number, we can generate EPDs for individual animals within a breed.
- Selection based on EPDs is 5 - 9 times more accurate for objectively measured traits.



# What is the best Bull?

ID	CED	BW	WW	YW	Milk	CEM	\$F
A	13	-2.0	50	90	20	5	40
B	3	4.5	75	140	23	0	70
C	10	1.2	62	110	30	3	55
D	7	2.8	57	105	10	1	55

2017

ave: 6.5 1.5 53 63 17 1.2 52



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If you need a terminal sire for use on mature cows and plan to retain ownership through finishing and sell fed cattle on a carcass value basis?



- Assuming bulls will sire 25 calves a year for 5 years, Bull B has the highest \$F value by \$15 per head over next best option, based on this:

125 offspring x \$15/head = \$1,875 more value for B than next best



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If you have 20 virgin heifers to breed, have full time job that includes constant out of state travel, will use the bull in a terminal mating and sell all calves at weaning?



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If you intent to use the bull on cows & heifers in a rotational mating system that generates your herd replacements and sell all other calves as yearlings?





# Identify What Traits are Important to Your Program

## Replacement females needed?

- fertility
- calving ease
- milk (how much?)
- udder conformation
- potential longevity
- volume and capacity
- Growth (balanced with calving ease and mature size)
- Balancing milk & mature size to your forage resources is critical to achieve reproductive efficiency/profitability



Selection pressure, time & your \$ are all precious commodities & should not be squandered!!

*Breeding objectives should depend on what makes \$ for you & your customers.*

*Accuracy of selection is critical!*

*Use the tools available to your advantage!*



# Questions?

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