

Using Genomics to Make Management Decisions
 Dr. Jared Decker
 University of Missouri

To download session handouts, text HANDOUTS to 313131

Tradition

Legacy

Management Decisions

- Genetic Plan for Herd (a.k.a. breeding objective)
- Bull and Semen Purchases
- Replacement Females
- Nutrition
- Marketing Calf Crop

Management Decisions

- **Genetic Plan for Herd (a.k.a. breeding objective)**
- Bull and Semen Purchases
- Replacement Females
- Nutrition
- Marketing Calf Crop

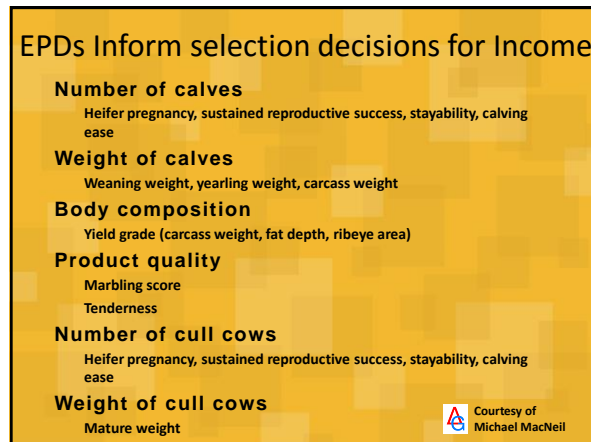
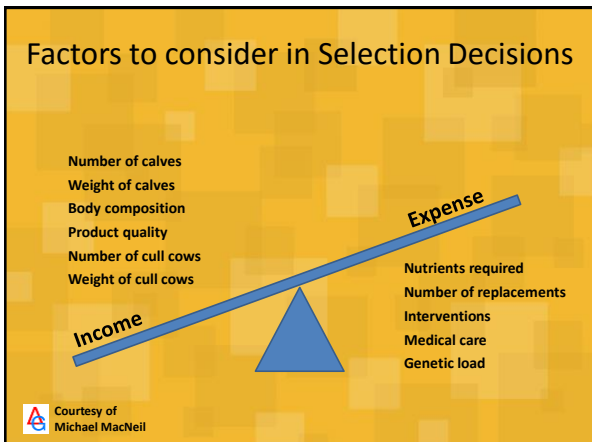
Why would I want to develop a plan?
a.k.a. breeding objective

Focus selection decisions on our economic well being

Make selection decisions more *accurately* and *consistently*

Simplifies evaluation of candidates for selection

Courtesy of Michael MacNeil



Questions

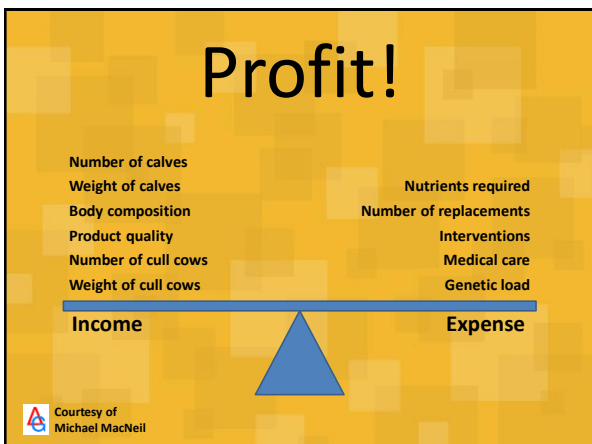
That is a lot of EPD to consider at one time – genetic improvement would be faster if I considered few traits, right?

That depends on how you define “*genetic improvement*”

Individual traits would change more quickly by considering fewer of them

But, what trait should we be maximizing?

Courtesy of Michael MacNeil



What is an economic index?

Combination of EPDs weighted according to their economic importance

Expressed as a dollar value

Breeds have different indexes

Different indexes for different marketing endpoints

Courtesy of Michael MacNeil

Maternal Economic Indexes

Replacement females, calves sold at weaning.

Angus: Weaned Calf Value \$W

Hereford: Baldy Maternal Index BMI\$

Red Angus: HerdBuilder HB

Simmental: All-Purpose Index API

Gelbvieh: \$Cow

Beefmaster: Maternal Index \$M

Terminal Economic Indexes

Growth and Carcass, females not retained.

Angus: Beef Value \$B

Hereford: Certified Hereford Beef Index CHB\$

Red Angus: GridMaster GM

Simmental: Terminal Index TI

Gelbvieh: FPI

Limousin: Mainstream Terminal Index \$MTI

Beefmaster: Terminal Index \$T

Information Overload!

Simplify

Field-Testing \$BEEF

Used embryos from flushes to produce:

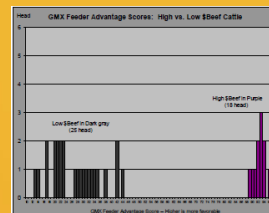
25 Low \$B calves
(average \$47.40 \$B)

18 High \$B calves
(average \$141.12 \$B)

Field-Testing \$BEEF

Low \$B had GeneMax
Feeder Advantage
index average of 27

High \$B had
GeneMax Feeder
Advantage index
average of 94



Field-Testing \$BEEF

- Breeding values (twice the progeny difference) predicted profit differences of \$187.38 between average of the two groups



Field-Testing \$BEEF

- Breeding values (twice the progeny difference) predicted profit differences of \$187.38 between average of the two groups
- **Actual difference was \$215.47**



Management Decisions

- Genetic Plan for Herd (a.k.a. breeding objective)
- **Bull and Semen Purchases**
- Replacement Females
- Nutrition
- Marketing Calf Crop

Simplest Implementation of Genomic Predictions

- **BUY BULLS WITH GE-EPDs**
- Increases EPD precision/reliability
- Identify genetic differences between flush mates
- Equivalent to 10 to 20 progeny
- Reduces risk



Management Decisions

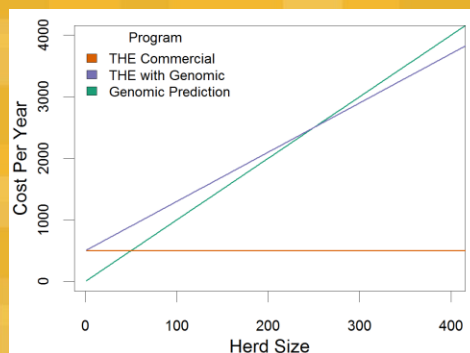
- Genetic Plan for Herd (a.k.a. breeding objective)
- Bull and Semen Purchases
- **Replacement Females**
- Nutrition
- Marketing Calf Crop

Low Tech, Low Cost, Low ROI
Have to have bull selection right!

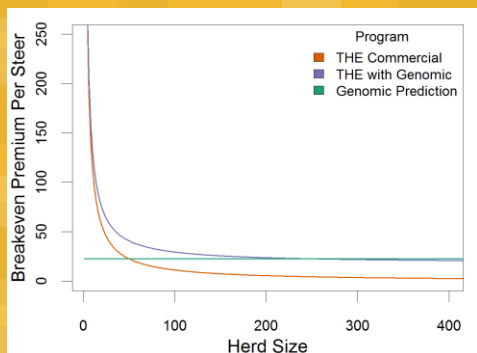
High Tech, Higher Cost, High ROI
Take things to next level

Comparison of genetic predictions for commercial herds

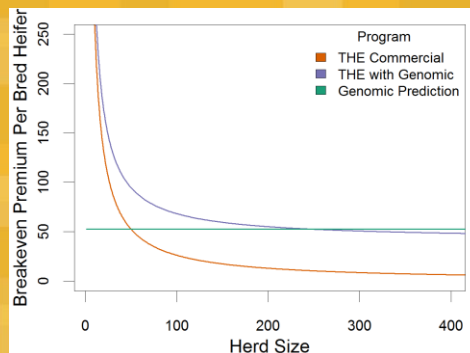
- See handout for more information on available genetic predictions for commercial cattle
- Genomics tests cost of \$25
- Simmental THE \$500 per year
- Simmental THE CHR \$20 per female
- Assume 20% of herd is replaced each year
- Assume 88% weaning rate
- Assume twice as many heifers needed for replacements as are DNA tested.
- Assume 95% of heifers are bred
- Ignore data processing costs and TSU/blood card costs



For genetic prediction, below 50 cows, use genomic tests.
 For genomic-enhanced prediction, below 250 cows, use genomic test.
 For larger herds, use THE option.



Need \$22.73 premium per steer to pay for genomic testing.
 For 400 cows, need \$2.84 premium per steer to pay for THE.



Need \$52.60 premium per bred heifer to pay for genomic testing.
 For 400 cows, need \$6.58 premium per heifer to pay for THE.

Management Decisions

- Genetic Plan for Herd (a.k.a. breeding objective)
- Bull and Semen Purchases
- Replacement Females
- **Nutrition**
- Marketing Calf Crop

Cow Efficiency

Pounds Weaned Per Acre

↑ Number Weaned

↓ Cow Weight

↑ Weaning Weight

Number Weaned

Get Females Bred

Heifer Pregnancy

Stayability/Sustained Cow Fertility

Cows that have a calf year after year

One of the most important traits for profitability!

Number Weaned

Have a live calf

Calving Ease Direct

Only used for mating with heifers!

Not birth weight!

Calving Ease Maternal

If you have problems with dystocia in mature cows, you have a Calving Ease Maternal problem

Cow Weight

Smaller cows require less feed

Mature Cow Weight

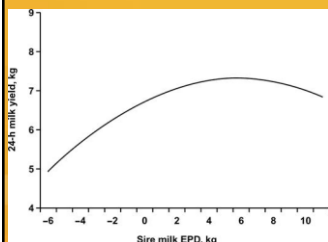
Cow Weight

Smaller cows require less feed

Mature Cow Weight

Bend the growth curve at the mature end!

Increased Milk



Costs you more than it returns

See work by Dave Lalman

Angus Optimal Milk Module

<https://www.angus.org/Performance/OptimalMilk/OptimalMilkMain.aspx>

Cow Efficiency: Crossbreeding

Pounds Weaned Per Acre



Number Weaned



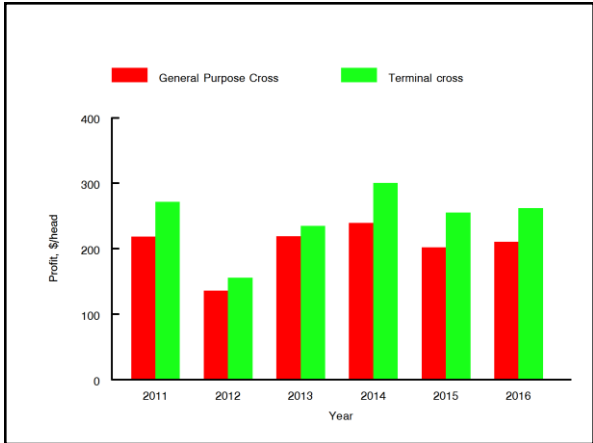
Weaning Weight

Cow Efficiency:
Terminal Crossbreeding
Pounds Weaned Per Acre

↑ Number Weaned

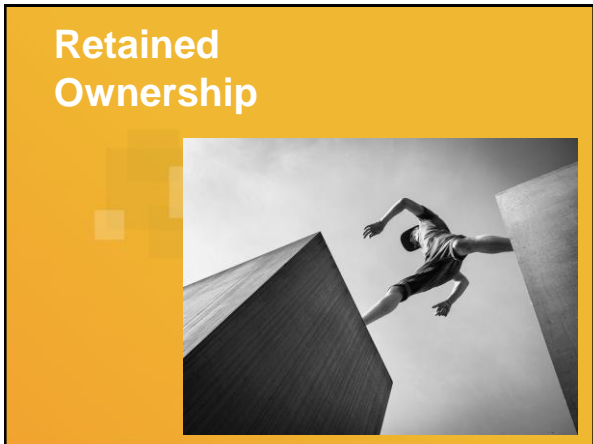
↓ Cow Weight

↑ Weaning Weight



Management Decisions

- Genetic Plan for Herd (a.k.a. breeding objective)
- Bull and Semen Purchases
- Replacement Females
- Nutrition
- **Marketing Calf Crop**



Get Paid For What They Are Worth

Average of heifer crop = Average of steer crop



Top Dollar Angus

- a) Six years of proven historical maternal sire data + current years calf crop sires
 - b) DNA results from GeneSeek or Zoetis
- Use qualifying sires

Kenny Stauffer
308-641-0429
<http://www.topdollarangus.com/>



Reputation Feeder Cattle

EPDs of all the bulls used in your herd for the past 10 years

Ralph Peterson
785-577-0332
<http://reputationfeedercattle.com/>



IGS Feeder Profit Calculator

Modification of ASA's \$TI index using current prices/costs, heterosis, and non-genetic factors (e.g., vaccination status).

Chip Kemp
573.239.0524
<http://www.internationalgeneticsolutions.com/index.php/feeder-profit-calc>



Red Angus Feeder Calf Certification Program

Traceability to at least 50% Red Angus Bloodlines

Chessie Mitchell
(940) 387-3502 Ext. 2
<https://redangus.org/marketing/tagging-programs/>



Hereford Advantage Program

Registered Hereford bulls with transferred ownership.
Hereford bull battery average \$CHB index* value ranking in the top 20% of the breed.

Trey Befort
(816) 842-3757
<https://hereford.org/commercial/feeder-cattle/the-hereford-advantage/>



Angus Source

Sired by registered Angus bulls
Optionally include GMX Focus or GMX Advantage results

816-383-5100
<http://www.angus.org/angussource>



Integrity Beef Alliance

Registered Black Angus, Red Angus, Beefmaster, Hereford, or Charolais having EPDs in top 20 percent of their respective breed for weaning weight and yearling weight

580.224.6430
<http://integritybeef.org/>



BBU E6 Program

At least 50% Beefmaster

210-732-3132
http://www.beefmasters.org/purebred/E6_female.php



Premium Red Baldy Program

Females must be sired by bulls in the top 50% of the breed for Baldy Maternal Index (BMI\$) or Herdbuilder Index (HB).

Trey Befort
(816) 842-3757
Chessie Mitchell
(940) 387-3502, ext. 2
<https://hereford.org/premium-red-baldy/>
<https://redangus.org/marketing/tagging-programs/>

Working On the Business Questions

- What are the goals of my breeding program?
- How should I be marketing my cattle? How can I use genetics to better market my cattle?
- Should I crossbreed? If so, which breeds should I use?
- Should I use a terminal crossbreeding system? If so, should I be buying heifers?
- Which economic selection index should I be focused on?
- Should I be DNA testing my cattle? If so, which ones?
- How can I turn over generations faster?
- What data should I be collecting?
- Who is going to analyze that data for me? Breed association? Private firm?
- Does my breeding program meet my customer's needs?
- How can I provide better customer support?
- Should I be buying my customer's calves?

David Pratt, Ranch Management Consultants, Inc.
<http://blog.steakgenomics.org/2018/02/do-you-own-your-job-or-business-are-you.html>

UNIVERSITY OF MISSOURI



an equal opportunity/access/affirmative action/
pro-disabled and veteran employer

Jared Decker
573-882-2504
DeckerJE@Missouri.edu
<http://blog.steakgenomics.org>