Changes in the U.S. Cowherd: Implications for Cow Efficiency

Florida Beef Cattle Short Course
May 9, 2018

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Where we are now
Today cattle have tremendous capacity for post-weaning growth and carcass weight.
Figure 3. Relative genetic trends for yearling weight (lb) of the seven most highly used beef breeds (3a) and all breeds that submitted 2017 trends (3b) adjusted for birth year 2015 using the 2017 across-breed EPD adjustment factors.

3a.
Finishing Phase Performance

ADG, lbs

Jan-91  Jan-93  Jan-95  Jan-97  Jan-99  Jan-01  Jan-03  Jan-05  Jan-07  Jan-09  Jan-11  Jan-13  Jan-15  Jan-17
Carcass Weights
Federally Inspected

Graph showing carcass weights for Steers, Heifers, and Cows from 1993 to 2020.
Reproduction
Beef Calf Crop Percent
Estimated from USDA NASS Data

Source: Dr. Derrell Peel, Oklahoma State University
Where do we go from here?

If you are like me, and want to grab every opportunity that comes your way, repeat after me:

The answer is YES!
Now, what was the question?

Richard Branson
Selection and development of females that excel in fertility, lower cost of production, AND maintain post-weaning characteristics.
Profitability Differences

Pendell et al., 2015 (KFMA data)

- 79 operations with data from 2010 through 2014
- High profit 1/3 averaged $415 more net return per cow compared to low profit 1/3
- 32.2% difference due to gross income
  - Weaning weight
  - Weaning rate
  - Calf price
  - Cull cow income
- 67.8% difference due to reduced cost
Value vs Cost of Added Weaning Weight

Pendell et al., 2015 (KFMA data)

- 1 pound of added weaning weight = $0.86 added cost per cow
- 234 weekly sale reports (2010 – 2014) from Oklahoma National Stockyards value of gain = $0.85 ± 0.33
Reproductive Efficiency / Fertility / Stayability
Stayability

- Total Herd Reporting (THR)
- Stayability – improves cowherd efficiency through reduced replacement rate
- Available for
  - Red Angus
  - Simmental
  - Simbrah
  - Gelbvieh
  - Limousin
  - Saler
Emphasis on fertility has been quietly expanding since 1995

- Red Angus initiated THR and Stayability in 1995
  - Positive observation
    - Must calve as a 2-yr-old
    - Produce calf every year until at least 6
  - Negative observation
    - Miss a calf / open
    - Culled for soundness, production, disposition, BCS, etc.
Six unit improvement is equivalent to:

*89% weaning rate in 1990 to 92% weaning rate in 2017*
Beef Calf Crop Percent
Estimated from USDA NASS Data

Source: Dr. Derrell Peel, Oklahoma State University
AHA Releases New Fertility Traits

The American Hereford Association (AHA) is in its 15th year of Whole Herd Reporting. Recently, this program allowed for the development of two new fertility traits, Heifer Calving Rate (HCR) and Sustained Cow Fertility (SCF), which have been released as a research analysis on the AHA website at Hereford.org.

These two traits will become part of the full evaluation in the near future and will be added to the $ Indexes. But today they are just reported as research with no correlation to any other traits and have no genomic component.

fertility expected progeny differences (EPDs).

Heifer Calving Rate

The Heifer Calving Rate EPDs are produced from an animal model genetic evaluation for 293,313 animals encompassing a six-generation pedigree. Heifer calving records were analyzed as a categorical trait in which more than 98,000 records were used in the binary analysis as calved and not calved, based on recorded calf birth date.

The contemporary groups were defined as herd, first-calf heifer yearling contemporary group, calf birth year and at first calving between 600-800 days was used as part of edits along with checks for contemporary group variation. Heifer calving rate for the dataset was 73%, under the criterion that the heifers calved by 800 days of age. The heritability for heifer calving rate is 15, which is consistent with the magnitude of estimates for lowly heritable reproductive traits but still allows for genetic progress.

The following example depicts a comparison between two sires for their HCR EPDs to describe genetic differences in future daughter calving rate. Note that a higher
Both bulls have over 270 daughters in production. One bull has SCF = 39, and one bull has SCF = -6.

Given 100 2-yr-old daughters each, the more fertile bull has probability of 45 more 12-yr-old daughters still in the herd 10 yr from now.
Mature Size

Results of a century of breeding

Champions 1835 and 1937
Genetic Trend For Cow Weight
Angus and Hereford
Mature Weight Genetic Trend
Red Angus

Graph showing the trend of MWT EPD (Economic Production Difference) from 1970 to 2010. The trend line indicates an increase in MWT EPD from 1970 to 1990, followed by a gradual decrease from 1990 to 2010.
Cow Weight at Weaning
Red Angus
Calf WW vs Cow BW

\[ y = 0.0607x + 459 \]

*Each 100 lb cow weight increases cow costs by $35 to $45 annually*
Figure 4. Relative genetic trends for maternal milk (lb) of the seven most highly used beef breeds (4a) and all breeds that submitted 2017 trends (4b) adjusted for birth year 2015 using the 2017 across-breed EPD adjustment factors.
Peak Milk Yield
Spencer and Bayliff, 2016

- Commercial Angus herd
- Spring calving
- Sire milk EPDs: above breed avg
- Peak yield (May) = 31 lb
y = 3.7456x + 73.602

10% more peak yield = 5% more MER

Ferrell and Jenkins (1987) and Montano-Bermudez et al. (1990)
Conversion of Milk to Calf Gain
How much high-quality forage or similar mixed ration does it take to make a pound of milk?
Range Cow Research Center
Spencer and Bayliff, 2017

DMI Influence on Milk Yield

\[ y = 0.4801x + 9.4476 \]

\[ R^2 = 0.5172 \]

Daily Milk Yield (lbs.)

Daily DMI (lbs.)

lb feed : lb milk conversion is about 2:1
Increasing milk yield is relatively efficient

More milk = more weaning weight

Avg of 5 studies: 55 lbs milk per 1 lb added calf gain

How much feed to the cow? $2 \times 55 = 110$ lbs
Forage abundance and quality frequently limit milk yield

Brown et al., 2005
Peak Milk Yield
Andresen, 2017

- Commercial Angus and H X A
- Fall calving
- Sire milk EPDs: below breed avg
- Peak yield (November)
- Ang = 22 lbs
- Herf X Ang = 20 lbs
Maintenance

Growth
What happens to cow maintenance costs with aggressive selection for growth, gradual increases in cow size (primarily from increased visceral organ mass), and genetic potential for milk?
MAINTENANCE REQUIREMENTS

APPETITE

There is a limit to what your forage system can support
Relationship Between DMI and Feed/Gain and ADG for 750 lb Steers at Hitch 1 (2013 - 2017)

\[ y = 0.1954x - 0.6819 \]

\[ R^2 = 0.6267 \]

1,018 Lots

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean</th>
<th>Range</th>
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<tbody>
<tr>
<td>Death Loss</td>
<td>2.01</td>
<td>0.00 - 7.55</td>
</tr>
<tr>
<td>DMI</td>
<td>21.59</td>
<td>17.01 - 25.92</td>
</tr>
<tr>
<td>ADG</td>
<td>3.54</td>
<td>2.60 - 4.83</td>
</tr>
<tr>
<td>Feed/Gain</td>
<td>6.13</td>
<td>5.00 - 7.53</td>
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</table>

Source: Dr. Britt Hicks, 2018
Genetic Trend For DMI
Angus, Hereford
Growing cattle consuming high-quality concentrate or high-quality mixed diets

Positive relationship between DMI for concentrate and forage diets

- Foote et al., 2017: .51
- Cassaday et al., 2016: .58

Little or negative relationship between concentrate and forage ADG

- Foote et al., 2017: -.09
- Cassaday et al., 2016: -.3
# Retallick et al., 2017: ADG

<table>
<thead>
<tr>
<th>Breed</th>
<th>Gain, lb/d</th>
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<tbody>
<tr>
<td>South Devon</td>
<td>0.07</td>
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<tr>
<td>Angus</td>
<td>0.00</td>
</tr>
<tr>
<td>Hereford</td>
<td>-0.11</td>
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<tr>
<td>Simmental</td>
<td>-0.33</td>
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<tr>
<td>Charlolais</td>
<td>-0.37</td>
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<tr>
<td>Red Angus</td>
<td>-0.42</td>
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<tr>
<td>Beefmaster</td>
<td>-0.44</td>
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<tr>
<td>Santa Gertrudis</td>
<td>-0.55</td>
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<tr>
<td>Gelbvieh</td>
<td>-0.55</td>
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<tr>
<td>Brangus</td>
<td>-0.57</td>
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<tr>
<td>Limousin</td>
<td>-0.77</td>
</tr>
<tr>
<td>Brahman</td>
<td>-0.90</td>
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</tbody>
</table>
Breed | DMI, lb/d
--- | ---
South Devon | -3.48
**Beefmaster** | -3.44
Limousin | -3.24
**Brahman** | -2.97
Santa Gertrudis | -2.29
Hereford | -2.11
Charolais | -1.94
Gelbvieh | -1.59
Red Angus | -1.50
**Brangus** | -1.30
Simmental | -1.17
Angus | 0.00
## Retallick et al., 2017: Efficiency

<table>
<thead>
<tr>
<th>Breed</th>
<th>Efficiency</th>
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<tr>
<td>South Devon</td>
<td>0.200</td>
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<tr>
<td>Beefmaster</td>
<td>0.096</td>
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<tr>
<td>Hereford</td>
<td>0.090</td>
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<tr>
<td>Charlolais</td>
<td>0.030</td>
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<tr>
<td>Limousin</td>
<td>0.017</td>
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<tr>
<td>Santa Gertrudis</td>
<td>0.012</td>
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<tr>
<td>Angus</td>
<td>0.000</td>
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<tr>
<td>Red Angus</td>
<td>-0.004</td>
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<tr>
<td>Simmental</td>
<td>-0.004</td>
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<tr>
<td>Brahman</td>
<td>-0.023</td>
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<tr>
<td>Gelbvieh</td>
<td>-0.027</td>
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<tr>
<td>Brangus</td>
<td>-0.049</td>
</tr>
</tbody>
</table>
Summary

- Inputs have been adjusted to maintain a higher input cow herd
- Fertility is beginning to improve and new tools will help
- In MANY cases, modest negative pressure on milk production would improve the match to forage resources
- DMI and Mature Cow Weight EPD’s are relatively new and beginning to have a positive impact
- Matching cows to forage = MODERATE milk, growth, feed intake and mature size
- With today’s tools there is no need to give up (go backwards) on post-weaning performance, carcass yield, or quality