Cow Milk Production vs Calf Size

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Milk Production vs Calf Size

• Systems approach rather than a calf output approach
  – Calf Output
    • Weaning
    • Postweaning
  – Cow Pregnancy Rate
    • Longevity of the cowherd
  – Production Costs
  – Carrying capacity
  – Flexibility in the System
    • Production Risks
    • Drought/high rainfall, etc
Beef Cattle Industry Ideology

• Measuring outputs is more meaningful than inputs
  – Weaning weight over production costs

• Modify environments in order to “get heavier calves, greater percent calf crop and more total pounds”
  – Little regard to production costs
  – Rather than increasing net return
Reproduction Drives Production Efficiency

• Reproduction is the main factor limiting production efficiency in the beef cow herd (Dickerson, 1970)
  – Greatest production loss in the cow/calf segment (Bellows and Short, 1994)

• Reproduction is 5x more economically important than traits like:
  – Milk production
  – Calf growth (Trenkle and Willham, 1977)
Profitability in Cow/Calf Production

• Two largest factors for profitability from financial and production data from Illinois and Iowa
  – Feed costs – > 50% of variation in profit
  – Depreciation and operation costs – 17% of variation

• Calf BW
  – 5% influence in profitability

Miller et al., 2001
# Nebraska & South Dakota Beef Cow-Calf Per Cow; 2015

<table>
<thead>
<tr>
<th>Metric</th>
<th>Top 35%</th>
<th>Herd Ave</th>
<th>Bottom 20%</th>
<th>Dif</th>
<th>% Dif</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of production/cwt</td>
<td>132.96</td>
<td>137.71</td>
<td>155.53</td>
<td>-$22.57</td>
<td>16%</td>
</tr>
<tr>
<td>Number of cows</td>
<td>122.2</td>
<td>158.6</td>
<td>137.8</td>
<td>-15.6</td>
<td>-11%</td>
</tr>
<tr>
<td>Cows per FTE</td>
<td>656.3</td>
<td>617.7</td>
<td>325</td>
<td>331.3</td>
<td>102%</td>
</tr>
<tr>
<td>Culling percentage</td>
<td>15.8</td>
<td>17.1</td>
<td>28.6</td>
<td></td>
<td>-12.8%</td>
</tr>
<tr>
<td>Calving percentage</td>
<td>95.2</td>
<td>94.4</td>
<td>95.6</td>
<td></td>
<td>-.4%</td>
</tr>
<tr>
<td>Weaning percentage</td>
<td>91</td>
<td>90.7</td>
<td>94.1</td>
<td></td>
<td>-3.1%</td>
</tr>
<tr>
<td>Calves sold per cow</td>
<td>.89</td>
<td>.90</td>
<td>.93</td>
<td>-.04</td>
<td>4%</td>
</tr>
<tr>
<td>Calf death loss percent</td>
<td>2.9</td>
<td>3.2</td>
<td>4.5</td>
<td></td>
<td>-1.6%</td>
</tr>
<tr>
<td>Avg. sale wt. of calves</td>
<td>535</td>
<td>560</td>
<td>598</td>
<td>-63 lbs</td>
<td>-11%</td>
</tr>
<tr>
<td>Ave weaning weight</td>
<td>485</td>
<td>520</td>
<td>535</td>
<td>-50 lbs</td>
<td>-9%</td>
</tr>
<tr>
<td>Lbs. weaned/exposed female</td>
<td>441</td>
<td>472</td>
<td>503</td>
<td>62 lbs</td>
<td>-12%</td>
</tr>
</tbody>
</table>

Benchmark Report, 40 farms FINBIN© University of Minnesota
Matching Genetic Potential with Forage Resources
Relationship of sire milk EPD and 24-h milk yield

Brown et al. 2005
Average weaning weight in commercial cow/calf operations

- NM, TX, OK
- ND

Environment constraint?

Bevers, 2012
CHAPS: Average 205-d weaning weight in commercial cow/calf operations

Ramsay et al., 2019
Milk and Calf Gain

• Is there a limit of milk production that YOUR forage can support?

• Is there a limit calf milk intake/milk production that will support additional gain?
Meta-analysis of 20 published papers on Milk and Calf Weaning Weight

Milk Production, lb/d

Calf Weaning Weight, lb

\[ y = 7.8944x + 361.19 \]

\[ R^2 = 0.1874 \]

Mulliniks et al. 2020
When does milk influence calf growth?

**60 days of age**

\[ y = 1.85x + 105.78 \]
\[ R^2 = 0.1886 \]

**205 days of age**

\[ y = -0.3923x^2 + 19.838x + 390.05 \]
\[ R^2 = 0.1216 \]

Edwards et al. 2017
Milk Production and Early Calf Growth

- Energy intake ~ 86% from milk at 45 d of age
- Forage intake greater in progeny of low milking dams

The graph shows the relationship between peak milk production (lb/d) and calf BW (lb). The equation of the line is:

\[ y = 1.85x + 105.78 \]

with an R² value of 0.1886.
Milk Production and Post-Peak Lactation Growth

- Energy intake from milk ~ 19% by weaning
- Calf growth after peak lactation
  - Similar across milk groups
- Forage intake greater in progeny of low milking dams
  - Offset nutrient intake with forage intake
  - Dependent on forage quality

\[ y = -0.3923x^2 + 19.838x + 390.05 \]
\[ R^2 = 0.1216 \]
Milk influence in different environments

Humid Environment - Tennessee

Semi-arid Environment - Nebraska

\[y = -0.3923x^2 + 19.838x + 390.05\]

\[R^2 = 0.1216\]

\[y = 6.39x + 436.92\]

\[R^2 = 0.141\]
Impact of Milk on Calf Weaning Weight

• Milk drives calf growth up to peak lactation
  – Highly variable response post peak lactation

• Forage quality after peak lactation impacts growth
  – Forage intake can offset lack of milk
    • High vs Low forage quality
Selection for Milk Impacts More than Calf Growth

What about the entire production system??
Increased Milk Can Decrease Pregnancy Rates

- 237 Spring-calving Angus cows
- Fed high-quality forage diet

*P = 0.03*

Edwards et al., 2017
Milk Production and Resumption of Estrus in Young Cows in NM

\[ y = 3.6461x + 36.477 \]

\[ R^2 = 0.3802 \]

Mulliniks et al. 2020
Net energy balance during breeding by calving season in Nebraska Sandhills

Mulliniks and Adams, 2019
Forage Intake Needed to Meet Protein Requirements for Milk

- 10 lb milk/day
- 20 lb milk/day
- 30 lb milk/day

Legend: 12% - blue, 8% - red, 4% - green
Comparison of Genetic x Environment on Productivity

Tennessee
• High growth potential
• High milk potential
• High forage growth and feed input

New Mexico
• Moderate growth
• Low milk potential
• Limited forage availability
• Low feed input
Milk Production and Calf Weaning Weight in Two Different Environments

24-hr Milk Production, lb

- Tennessee: 24.2 lb
- New Mexico: 13.2 lb

Calf Weaning Weight, lb

- Tennessee: 612 lb
- New Mexico: 561 lb

TN: 25 lb Calf Weaned/1 lb of Milk
NM: 43 lb Calf Weaned/1 lb of Milk
Pregnancy Rate and Pounds of Calf Weaned Per Cow Exposed

Pregnancy Rate, %
- Tennessee: 88%
- New Mexico: 96%

Pounds of Calf Weaned Per Cow Exposed
- Tennessee: 539
- New Mexico: 539
NM vs TN Evaluation

• Take into account cow retention
  – 61% retention rate at 5 yr of age in NM
  – 44% retention rate at 5 yr of age in TN

• Cost of production
  – Lower cost of production in NM
    • ~$300 – 400 decrease in cost of production
# Effect of Milk on Feedlot Performance

<table>
<thead>
<tr>
<th>Item</th>
<th>Low</th>
<th>Moderate</th>
<th>High</th>
<th>SEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Days</td>
<td>205</td>
<td>205</td>
<td>205</td>
<td>--</td>
</tr>
<tr>
<td>Initial BW, lb</td>
<td>539</td>
<td>548</td>
<td>570</td>
<td>29</td>
</tr>
<tr>
<td>Gain, lb/d</td>
<td>2.90</td>
<td>2.82</td>
<td>2.86</td>
<td>0.13</td>
</tr>
<tr>
<td>DMI, lb/d</td>
<td>18.41</td>
<td>18.90</td>
<td>19.00</td>
<td>0.59</td>
</tr>
<tr>
<td>Gain/feed</td>
<td><strong>0.157</strong></td>
<td><strong>0.149</strong></td>
<td><strong>0.150</strong></td>
<td>0.07</td>
</tr>
</tbody>
</table>

**Lewis et al. 1990**

**Increased Energy Requirements = Decreased Feedlot Efficiency!**
Conclusion

• We have a tendency to overdue things
  – Larger milking cows increase production risks, increase costs
• Matching cows to the environment
  – Balancing act
Increasing Milk Increases Risk

• Minimal Increase in Calf Growth
  – Potential for no increase in calf growth
• Feed resources may limit expression of milk
• Production System Impact
  – May decrease reproductive efficiency
  – May decrease post-weaning calf efficiency
  – Production costs increase
Questions