Crossbreeding Beef on Dairy

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Why the interest in beef on dairy?

- Add value to calves
- Too many dairy replacement heifers
- Improved profitability
- Calving ease
- Develop a genetic strategy for dairy herd
- Consistent end product
- ~5% in USA (Angus, Limousin, SimAngus)
Breeding to Feeding

A New Profit Stream for U.S. Dairies

The state of today’s dairy and beef industries have made Breeding to Feeding™ a clear way to connect beef supply with demand.

- Tight beef supplies worldwide have fueled high beef prices.
- This year’s beef calf crop and cow herd are at their smallest levels in more than 60 years. Beef calf numbers have declined each year since 1995.
- Feedlots and packers are searching for uniform, quality cattle, which efficiently convert feed to gain.
- Dairy steers make up a significant portion of the U.S. beef supply.
- Dairies can capture more revenue by providing a consistent supply of dairy-beef calves bred for uniformity, quality, growth, and feedlot performance.
- Many dairy producers produce an abundance of heifers – more than enough to replenish their milking herd – due to improved reproduction and new technologies.

ABS InFocus™

ABS InFocus (Bull x Dairy)

ABS InFocus identifies the strategic use of proven beef sires on dairy cows within a comprehensive breeding plan. InFocus enables dairies to increase cash flow and improve future herd genetics. Lower performing cows are bred to beef and calves are sold at a premium. Top performing cows are used for heifer replacements.

ABS Beef x Dairy Advantage

There are clear differences between beef bulls when tested on dairy cows for fertility, calving ease, still birth and calf quality. The ABS Beef World Data™ program monitors these results and graduates only those sires with a competitive advantage over proven dairy beef sires.

- Increased Fertility: ABS bulls are a proven dairy fertility results, and bulls that achieve a 5-star ranking perform 2.3 percentage points better for conception rate than industry average. This leads to more cows in lactation and reduces the number of units to achieve pregnancy.
- Improved Calving Ease: Improved calving ease reduces stress in the maternity pen and gets cows back on peak milk earlier. The industry average for Holstein calving difficulty is significantly greater than InFocus sires.
- Reduced Still Birth: InFocus sires reduce the still birth rate by more than half compared to Holstein breed averages.
- Calf Quality: ABS InFocus sires are designed to produce superior beef cattle from dairy cows, in terms of health, growth rate, feed efficiency and carcass merit. InFocus calves significantly outperform dairy steers and generally exceed dairy beef.

InFocus Angus and Holstein data based on >20,000 observations Holstein heifers and lactating cows.
The Big Unknowns

- What breeds complement each other?
- Are there sire differences?
- How do we feed these animals?
- How will these beef x dairy crossbreds affect the beef market?
Selection of breeds

- Select semen from top bulls and breeds
- Black maybe good, but might not be the answer
- Want a calf that looks like a beef animal
- Maximize growth – may desire to think from a feedlot mentality
- Understand the beef markets
# Beef breed differences

<table>
<thead>
<tr>
<th>Breed</th>
<th>Birth weight (lb)</th>
<th>Marbling Score</th>
<th>Ribeye Area (in²)</th>
<th>Fat Thickness (in)</th>
<th>Carcass Weight (lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angus</td>
<td>85.5</td>
<td>5.67</td>
<td>13.78</td>
<td>0.662</td>
<td>937.3</td>
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<tr>
<td>Red Angus</td>
<td>85.5</td>
<td>5.47</td>
<td>13.47</td>
<td>0.635</td>
<td>901.2</td>
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<tr>
<td>Charolais</td>
<td>91.1</td>
<td>4.94</td>
<td>14.70</td>
<td>0.456</td>
<td>922.4</td>
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<tr>
<td>Gelbvieh</td>
<td>87.5</td>
<td>4.97</td>
<td>14.46</td>
<td>0.536</td>
<td>914.9</td>
</tr>
<tr>
<td>Hereford</td>
<td>88.6</td>
<td>4.91</td>
<td>13.62</td>
<td>0.586</td>
<td>890.3</td>
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<tr>
<td>Limousin</td>
<td>87.5</td>
<td>4.90</td>
<td>14.80</td>
<td>0.517</td>
<td>911.2</td>
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<tr>
<td>Simmental</td>
<td>88.9</td>
<td>5.06</td>
<td>14.52</td>
<td>0.495</td>
<td>920.1</td>
</tr>
</tbody>
</table>

Kuehn and Thallman 2019, 2018 Across Breed EPD Table and Improvements. Beefimprovement.org
Angus

- Small frame, high quality carcass
- Well-marbled meat
- Naturally polled
- Vigorous breed

Hereford

- Docile and easy handling
- Superior foraging ability, vigor and hardiness
- Fast growing cattle with good beef quality
Charolais

- Good growth, heavy muscling in round and loin
- Calving ease
- Large frame animal
- Fit into any system

Limousin

- Early maturing, lean beef
- High yield of saleable meat – The Carcass breed
- Excellent feed efficiency
Simmental

- Excellent feed conversion and efficiency
- Calving ease
- Good growth rates

Gelbvieh

- Early maturing, excellent temperament
- High cutout yields – large ribeye area
- Good birth weight of calves
- Lean breed
European breeds

- Calving ease, muscle development, growth rate, hide color and meat color

- Belgian Blue
- Charolais Excellence
- INRA95
  - Charolais
  - Blonde d’Aquitaine
  - Limousin
  - Maine Anjou
Viking Red crossbreeding
### Averages for genetic groups

<table>
<thead>
<tr>
<th>Trait</th>
<th>H64</th>
<th>HO</th>
<th>HI</th>
<th>LO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth weight (lb)</td>
<td>91.5a</td>
<td>94.1a</td>
<td>91.9a</td>
<td>79.6a</td>
</tr>
<tr>
<td>Weaning weight (lb)</td>
<td>223.8b</td>
<td>228.4a,b</td>
<td>250.4a</td>
<td>218.3b</td>
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<tr>
<td>Hip height (in)</td>
<td>37.8a,b</td>
<td>37.8a,b</td>
<td>38.7a</td>
<td>36.8b</td>
</tr>
<tr>
<td>Weight gain (lb)</td>
<td>132.1a</td>
<td>134.3a</td>
<td>158.5b</td>
<td>138.7a</td>
</tr>
<tr>
<td>Average daily gain (lb/d)</td>
<td>1.46</td>
<td>1.48</td>
<td>1.65</td>
<td>1.52</td>
</tr>
</tbody>
</table>

Means within rows with different superscripts are significantly different ($P < 0.05$)
<table>
<thead>
<tr>
<th>Trait</th>
<th>H64</th>
<th>HO</th>
<th>HI</th>
<th>LO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final live weight (lb)</td>
<td>1,031&lt;sub&gt;a,c&lt;/sub&gt;</td>
<td>1,090&lt;sub&gt;a,b&lt;/sub&gt;</td>
<td>1,167&lt;sub&gt;b&lt;/sub&gt;</td>
<td>958&lt;sub&gt;c&lt;/sub&gt;</td>
</tr>
<tr>
<td>Carcass weight (lb)</td>
<td>566&lt;sup&gt;a&lt;/sup&gt;</td>
<td>578&lt;sup&gt;a&lt;/sup&gt;</td>
<td>634&lt;sup&gt;b&lt;/sup&gt;</td>
<td>507&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>Fat thickness (in)</td>
<td>0.18</td>
<td>0.20</td>
<td>0.24</td>
<td>0.17</td>
</tr>
<tr>
<td>Ribeye area (in&lt;sup&gt;2&lt;/sup&gt;)</td>
<td>10.2&lt;sup&gt;a&lt;/sup&gt;</td>
<td>9.8&lt;sub&gt;a,b&lt;/sub&gt;</td>
<td>10.2&lt;sup&gt;a&lt;/sup&gt;</td>
<td>9.1&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>KPH fat (%)</td>
<td>1.5&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.5&lt;sub&gt;a,b&lt;/sub&gt;</td>
<td>1.4&lt;sup&gt;b&lt;/sup&gt;</td>
<td>1.5&lt;sub&gt;a,b&lt;/sub&gt;</td>
</tr>
<tr>
<td>Dressing percentage (%)</td>
<td>56.0&lt;sup&gt;a&lt;/sup&gt;</td>
<td>53.9&lt;sup&gt;c&lt;/sup&gt;</td>
<td>55.3&lt;sub&gt;a,b&lt;/sub&gt;</td>
<td>54.4&lt;sub&gt;b,c&lt;/sub&gt;</td>
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</table>

Means within rows with different superscripts are significantly different ($P < 0.05$)
Marbling and Yield Grade for genetic groups

<table>
<thead>
<tr>
<th>Trait</th>
<th>H64</th>
<th>HO</th>
<th>HI</th>
<th>LO</th>
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</thead>
<tbody>
<tr>
<td>Marbling$^1$</td>
<td>3.8</td>
<td>3.9</td>
<td>3.7</td>
<td>3.6</td>
</tr>
<tr>
<td>Maturity$^2$</td>
<td>1.4</td>
<td>1.3</td>
<td>1.3</td>
<td>1.3</td>
</tr>
<tr>
<td>Yield grade (units)</td>
<td>$1.6^a$</td>
<td>$1.7^{a,b}$</td>
<td>$1.8^b$</td>
<td>$1.7^{a,b}$</td>
</tr>
</tbody>
</table>

Means within rows with different superscripts are significantly different ($P < 0.05$)

$^1$ Slightly Abundant = 1, Moderate = 2, Small = 3, Slight = 4, Traces = 5

$^2$ Maturity A = 1, Maturity B = 2, Maturity C = 3
Limousin x Jersey research

- 31 Limousin x Jersey strip loins
- 25 Certified Angus Beef (CAB) strip loins
- Carcass measurements and sensory panel
- SDSU 2012 study
## Palatability of beef

Table 1. Least Squared means of WBSF, and palatability traits of Limousin x Jersey and CAB steaks.

<table>
<thead>
<tr>
<th>Item</th>
<th>Treatment</th>
<th>SEM</th>
<th>Certified Angus Beef</th>
<th>SEM</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>WBSF (kg)</td>
<td>Limousin x Jersey</td>
<td>2.58x</td>
<td>0.08</td>
<td>2.22y</td>
<td>0.09</td>
</tr>
<tr>
<td>Tenderness</td>
<td></td>
<td>5.78</td>
<td>0.11</td>
<td>5.97</td>
<td>0.12</td>
</tr>
<tr>
<td>Juiciness</td>
<td></td>
<td>5.34</td>
<td>0.08</td>
<td>5.52</td>
<td>0.09</td>
</tr>
<tr>
<td>Beef Flavor</td>
<td></td>
<td>6.11</td>
<td>0.07</td>
<td>6.19</td>
<td>0.08</td>
</tr>
<tr>
<td>Off Flavor</td>
<td></td>
<td>7.68</td>
<td>0.04</td>
<td>7.65</td>
<td>0.04</td>
</tr>
</tbody>
</table>

*WBSF = Warner-Bratzler shear force; Tenderness: 1 = Extremely tough, 8 = Extremely tender; Juiciness: 1 = Extremely dry, 8 = Extremely juicy; Beef Flavor: 1 = Extremely bland, 8 = Extremely intense; Off Flavor: 1 = Extremely intense, 8 = Non detectable

y Means within rows with different superscripts differ (P < 0.05)
## Sire differences

<table>
<thead>
<tr>
<th>Item</th>
<th>Sire A&lt;sup&gt;a&lt;/sup&gt;</th>
<th>SEM</th>
<th>Sire B&lt;sup&gt;b&lt;/sup&gt;</th>
<th>SEM</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>12&lt;sup&gt;th&lt;/sup&gt; Rib Fat Thickness (in)</td>
<td>2.84</td>
<td>0.08</td>
<td>2.8</td>
<td>0.05</td>
<td>0.8589</td>
</tr>
<tr>
<td>Hot Carcass Weight (lbs.)</td>
<td>759.38</td>
<td>17.69</td>
<td>787.61</td>
<td>10.43</td>
<td>0.1798</td>
</tr>
<tr>
<td>Ribeye Area (in&lt;sup&gt;2&lt;/sup&gt;)</td>
<td>14.16</td>
<td>0.38</td>
<td>14.46</td>
<td>0.22</td>
<td>0.5022</td>
</tr>
<tr>
<td>KPH&lt;sup&gt;c&lt;/sup&gt; (%)</td>
<td>2.25</td>
<td>0.11</td>
<td>2.37</td>
<td>0.06</td>
<td>0.3395</td>
</tr>
<tr>
<td>Yield Grade</td>
<td>2.10</td>
<td>0.15</td>
<td>2.17</td>
<td>0.09</td>
<td>0.7062</td>
</tr>
<tr>
<td>Marbling Score&lt;sup&gt;d&lt;/sup&gt;</td>
<td>400.00</td>
<td>49.15</td>
<td>399.57</td>
<td>11.30</td>
<td>0.9845</td>
</tr>
<tr>
<td>Lean Maturity&lt;sup&gt;e&lt;/sup&gt;</td>
<td>162.50</td>
<td>6.95</td>
<td>168.70</td>
<td>4.10</td>
<td>0.4489</td>
</tr>
<tr>
<td>Skeletal Maturity&lt;sup&gt;e&lt;/sup&gt;</td>
<td>152.50</td>
<td>5.30</td>
<td>155.22</td>
<td>3.13</td>
<td>0.6622</td>
</tr>
</tbody>
</table>

<sup>a</sup> Wulf Limousin x Jersey sire 137LM3270, n = 8
<sup>b</sup> Wulf Limousin x Jersey sire 137LM3405, n = 23
<sup>c</sup> Kidney, Pelvic, Heart fat
<sup>d</sup> Slight 00 = 300, Small = 400
<sup>e</sup> A 00 = 100, B 00 = 200

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Bumsted et al. 2012, Tenderness and beef palatability traits of Limousin Jersey cross bred steers and Certified Angus Beef.
# Quality grade

Table 4. Palatability and WBSF values of Limousin x Jersey steaks based upon Quality Grade.

<table>
<thead>
<tr>
<th>Item</th>
<th>USDA Choice</th>
<th>SEM</th>
<th>USDA Select</th>
<th>SEM</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tenderness</td>
<td>5.49&lt;sup&gt;y&lt;/sup&gt;</td>
<td>0.14</td>
<td>6.00&lt;sup&gt;x&lt;/sup&gt;</td>
<td>0.11</td>
<td>0.0078</td>
</tr>
<tr>
<td>Juiciness</td>
<td>5.31</td>
<td>0.12</td>
<td>5.36</td>
<td>0.11</td>
<td>0.7266</td>
</tr>
<tr>
<td>Beef Flavor</td>
<td>5.91&lt;sup&gt;y&lt;/sup&gt;</td>
<td>0.09</td>
<td>6.25&lt;sup&gt;x&lt;/sup&gt;</td>
<td>0.08</td>
<td>0.0076</td>
</tr>
<tr>
<td>Off Flavor</td>
<td>7.62</td>
<td>0.06</td>
<td>7.71</td>
<td>0.05</td>
<td>0.2349</td>
</tr>
<tr>
<td>WBSF</td>
<td>2.72</td>
<td>0.14</td>
<td>1.59</td>
<td>0.12</td>
<td>0.2358</td>
</tr>
</tbody>
</table>

<sup>a</sup> WBSF = Warner-Bratzler shear force; Tenderness: 1 = Extremely tough, 8 = Extremely tender; Juiciness: 1 = Extremely dry, 8 = Extremely juicy; Beef Flavor: 1 = Extremely bland, 8 = Extremely intense; Off Flavor: 1 = Extremely intense, 8 = Non detectable
<sup>b</sup> n = 13
<sup>c</sup> n = 18
<sup>x</sup> Means within rows with different superscripts differ (P < 0.05)
Beef on Dairy Business Plan

- Know the market
  - More dairy-beef calves means buyer will become more selective
  - Crossbred calves need to be competitive in the feedlot

- Excellent calf care and identification

- Conduct a genetic audit of herd
  - Low genetic animals do not need to contribute offspring
Determine heifer goal numbers

• Determine goal cull rate and herd size
  – To maintain herd size, the number of first-calf heifers coming into herd per year needs to equal the number of milking cows leaving

• The number of heifers you need annually depends on heifer cull rate and heifer death loss

• The number of heifers born per year is affected by the gender of the pregnancies and how quickly cows become pregnant each year
Selecting replacements

- How many heifers will a dairy produce
  - Determine the number of heifers you need to replace cows

- Cost to raise heifers keeps increasing
  - $1,800 to $2,200 to 24 months of age

- Genomic test heifers – cull bottom 20% or breed to beef

- Keep track of economics and data
WCROC Dairy Example

- 300-cows dairy in west central Minnesota
  - Generate 115 to 150 heifers per year
  - No sexed semen
  - Crossbreeding with Holstein, Montbéliarde, Viking Red, Normande, Jersey
  - Need about 90 to 100 heifers per year to maintain herd size
  - Bred 40 cows with Limousin and Limflex bulls to end the breeding season
Conclusions

- Consider your goals

- Shifts in the beef market will happen – how does this affect how many heifers you need

- Don’t just use the cheap bulls
  - Sire selection matters

- Keep track of economics and data