Breeding System Opportunities and Costs

Sandy Johnson
ASI Update
Nov. 2015
The QB mission is to improve profitability of beef cow-calf operations by facilitating the adoption of applied reproductive and genetic technologies that will add value to beef cattle produced and marketed in the U.S. and contribute to improvements in beef quality to satisfy increasing domestic and global demand for high-quality beef.

**QB Guidelines**

- [QB Program Overview](#)
- [QB Program Guidelines](#)
- [QB Commercial Feed Yard Program](#)
- [QB By the Numbers - EPD](#)
- [QB By the Numbers - Economic Indices](#)

**QB Newsletters**

- [Spring 2014](#)
<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Commercial</th>
<th>Multiple</th>
<th>Seedstock</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value of replacements</td>
<td>80</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduce calving difficulty</td>
<td>55</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Premium at weaning</td>
<td>46</td>
<td>46</td>
<td>54</td>
<td>38</td>
</tr>
<tr>
<td>Raising bulls for others</td>
<td>42</td>
<td>9</td>
<td>52</td>
<td>51</td>
</tr>
<tr>
<td>Raising bulls for yourself</td>
<td>38</td>
<td>27</td>
<td>51</td>
<td>30</td>
</tr>
<tr>
<td>Premium for carcass</td>
<td>29</td>
<td>26</td>
<td>38</td>
<td>21</td>
</tr>
</tbody>
</table>

Survey asked “How does AI contribute to the profitability of your operation? Please check all that apply.”
AI in a commercial herd

“I don’t understand why the whole world doesn’t use applied reproductive technologies, at least on heifers,“

Herbert Holzapfel, Holzapfel Ranch Willows, CA

listen at www.appliedreprostrategies.com
Table 2. Effect of cattle industry involvement\(^1\) on value of AI-sired calves, semen cost, and years of AI experience

<table>
<thead>
<tr>
<th></th>
<th>Value of AI-Sired Calves</th>
<th>Semen Cost</th>
<th>Years AI Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial</td>
<td>187 ± 79 (^a)</td>
<td>22.2 ± 1.6 (^a)</td>
<td>11.4 ± 1.3 (^a)</td>
</tr>
<tr>
<td>Seedstock</td>
<td>709 ± 63 (^b)</td>
<td>29.7 ± 1.3 (^b)</td>
<td>16.9 ± 1.0 (^b)</td>
</tr>
<tr>
<td>Multiple</td>
<td>398 ± 58 (^c)</td>
<td>25.6 ± 1.2 (^a)</td>
<td>15.4 ± 0.9 (^b)</td>
</tr>
</tbody>
</table>

\(^1\) Involvement in the cattle industry: Commercial cow/calf producer, Seedstock producer, Commercial heifer development, AI Technician, Veterinarian, or Other; more than one response was allowed.
Chute-side service available

American Rancher episode visits cattlemen in Missouri who use Genex chute side service

• Google – “Genex_Proof_Final_042213”

http://crinetsupport.blogspot.com/2015/05/genexchutesideservice-month-of-may.html
Insemination practices

Heifers

- EAI: 41
- TAI: 33
- EAI & TAI: 26

Cows

- EAI: 43
- TAI: 35
- EAI & TAI: 22
Split time AI with Sexed Semen
Normal fixed-timed AI protocol

Modification for non-estrous cows
## Optimizing the Use of Sex-Sorted Semen in FTAI

<table>
<thead>
<tr>
<th>Estrus</th>
<th>Conventional Semen @ 66 hr</th>
<th>Sex-sorted Semen @ 66 hr</th>
<th>Sex-sorted @ 66 hr with delay of non-estrous</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>77%&lt;sup&gt;a&lt;/sup&gt; (81/105)</td>
<td>51%&lt;sup&gt;b&lt;/sup&gt; (53/104)</td>
<td>42%&lt;sup&gt;b&lt;/sup&gt; (47/111)</td>
</tr>
<tr>
<td>No</td>
<td>37%&lt;sup&gt;c&lt;/sup&gt; (42/113)</td>
<td>2%&lt;sup&gt;d&lt;/sup&gt; (3/113)</td>
<td>36%&lt;sup&gt;c&lt;/sup&gt; (40/110)</td>
</tr>
<tr>
<td>Total</td>
<td>56% (123/218)</td>
<td>26% (56/217)</td>
<td>39% (87/221)</td>
</tr>
</tbody>
</table>

- Treatment x estrous expression interaction ($P < 0.0001$)
- Pregnancy rates within a row with different superscripts are different ($P < 0.0001$)

Thomas et al., 2015
Specialization
## Cost Per Pregnancy – Natural Service

<table>
<thead>
<tr>
<th>Cow:Bull</th>
<th>$5000</th>
<th>$5500</th>
<th>$6000</th>
<th>$6500</th>
<th>$7000</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>133</td>
<td>144</td>
<td>155</td>
<td>166</td>
<td>177</td>
</tr>
<tr>
<td>20</td>
<td>100</td>
<td>108</td>
<td>116</td>
<td>124</td>
<td>132</td>
</tr>
<tr>
<td>25</td>
<td>80</td>
<td>86</td>
<td>93</td>
<td>99</td>
<td>106</td>
</tr>
<tr>
<td>30</td>
<td>66</td>
<td>72</td>
<td>77</td>
<td>83</td>
<td>88</td>
</tr>
<tr>
<td>35</td>
<td>57</td>
<td>62</td>
<td>66</td>
<td>71</td>
<td>76</td>
</tr>
<tr>
<td>40</td>
<td>50</td>
<td>54</td>
<td>58</td>
<td>62</td>
<td>66</td>
</tr>
<tr>
<td>50</td>
<td>40</td>
<td>43</td>
<td>46</td>
<td>50</td>
<td>53</td>
</tr>
</tbody>
</table>
KSU-Bull vs AI Breeding Costs.xls --- A spreadsheet to evaluate the economic costs and benefits of natural (bull) breeding versus artificial insemination (AI) in beef herds.

Version 10-26-2015

INPUTS vs CALCULATED VALUES
In the Comparison, Bull carrying cost details, and AI cost details tab all blue numbers are inputs and all black numbers are calculated from these inputs (green values are "pulled" from another tab).

DESCRIPTION OF INPUTS:
Several input cells (i.e., blue number) have a red diamond in the upper right hand corner of the cell. By moving your mouse cursor over this diamond, a brief description of the input will be displayed on the screen.

MACROS
This spreadsheet uses macros to print the three different pages, however printing can also be done manually by highlighting the desired range and using the menu print commands.

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# Comparison of Bull vs. AI Breeding Costs

<table>
<thead>
<tr>
<th></th>
<th>100% bull power</th>
<th>AI plus Clean-up bulls</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Annual Bull Cost/Female Exposed</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of females bred</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Cow-to-bull ratio (cows per bull)</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Number of bulls needed</td>
<td>4.0</td>
<td>2.0</td>
</tr>
<tr>
<td>Cost per female exposed</td>
<td>$74.64</td>
<td>$37.32</td>
</tr>
<tr>
<td>Total Breeding Cost per Female Exposed</td>
<td>$74.64</td>
<td>$98.32</td>
</tr>
<tr>
<td>Final Pregnancy rate, %</td>
<td>92.0%</td>
<td>92.0%</td>
</tr>
<tr>
<td>Total Breeding Cost per Female Bred</td>
<td>$81.13</td>
<td>$106.87</td>
</tr>
<tr>
<td><strong>Benefit</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Added Value of A.I. Sired Calf at Weaning, $/hd (due to age, genetics, gender, etc.)</td>
<td>n/a</td>
<td>$50.00</td>
</tr>
<tr>
<td><strong>Total Cost per Female Bred</strong></td>
<td>$81.13</td>
<td>$79.37</td>
</tr>
</tbody>
</table>
Net gain or loss from fixed-timed AI

Herd

Net Gain or loss, $/exposed cow

1 2 3 4 5 6 7 8 Avg

100 120 140 160

Rodgers et al., 2012

$49
For iphone and androids
AI Cowculator Inputs

- Bull Maintenance cost
- Bull purchase price
- Useful life of bull
- Salvage value
- Interest rate
- Number of natural service bulls
- Number of bulls for clean up after AI

- Number of cows
- Expected weaning wt.
- Price of weaned calf
- AI labor cost
- AI facilities & equipment
- Synchronization products cost
- Semen cost
- Technician cost
Herd Information

Select breed type:
- Cows
- Heifers

Head in group:

Breeding Program

Date to start breeding:

Time of day to breed: 00:00 AM

Detection / Insemination method: Estrus AI

Days from last AI to bull turn in:

Input Costs

Labor costs ($/hr): 13.50
PG ($/dose): 2.80
GnRH ($/dose): 2.90
CIDR ($/insert): 11.00
Semen ($/unit): 25.00

NEXT
Features

• Recommended systems for cows & heifers
• Select systems by type
  – Heat detect & AI systems
  – Heat detect & cleanup AI systems
  – Fixed-Timed AI Systems
• List of daily activities
• Generates Barn Calendar
• Cost per AI pregnancy
• Support materials

Free download at

http://iowabeefcenter.org/estrus_synch.html
Figure 2. Cumulative proportion of cows calving in the same herd over time. Year 1 unsynchronized and natural service, in subsequent years, synchronization and fixed-timed AI followed by cleanup natural service.
Attitude towards AI

http://www.mirandaochocki.com/attitude-changes-everything/
UF-NFREC Case Study

The graph shows the percentage of calving days against calving day for each year from 2006 to 2013. The data indicates a trend where the percentage of calved animals increases with the calving day, with variations observed between different years.
## UF-NFREC Case Study

### Breeding season pregnancy rates:

<table>
<thead>
<tr>
<th>Year</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>PR</td>
<td>81%</td>
<td>86%</td>
<td>84%</td>
<td>86%</td>
<td>82%</td>
<td>94%</td>
<td>92%</td>
<td>93%</td>
</tr>
<tr>
<td>Mean calving day</td>
<td>79.2</td>
<td>80.9</td>
<td>59.2</td>
<td>56.2</td>
<td>53.7</td>
<td>47.2</td>
<td>39.5</td>
<td>38.7</td>
</tr>
<tr>
<td>BS length</td>
<td>120</td>
<td>120</td>
<td>110</td>
<td>88</td>
<td>80</td>
<td>75</td>
<td>70</td>
<td>72</td>
</tr>
</tbody>
</table>
UF-NFREC Case Study

Change in calf value:

<table>
<thead>
<tr>
<th>Year</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mean calving day</strong></td>
<td><strong>79.2</strong></td>
<td><strong>80.9</strong></td>
<td><strong>59.2</strong></td>
<td><strong>56.2</strong></td>
<td><strong>53.7</strong></td>
<td><strong>47.2</strong></td>
<td><strong>39.5</strong></td>
<td><strong>38.7</strong></td>
</tr>
<tr>
<td>Difference from 2006/2007</td>
<td>0</td>
<td>0</td>
<td>21.7</td>
<td>24.7</td>
<td>27.2</td>
<td>33.7</td>
<td>41.4</td>
<td>42.2</td>
</tr>
<tr>
<td>Per calf increase in value</td>
<td>0</td>
<td>0</td>
<td><strong>$87</strong></td>
<td><strong>$99</strong></td>
<td><strong>$109</strong></td>
<td><strong>$135</strong></td>
<td><strong>$166</strong></td>
<td><strong>$169</strong></td>
</tr>
<tr>
<td>Herd increase in value</td>
<td>0</td>
<td>0</td>
<td><strong>$19,100</strong></td>
<td><strong>$29,700</strong></td>
<td><strong>$32,700</strong></td>
<td><strong>$40,500</strong></td>
<td><strong>$49,800</strong></td>
<td><strong>$50,700</strong></td>
</tr>
</tbody>
</table>
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