An Economic Comparison of AI and Bull Breeding

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Decline in AI Usage

- Lack of trained employees after expansion
- Reduction of technician service
- Sale of calves and purchase of all replacements
- High milk production & negative energy balance
  - genetics
  - rations
  - rBST
NAHMS: May 1996
Part I: Reference of Dairy Management Practices

- 45.4% of dairy operations use no AI
- 34.8% use 1 herd bull
- 16.9% use 2 to 4 herd bulls
- 2.9% use 5 or more herd bulls
<table>
<thead>
<tr>
<th>Herd Size</th>
<th>Yes</th>
<th>%</th>
<th>No</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Do you use AI?</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;50 cows</td>
<td>146</td>
<td>85</td>
<td>26</td>
<td>15</td>
</tr>
<tr>
<td>50 to 99 cows</td>
<td>178</td>
<td>92</td>
<td>16</td>
<td>8</td>
</tr>
<tr>
<td>100 to 249 cows</td>
<td>64</td>
<td>87</td>
<td>10</td>
<td>13</td>
</tr>
<tr>
<td>&gt;250 cows</td>
<td>21</td>
<td>91</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td><strong>Are 100 % of your cows bred AI?</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;50 cows</td>
<td>122</td>
<td>84</td>
<td>24</td>
<td>16</td>
</tr>
<tr>
<td>50 to 99 cows</td>
<td>121</td>
<td>68</td>
<td>57</td>
<td>32</td>
</tr>
<tr>
<td>100 to 249 cows</td>
<td>44</td>
<td>69</td>
<td>20</td>
<td>31</td>
</tr>
<tr>
<td>&gt;250 cows</td>
<td>8</td>
<td>38</td>
<td>13</td>
<td>62</td>
</tr>
<tr>
<td><strong>Are 100% of your heifers bred AI?</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;50 cows</td>
<td>110</td>
<td>75</td>
<td>36</td>
<td>25</td>
</tr>
<tr>
<td>50 to 99 cows</td>
<td>101</td>
<td>57</td>
<td>77</td>
<td>43</td>
</tr>
<tr>
<td>100 to 249 cows</td>
<td>20</td>
<td>31</td>
<td>44</td>
<td>69</td>
</tr>
<tr>
<td>&gt;250 cows</td>
<td>6</td>
<td>29</td>
<td>15</td>
<td>71</td>
</tr>
</tbody>
</table>
Why Natural Service Sires?

1. Eliminate need for heat detection
   “outsourcing heat detection to the bull”

2. No investment in AI equipment or facilities

3. Semen costs are too high
Important Economic Considerations

1. Foregone genetic improvement
2. Dry cow management
3. Risk of dystocia
4. Transmission of reproductive diseases
5. Risk of infertile bulls
6. Human Safety
Foregone Genetic Improvement

Predicted Transmitting Abilities

Milk Fat Protein SCS MIM

USDA AIPL

PTAM PTAF PTAP PTASCS PTAPL

Net Merit $
Foregone Genetic Improvement

Predicted Transmitting Abilities

A PTAM of +1500 means a bull is expected to have daughters that will average 1500 lbs. more milk than the average cow born in 1990.

Ranks and differences between bulls are most important.

Net Merit $ = 10 \times \text{Production}, 4 \times \text{Productive life}, \text{and } -1 \times \text{Somatic Cell Score.}$
## Foregone Genetic Improvement

### Young Sires:

<table>
<thead>
<tr>
<th></th>
<th>Milk</th>
<th>Fat</th>
<th>Prod. Life</th>
<th>Net Merit $</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AI BULLS</strong></td>
<td>+ 790</td>
<td>+30</td>
<td>+0.9</td>
<td>+ 87</td>
</tr>
<tr>
<td><strong>Non AI Bulls</strong></td>
<td>+ 311</td>
<td>+12</td>
<td>+0.7</td>
<td>+ 40</td>
</tr>
<tr>
<td><strong>AI Advantage</strong></td>
<td>+ 479</td>
<td>+18</td>
<td>+0.2</td>
<td>+ 47</td>
</tr>
<tr>
<td><strong>Active AI</strong></td>
<td>+1422</td>
<td>+47</td>
<td>+1.4</td>
<td>+138</td>
</tr>
</tbody>
</table>

• Actual differences may be larger
• Restricting to 70th percentile of AI bulls would add $20 to the active AI advantage
• Genetic gains are cumulative

8-98 USDA-DHIA
Worksheet 1. Evaluating the Use of a Herd Bull
(adapted from: M. A. Faust, Iowa State University)

A. Purchase price of Bull $_______
B. Bull slaughter value $_______
C. Bull mortality based on 2% death loss (B x .98) $_______
D. Years bull is kept ________yr.
E. Bull cost per year (A - C) / D ________$/yr.
F. Bull feed cost per day ________$/d
G. Bull feed cost per year (F x 365) ________$/yr.

1200
1100
1078
1.5
81.33
2.50
912.50
H. Bull labor, veterinary, bedding, and facility costs per year ________$/yr.

I. Net Merit $ of bull
   \[(\text{NM$ of sire} + \text{NM$ of dam}) / 2\] ________$

J. Number of cows and heifers settling to bull per year ________cows/yr.

K. Number of heifers born sired to bull \[(J / 2)\] ________heifers/yr.

L. No. of lactations expected per cow ________lactations

M. Total bull costs per heifer \[(E + G + H) / K\] ________$

N. Net Merit $ of AI bulls used ________$

O. Semen cost per unit ________$
P. Number of units per conception $\text{3 units}$
Q. Number of units per heifer (P x 2) $\text{6 units}$
R. Semen cost per heifer (O x Q) $\text{72 \$/heifer}$
S. Expected advantage for bull daughters over AI daughters (I - N) x L $\text{-141 \$}$
T. Expected cost advantage for bull daughters over AI daughters ((R + $5.00) - M $\text{35.25 \$}$
U. Net advantage for Bull over AI (S + T) $\text{-105.75 \$}$

V. If U is negative, then the maximum number of additional days open that is justified for using AI is (-U / 3.5) $\text{30.2 d}$
Dry Cow Management

- Dry off
  - Maintaining idle cow
  - Loss of 1000 - 2000 lbs. if dry period < 30 days
  - Days dry less variable with AI, even with routine preg checks
- Transition rations
  - Additional feed costs and metabolic disorders
- Choice
- List of cows to preg check
Calving Difficulty

- Heritability of calving ease 15%
- Genetics & Management Important
  breed on size, not age
- Calving Ease important for heifers
- AI often is first eliminated for heifers
- NAAB reports %DBH
- Use AI bulls with <9% DBH
Safety

Family, employees, veterinarians, other dairy professionals

Who has been chased up a tree by a straw of semen or brutalized by an AI technician?

- Sturdy and secure pen
- Safety training for all employees
- Way to separate the bull from workers
- Have second employee nearby
- Plenty of escape routes
- Know the signs of aggression
Other Considerations

- Infertility
- Low libido
- Venereal Diseases
  - Vibriosis
  - Trichomoniasis
  - Brucellosis,
  - Leptospirosis
So you still decided to buy a herd bull?
Management of Herd Bulls

1. Select bulls wisely
   - Use Pedigree Index for NM$
   - Choose bulls in 70th percentile for AI (>155)
   - Sires of purchased bulls should be in 90th percentile (>180)
   - Average semen price of top 25 Holstein AI sires is < $25
Management of Herd Bulls

1. Use several young bulls
2. Breeding soundness exam
3. Safe facilities and training
4. Bull Comfort
5. Routine pregnancy checking
Summary

1. Foregone genetic improvement
2. Dry cow management
3. Risk of dystocia
4. Transmission of reproductive diseases
5. Risk of infertile bulls
6. Human Safety