Genetic Possibilities to Reduce Calf Mortality

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Message

1. High stillbirth rate
2. Large difference between sires
3. Stillbirth need to be:
   - Monitored
   - Genetic evaluated
   - Accounted for in selection
Outline of talk

• Phenotypic levels
• Genetic Aspects
• Danish Recording and Genetic Evaluation
• Behind the phenotypic trend
• Final Recommendation and conclusion
Phenotypic levels
Two types of calf mortality

- **At calving**
  - 0–1 day (Stillbirth)

- **After birth**
  - 1-180 days
## Calf mortality in %
### Denmark 2004

<table>
<thead>
<tr>
<th></th>
<th>Danish Holstein</th>
<th>Danish Red Holstein</th>
<th>Danish Jersey</th>
<th>Danish Red</th>
</tr>
</thead>
<tbody>
<tr>
<td>At first calving</td>
<td>11</td>
<td>13</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>At later calving</td>
<td>6</td>
<td>7</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>After birth</td>
<td>6</td>
<td>5</td>
<td>13</td>
<td>6</td>
</tr>
<tr>
<td>1 to 180 days</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Calf mortality after birth

Holstein

Age in days

Management on farm: Important

Sire of calf: Not so important
Stillbirth at first calving
Danish dairy breeds

Year of calving
Holstein
Red Holstein
Jersey
Danish Red
Genetic Aspects of Calving Traits
Calving traits in a breeding program
- Future aspects to consider

- Labour costs will increase
- Veterinarian costs will increase
- Less time / money for calving assistance
- Increased focus on animal welfare

**Future demand:**
Cows should deliver a LIVING calf
WITHOUT problems
Two Genetic Effects

- Sire of cow
- Cow effect
- Sire of calf
- Calf effect
Predicted Transmitting ability (PTA)

- PTA = effect in progeny, when the sire is used randomly in the population
- PTA = $\frac{1}{2}$ breeding value
## Differences among sires

<table>
<thead>
<tr>
<th>Trait</th>
<th>Effect</th>
<th>Range of PTA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stillbirth -first calving</td>
<td>Calf effect</td>
<td>6 % to 17%</td>
</tr>
<tr>
<td></td>
<td>Cow effect</td>
<td>6 % to 17%</td>
</tr>
<tr>
<td>Stillbirth -later calving</td>
<td>Calf effect</td>
<td>4 % to 8%</td>
</tr>
<tr>
<td></td>
<td>Cow effect</td>
<td>5 % to 7%</td>
</tr>
<tr>
<td>Mortality 1-180 days</td>
<td>Calf effect</td>
<td>6 % to 8%</td>
</tr>
</tbody>
</table>
Danish Recording and Genetic Evaluation of Calving Traits
Danish recordings since 1985

- Stillbirth
- Calf size
- Calving ease

- Records from 85-90% of ALL calvings
Genetic evaluation of sires

- Birth index (calf effects)
- Calving index (cow effect)
## Birth index (calf trait)

<table>
<thead>
<tr>
<th>First calving</th>
<th>Stillbirth</th>
<th>$h^2$</th>
<th>Typical no. obs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calving ease</td>
<td>5%</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>Calf size</td>
<td>19%</td>
<td>30</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Later calving</th>
<th>Stillbirth</th>
<th>$h^2$</th>
<th>Typical no. obs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calving ease</td>
<td>1%</td>
<td>215</td>
<td></td>
</tr>
<tr>
<td>Calf size</td>
<td>14%</td>
<td>190</td>
<td></td>
</tr>
</tbody>
</table>
## Calving index (cow trait)

<table>
<thead>
<tr>
<th></th>
<th>h²</th>
<th>Typical no. obs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First calving</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stillbirth</td>
<td>6%</td>
<td>110</td>
</tr>
<tr>
<td>Calving ease</td>
<td>6%</td>
<td>100</td>
</tr>
<tr>
<td>Calf size</td>
<td>4%</td>
<td>100</td>
</tr>
<tr>
<td><strong>Later calving</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stillbirth</td>
<td>1%</td>
<td>(100)</td>
</tr>
<tr>
<td>Calving ease</td>
<td>3%</td>
<td>(90)</td>
</tr>
<tr>
<td>Calf size</td>
<td>4%</td>
<td>(90)</td>
</tr>
</tbody>
</table>
Calf size

- Recorded as
  - Small
  - Just below medium
  - Just above medium
  - Large

- High heritability (15-20 %) (calf effect)
- Large calves: calving diff. ↖ and stillbirth ↖
- Good indicator trait
PTA’s of stillbirth and calf size

Genetic correlation = 0.69
Calving ease

- Genetic correlation with stillbirth
  - Calf traits = 0.8
  - Cow traits = 0.6

Genetic evaluation of calving ease only, is not efficient for reducing the stillbirth rate!
Weight in Danish Total Merit Index (S-indeks)

- Birth index = 6 % (Jan. 2005)
- Calving index = 6 %
- Both traits will be improved
Behind the phenotypic trend
Stillbirth at first calving

Increase:
50% Genetic
50% Management
Stillbirth at first calving
- sire of calf
Stillbirth at first calving
- Sire of cow

Year of calving
Final recommendation

- Record stillbirth, calving ease, (calf size)
- Monitor and publish stillbirth rates
- Implement genetic evaluation
- Use this info. in selection (sire of sons)
Conclusion

Stillbirth rates can be lowered by selection!

-so it’s up to you ...