Genomic Breeding Plans

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How do we use genomic breeding values?

• Now?

• In the future?
What do we do – now?

Waiting bulls?

Bull calves?
Waiting bulls

Probability of culling a Top 20% bull

<table>
<thead>
<tr>
<th></th>
<th>Reliability 0.3</th>
<th>Reliability 0.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 % culling</td>
<td>6.1%</td>
<td>2.4%</td>
</tr>
<tr>
<td>50 % culling</td>
<td>18.5%</td>
<td>10.0%</td>
</tr>
</tbody>
</table>

Culling should be done within age group and family
## Waiting bulls

### Probability of culling a Top 5% bull

<table>
<thead>
<tr>
<th>Culling Level</th>
<th>Reliability 0.3</th>
<th>Reliability 0.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>30% culling</td>
<td>2.4%</td>
<td>0.3%</td>
</tr>
<tr>
<td>50% culling</td>
<td>10.0%</td>
<td>2.6%</td>
</tr>
</tbody>
</table>

Culling should be done within age group and family
The choice among two full sibs

Probability of being right vs Reliability of Mendelian sampling term
What do we do – in the future?

- **Pre-selection**
  - Traditional waiting bull scheme
  - Selection of test bulls using genomic information

- **Hybrid**
  - Both progeny-tested and young bulls as sires of sons and daughters

- **Turbo**
  - Ignoring age when selecting bull sires
Improvement in gain – $r^2=0.4$
Improvement in inbreeding – $r^2=0.4$
Should we use young bulls intensively?
Uncertainty of groups

![Graph showing the uncertainty of groups with NTM on the y-axis and Bulls in group on the x-axis.

- The graph includes a line for GenVik Plus.

- The x-axis scale ranges from 0 to 10, labeled as Bulls in group.

- The y-axis scale ranges from 0 to 70, labeled as NTM.]

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**Graph Details**

- **Title:** Uncertainty of groups
- **Axes:**
  - Y-axis: NTM (0 to 70)
  - X-axis: Bulls in group (0 to 10)
- **Legend:**
  - GenVik Plus (black line)

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**Analysis:**

The graph illustrates the trend of uncertainty in groups as the number of bulls increases. The GenVik Plus line shows a decrease in NTM values as the number of bulls increments, indicating reduced uncertainty.
Superiority of young bulls

- GenVik Plus
- Progeny tested

Graph showing the NTM values for different numbers of bulls in a group.
How to use young bulls

• Use them in groups – ’six packs’

• Use several
Genotyping effort – $r^2=0.5$

- **Annual gain, €**
- **Inbreeding**

- **Genotypings**

The graph shows the relationship between genotyping effort and the annual gain in €, along with the corresponding inbreeding levels. As the number of genotypings increases, the annual gain stabilizes, and the inbreeding levels reach a steady state.
Genotyping males or females – $r^2=0.5$
### Unbalanced use of sires

Relative to 30 bulls used equally

<table>
<thead>
<tr>
<th>More balanced</th>
<th>Best</th>
<th>Gain</th>
<th>Inbreeding</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>90%</td>
<td>102</td>
<td>121</td>
</tr>
<tr>
<td>15</td>
<td>75%</td>
<td>102</td>
<td>122</td>
</tr>
<tr>
<td>10</td>
<td>60%</td>
<td>103</td>
<td>134</td>
</tr>
<tr>
<td>5</td>
<td>50%</td>
<td>104</td>
<td>188</td>
</tr>
<tr>
<td>5</td>
<td>75%</td>
<td>104</td>
<td>254</td>
</tr>
</tbody>
</table>
Recommendations – for now!

• **Moderate selection among waiting bulls**
  • Within sire-group
  • Within year of birth
  • Up to 30% in Jerseys and Reds
  • Up to 50% in Holsteins

• **Use pre-selection of young bulls if rel. > 0**
  • In all breeds
Recommendations – for the future

• Maintain number of test bulls
• GenVik Plus should be used carefully
  • Jerseys and Reds
    • <20% of inseminations
    • >30 bulls
  • Holstein
    • <30% of inseminations
    • >30 bulls
• At least 1000 genotypings per year
• Both males and females could be genotyped
• Sires of sons should be used equally