Challenges in the new breeding schemes with use of effective Genomic Selection

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Challenges

• How do we make best use of genomic information?

• What are the risks?

• Are we willing to take the risk?
How do we use genomic breeding values?

- Bulls to breed cows
- Bulls to breed bulls
- Cows to breed bulls
Bulls to breed cows

Test bulls (young bulls)
Progeny tested bulls (proven bulls)

Worst Case: GS doesn’t work!
⇒ Increased young bull percentage
⇒ No large impact on genetic gain

Best Case: GS does work!
⇒ Farmers will use better bulls
Bulls to breed cows

- **Conventional**
  - 70% Proven bulls
  - 30% Young bulls

  - **Average NTM: 28.5**
    - 25 bulls

- **GenVikPlus**
  - 50% Progeny tested bulls
  - 20% Test bulls
  - 30% GenVikPlus bulls

  - **Average NTM: 30.3**
    - 15 Progeny tested bulls
    - 30 GenVikPlus bulls
How to use GenVikPlus bulls?

• Use them in groups
• Use several
Bulls to breed bulls

GenVikPlus bulls (young bulls)

Progeny tested bulls (proven bulls)
Variation in NTM among bulls

NTM

Sire, birth/year

2004 2005 2006 2007 2008 2009 2010

-20 -15 -10 -5 0 5 10 15 20 25 30

-15 -5 5 15 25 35

50% 80% +31 +15 +5 -1
Bulls to breed bulls

Proportion of selected bulls

Age of bull
How to use GenVikPlus bulls?

• Use them in groups

• Use several
Unbalanced use of bulls

Relative to 30 bulls used equally

<table>
<thead>
<tr>
<th>Best</th>
<th>Gain</th>
<th>Inbreeding</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>90%</td>
<td>102</td>
</tr>
<tr>
<td>15</td>
<td>75%</td>
<td>102</td>
</tr>
<tr>
<td>10</td>
<td>60%</td>
<td>103</td>
</tr>
<tr>
<td>5</td>
<td>50%</td>
<td>104</td>
</tr>
<tr>
<td>5</td>
<td>75%</td>
<td>104</td>
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</tbody>
</table>
Cows to breed bulls

• Should we genotype females?
  • If yes, how many?

• Should we use MOET?
Genetic gain without MOET
Genetic gain with MOET
Proportional superiority of MOET on Genetic gain

Proportional superiority, %

Male proportion

- 2000
- 0
Cows to breed bulls

• With MOET:
  • Optimum shifts towards more females when more genotypings

• Without MOET
  • Optimum is only males genotyped no matter how many genotypings

• Genotypings of females enhances beneficial effect of MOET on genetic gain
Recommendations – for the future

• Use GenVikPlus bulls
  • To breed cows with very low risk
  • To breed bulls with some risk

• Genotyping of females will lead to efficient bull dam selection

• The investment in genotyping females is best if an effective MOET program is used