Reliability of breeding values for DMI by adding data from additional research farms

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Introduction

- Feed
  - Milk production
  - Maintenance
  - Growth

- Main part of variable costs

- Breed for efficient cows
  - Reduce costs
  - Reduce greenhouse gases
Aim

To evaluate the reliability of gEBV for DMI after combining data from research farms and feeding companies.
DMI data

- Data from 1990 onwards:
  - Research farms
    - WLR (historic)
    - ILVO
  - Feeding companies
    - Trouw Nutrition (historic)
    - Schothorst Feed Research (historic)
    - AVEVE
DMI data

- Data criteria:
  - ≥ 5 weekly DMI records per cow per parity
  - ≥ 5 animals per experimental treatment
  - Standardise DMI (excl. experimental treatments)
  - Lactation 1, 2 and 3
DMI data in June 2018

<table>
<thead>
<tr>
<th>About:</th>
<th>160,000 records</th>
</tr>
</thead>
<tbody>
<tr>
<td>5,400 cows</td>
<td></td>
</tr>
<tr>
<td>1,102 experimental treatments</td>
<td></td>
</tr>
<tr>
<td>8,400 lactations</td>
<td></td>
</tr>
</tbody>
</table>

Genotypes: ~2,300 cows
Multivariate model

- Corrections for different effects using a multivariate model:

\[
\text{dmi1 dmi2 dmi3} = \text{breed} + \text{dim} + \text{agec} + \\
\text{exp} + \text{herdmonth} + \text{herdyear} + \\
\text{perm} + \text{animal} + e
\]

- \(H^{-1}\) matrix
Predictor traits

- Genomic EBV DMI directly from DMI genetic evaluation combined with national EBV for four predictor traits:
  - Kg milk
  - Kg fat
  - Kg prot
  - Liveweight

<table>
<thead>
<tr>
<th></th>
<th>DMI1</th>
<th>DMI2</th>
<th>DMI3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kg milk</td>
<td>0.55</td>
<td>0.58</td>
<td>0.56</td>
</tr>
<tr>
<td>Kg fat</td>
<td>0.58</td>
<td>0.60</td>
<td>0.58</td>
</tr>
<tr>
<td>Kg prot</td>
<td>0.59</td>
<td>0.61</td>
<td>0.59</td>
</tr>
<tr>
<td>LiveWeight</td>
<td>0.67</td>
<td>0.45</td>
<td>0.41</td>
</tr>
</tbody>
</table>

- Selection index weighted based on reliabilities

- Model reliability
Reliabilities DMI – only genomics

<table>
<thead>
<tr>
<th>Year</th>
<th>Records</th>
<th>Animals</th>
<th>Experiments</th>
<th>Lactations</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>55,437</td>
<td>2,249</td>
<td>123</td>
<td>2,922</td>
</tr>
<tr>
<td></td>
<td>+ 22,391</td>
<td>+ 965</td>
<td>+ 429</td>
<td>+ 1,502</td>
</tr>
<tr>
<td>2016</td>
<td>+ 51,610</td>
<td>+ 1,149</td>
<td>+ 368</td>
<td>+ 2,529</td>
</tr>
<tr>
<td>2017</td>
<td>+ 30,510</td>
<td>+ 1,082</td>
<td>+ 182</td>
<td>+ 1,409</td>
</tr>
</tbody>
</table>

Reliability (%) 2015: 18%  
Reliability (%) 2016: +7%  
Reliability (%) 2017: +8%  
Reliability (%) 2018: +5%  
Reliability (%) 2019: 38%
Reliabilities for bulls without daughters with DMI in pedigree of genetic evaluation.

DMI

Avg: 25%
Max: 77%
Reliabilities for bulls without *(green)* and with *(red)* daughters with DMI in pedigree of genetic evaluation DMI

Avg: 25%
Max: 77%

Avg: 47%
Max: 91%
Reliabilities for all bulls in pedigree of genetic evaluation DMI + predictors (blue)

Avg: 25%
Max: 77%

Avg: 47%
Max: 91%

Avg: 62%
Max: 92%
Conclusions

- **June 2018:**
  - ~25% more DMI data compared to 2017
  - Reliability on average increased to 62%

- **December 2018:**
  - DMI data will increase with another:
    - 1-2% records and experiments
    - 8-9% animals and lactations.
  - Official genetic evaluation with more bulls with information through predictors
Reliability breeding value for DMI

• On average 62% in June 2018

• Expected to increase to 70% in December 2018!