Udder classification based on AMS-data
Nieke Meijer | 26 August 2023
Royal Cooperative CRV u.a.

Cooperation of cattle breeders

the Netherlands and Flanders
23,000 members

Herd book
Herd book registration
Herd classification
Animal evaluation

Owner of CRV Holding BV
AMS-data

The Netherlands
4805 farms with AMS (33%)
9825 AMS boxes

JoinData
more than 1,400 farms
Lely
2014 onwards
375,000 milkings per day

More animals
~33% has no information from herd classification
1st + every 20th milking

Data collection

‘Achieve better breeding values for udder conformation by using more information’
Udder traits

Herd classification

- front udder attachment ✔
- front teat placement ✔
- teat length ✔
- udder depth ✔
- rear udder height ✔
- udder support ✔
- rear teat placement ✔
- lactation 1

AMS-data

- udder depth
- distance between front teats
- distance between rear teats
- udder balance ✔
- divided into lactation 1, 2, and 3
  (4 x 3 traits)
Teat coordinates

Coordinates in millimetres

- Z
- X
- Y
Udder balance

Average difference in udder depth between rear udder and front udder

Higher breeding value = higher rear udder relative to front udder

Optimum trait

Moderate correlations with current udder traits
- front udder attachment  0.25
- front teat placement   0.29
- teat length             0.25
- udder depth             0.24
- rear udder height       0.53
- udder support           0.34
- rear teat placement     0.36
### Heritabilities

<table>
<thead>
<tr>
<th>Traits based on herd classification</th>
<th>h²</th>
<th>Traits based on AMS</th>
<th>h²</th>
</tr>
</thead>
<tbody>
<tr>
<td>front udder attachment</td>
<td>0.25</td>
<td>udder depth 1</td>
<td>0.56</td>
</tr>
<tr>
<td>front teat placement</td>
<td>0.31</td>
<td>udder depth 2</td>
<td>0.56</td>
</tr>
<tr>
<td>teat length</td>
<td>0.38</td>
<td>udder depth 3</td>
<td>0.52</td>
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<tr>
<td>udder depth</td>
<td>0.39</td>
<td>distance front teats 1</td>
<td>0.60</td>
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<tr>
<td>rear udder height</td>
<td>0.26</td>
<td>distance front teats 2</td>
<td>0.53</td>
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<tr>
<td>udder support</td>
<td>0.22</td>
<td>distance front teats 3</td>
<td>0.45</td>
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<tr>
<td>rear teat placement</td>
<td>0.29</td>
<td>distance rear teats 1</td>
<td>0.45</td>
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<tr>
<td></td>
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<td>distance rear teats 2</td>
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<tr>
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<td>distance rear teats 3</td>
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<td>udder balance 1</td>
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<td>udder balance 2</td>
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<tr>
<td></td>
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<td>udder balance 3</td>
<td>0.43</td>
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</tbody>
</table>
## Genetic correlations

Between traits based on herd classification and AMS data

<table>
<thead>
<tr>
<th>Trait</th>
<th>parity 1</th>
<th>parity 2</th>
<th>parity 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>udder depth</td>
<td>0.98</td>
<td>0.97</td>
<td>0.97</td>
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<tr>
<td>front teat placement</td>
<td>0.98</td>
<td>0.98</td>
<td>0.97</td>
</tr>
<tr>
<td>rear teat placement</td>
<td>0.99</td>
<td>0.99</td>
<td>0.96</td>
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</tbody>
</table>
### Genetic correlations

Between parities for traits based on AMS data

<table>
<thead>
<tr>
<th>Trait</th>
<th>parity 1 – 2</th>
<th>parity 2 – 3</th>
<th>parity 1 - 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>udder depth</td>
<td>0.97</td>
<td>0.99</td>
<td>0.93</td>
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<tr>
<td>distance front teats</td>
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<td>0.94</td>
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<tr>
<td>distance rear teats</td>
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<tr>
<td>udder balance</td>
<td>0.96</td>
<td>0.98</td>
<td>0.85</td>
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## Reliabilities

<table>
<thead>
<tr>
<th>Trait</th>
<th>Reliability old EBV</th>
<th>Reliability new EBV</th>
<th>Difference in reliability</th>
<th>Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>front udder attachment</td>
<td>78.1</td>
<td>81.7</td>
<td>3.6</td>
<td>0.98</td>
</tr>
<tr>
<td>front teat placement</td>
<td>78.7</td>
<td>82.7</td>
<td>4.0</td>
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<tr>
<td>teat length</td>
<td>81.3</td>
<td>81.7</td>
<td>0.4</td>
<td>0.99</td>
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<tr>
<td>udder depth</td>
<td>81.4</td>
<td>83.9</td>
<td>2.5</td>
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<tr>
<td>rear udder height</td>
<td>77.1</td>
<td>78.6</td>
<td>1.5</td>
<td>0.99</td>
</tr>
<tr>
<td>udder support</td>
<td>75.3</td>
<td>79.2</td>
<td>3.9</td>
<td>0.97</td>
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<tr>
<td>rear teat placement</td>
<td>77.8</td>
<td>81.8</td>
<td>4.0</td>
<td>0.97</td>
</tr>
</tbody>
</table>

*bulls born from 2010 onwards*

*difference between current breeding values and new breeding values is the inclusion of the correlated traits based on AMS data*
Other countries

Scandinavia (Nordic Cattle Genetic Evaluation) since November 2016
only as correlated traits
comparable heritabilities and genetic correlations found

*source: Improved breeding values for udder conformation by including AMS data. Elisenda Rius-Vilarrasa and Emma Carlén (NAV/Växa Sverige), Anders Fogh (NAV/SEGES) and Terhi Vahlsten (NAV/Faba).
Summary

- Using AMS-data for genetic evaluation of udder conformation since April 2023 in the Netherlands and Flanders

- Repeated records of high-quality data
  - increased heritability
  - increased reliability

- Udder balance
  - First evaluation that publishes an udder conformation trait based on AMS-data

- Automatic data collection is the future