Breeding for milkability – How to use the new possibilities

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Why calculate breeding values for milkability?

- Labour is expensive – time used for milking has to be minimized

- Equipment is expensive – AMS systems has to optimize kg fat+protein produced per hour

Breeding is an important part of improving milkability – reliable EBV for milkability is important
What new possibilities are available?

New equipment can measure milkability

Lots of new quality data are available on central database

More reliable EBV’s for milkability can be calculated

More genetic progress can be achieved
Information about milkability

- Classification
  - original source of information in all Nordic countries
- TrueTest Milk Meters
  - Danish herds
  - Development project in Finland
- AMS
  - Danish Lely AMS herds – use for research purpose
  - Sweden DeLaval and GEA
Present genetic evaluation for milkability

**EBVs for milking speed based on:**

- Assessed by dairy farmers (DK, S, F)
- Registrations by milk meters (DK)
TruTest electronic milk meters

- 60-70 % of all Danish cows in milk recording
- Milking; duration, volume and milk sample
- Collected 6/11 times a year on farm
Milk flow
differences between herds

Danish Holstein
How to define milkability from TruTest Milk Meters?

- Milking time, minutes
- Flow, kg/min

Actually both had high correlation to farmers classification ($r_g \sim 0.9$)

- But using milking time would create a very negative correlation to yield traits.
Flow of milk or solids?

- Income from solids
- Fluid is only cost

Flow of solids is the goal!
Milk flow
First lactation

- 7 %

-12 %
Fat + Protein flow
First lactation
Genetic evaluation

Classification

Flow F + P

We choose flow if both sources are available!
Effect on $r^2$ for a cow with own performance

- Reliability, pedigree = 0.35

- Heritability milkability score $\approx$ 0.20
  - Reliability score+ped = 0.44

- Heritability avg. 5 flow obs. $\approx$ 0.50
  - Reliability flow+ped = 0.61

For bulls equals 1 daughter with flow approx 3 daughters with milkability score!
Effect of index for milkability

- For all breeds the effect of difference of +10 index units between sires is +10 grams of fat and protein in total per minute.
- For standard milk +10 units corresponds to 0.13 kilo more milk per minute.
- For Holstein +10 index units equals about 2.37 liters of milk / min.
- For a cow with daily yield of 30 kg of standard milk, milking time is 45 seconds or 5% shorter than for an average cow.
Milkability in breeding goal

- Breeding goal expressed in NTM
- Economic optimal progress for Nordic farmers
- Weight factors reflects economic value of less work load from improving milkability with one unit

<table>
<thead>
<tr>
<th>Breed</th>
<th>Weight factor</th>
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<tbody>
<tr>
<td>Red breeds</td>
<td>0,10</td>
</tr>
<tr>
<td>Holstein</td>
<td>0,08</td>
</tr>
<tr>
<td>Jersey</td>
<td>0,10</td>
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Collection of data from electronic equipment gives new possibilities

• Registration of data exposing new traits and registrations complementary to existing registrations

• Repeated measurements

• Objective measurements

• Measured on all cows in milk

• Measured over more lactations
Lely robots

- 10-15 % of all Danish cows
- Data collected routinely since Nov. 2011
- Collection done by milk recording technician
- Collected 6/11 times a year

- Data from DeLaval and GEA in Sweden
Data collection

In total 262 herds

33,253 cows
Pilot study – Genetic parameters, flow

- $h^2$ for flow$_{AMS}$ is higher than for traditional classifications and flow$_{TruTest}$.
  - Avg. of 14 days.

- High genetic correlations between traits

<table>
<thead>
<tr>
<th></th>
<th>$h^2$ (S.E.)</th>
<th>classifications (S.E.)</th>
<th>Flow, TruTest (S.E.)</th>
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</thead>
<tbody>
<tr>
<td>Flow (F+P), AMS</td>
<td>0.63 (0.07)</td>
<td>0.91 (0.05)</td>
<td>0.94 (0.03)</td>
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<tr>
<td>Classifications</td>
<td>0.20 (0.02)</td>
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<td>0.91 (0.02)</td>
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<tr>
<td>Flow (F+P), TruTest</td>
<td>0.41 (0.01)</td>
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</table>
Conclusion - Flow

- It is possible to utilize data from AMS in routine evaluation for milking speed.

- Limited effect for bulls
  - Already a lot of data from TruTest-meters.

- Cows from AMS-herds get own performance included.
Thank you for your attention
Den Europæiske Union ved Den Europæiske Fond for Udvikling af Landdistrikter og Ministeriet for Fødevarer, Landbrug og Fiskeri har deltaget i finansieringen af projektet.