Data from automatic milking systems used in genetic evaluations of temperament and milkability

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Norwegian dairy farming

- Larger herds with automatic milking systems (AMS)
- >1/3 of the dairy cows are in AMS herds

  ≈1500 milking robots
- AMS will be the dominating dairy production system in Norway within a few years

Automatic milking systems (AMS)

- Vast amounts of data are recorded daily
- Objective, frequent and accurate measures of many traits
- How can we best make use of these data?

Aim

- Examine whether data routinely recorded in AMS can be used to define new behavior- and milkability traits
- Estimate genetic correlations between these new traits and the current subjectively scored temperament, milking speed, and leakage

AMS data

- 46 herds with DeLaval milking robots
- Minimum 2 years of data from each herd
- Information from >6000 cows and >2 mill daily records

- Data for genetic analyses
  - Records from 6 to 305 days after calving
  - Lactation 1-7
  - Norwegian Red A.I. sire

Milkability

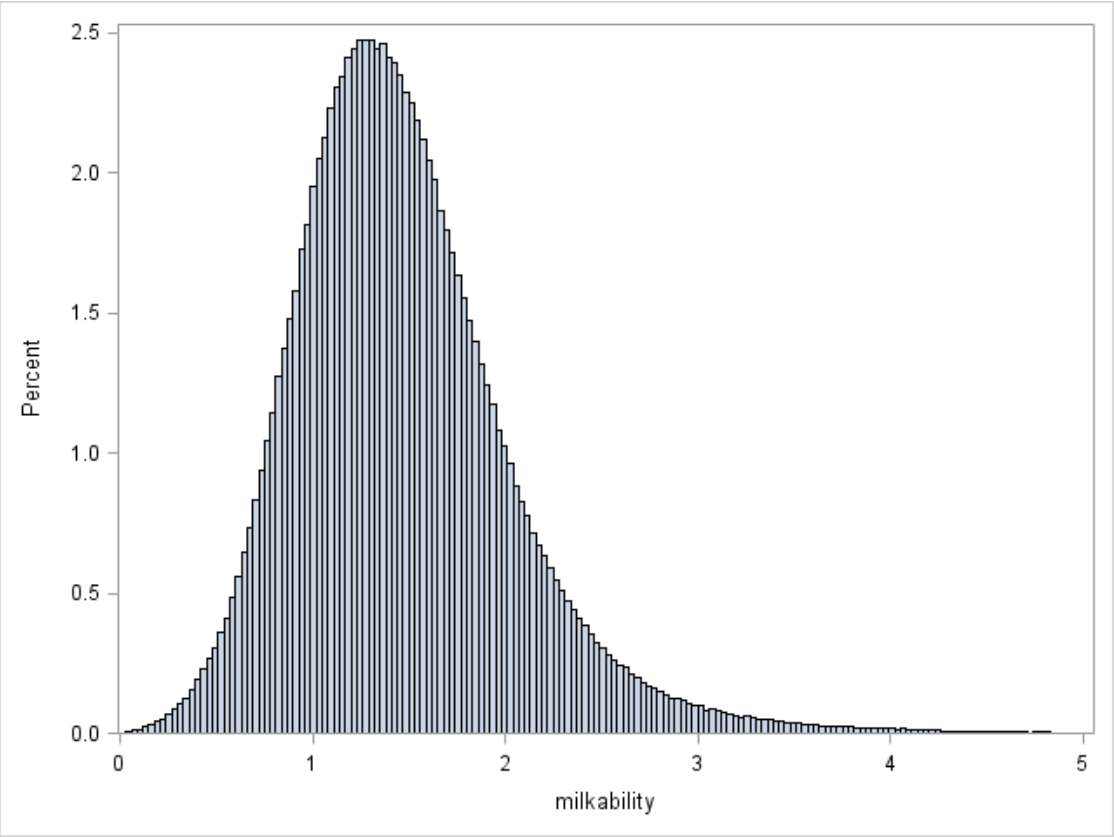
MILKABILITY = Milk yield per total time spent in the milking robot; kg milk per minute “box time”

Box time = actual milking time
+ time used for preparation and attachment of teat cups
+ the time the cow uses before she decide to leave the robot

- A combined measure of milking speed / milk flow and how efficient the cow is when visiting the milking unit
- Directly associated with the capacity of the milking robot

- Lactation mean milkability from day 6 to 305

Distribution of milk yield per minute spent in the milking robot



Overall mean:
1.5 kg milk per minute box time

95 % were within the interval
0.7 – 3.3.

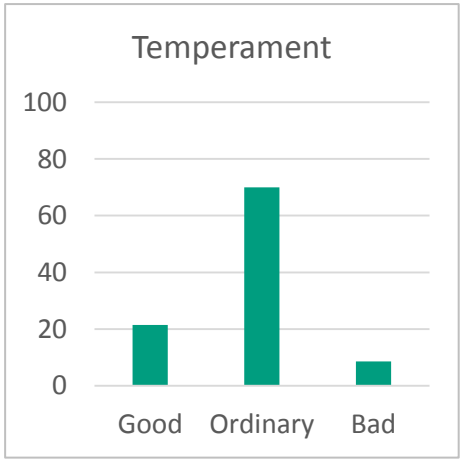
Behavior traits

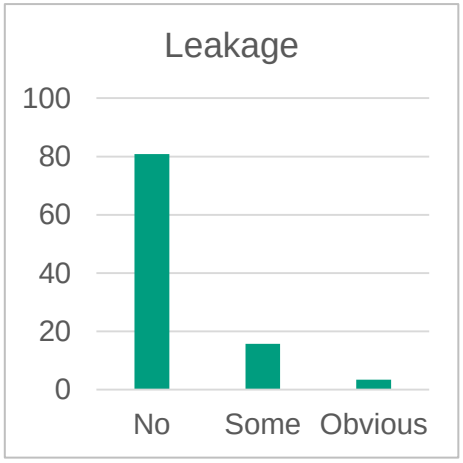
- Proportion of milkings with “kick-offs” during a lactation (pKO)
- Proportion of incomplete milkings during a lactation (pIC)

Subjectively scored traits

Temperament, milking speed and leakage

- 1st lactation cows
- Data from 330 000 cows
- Scored routinely by dairy farmers
- 3 categories





Model

- Multi-variate linear animal models
  - 3 AMS traits
  - 3 subjectively scored traits
- Variance components estimated using DMU (Madsen & Jensen. 2007)

Heritability and genetic correlations

AMS traits

	Milk-ability	pKO	pIC
Milkability	0.29	-0.35 0.11	-0.23 0.15
Proportion KickOffs (pKO)		0.20	0.88 0.11
Proportion Incomplete (pIC)			0.08

Subjectively scored traits

	Tempera-ment	Milking speed	Leakage
Tempera-ment	0.10	0.16 0.03	-0.11 0.03
Milking speed		0.26	-0.84 0.01
Leakage			0.14

Low score is favorable for all traits except milkability. Correlations marked

Favorable Unfavorable

Genetic correlations between AMS- and subjectively scored traits

		Subjectively scored traits		
		Temperament	Milking speed	Leakage
AMS traits	Milkability	-0.22 0.09	-0.88 0.03	0.53 0.07
	proportion KickOffs	0.54 0.11	0.27 0.11	0.02 0.13
	proportion Incomplete	0.27 0.18	0.08 0.18	-0.12 0.20

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➡ Potential traits to consider as alternative measures of temperament

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➡ Genetic association between difficult temperament and slower milking

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- Unfavorable but not as strong as to subjectively scored milking speed (0.84)

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New traits

- The cow meet different challenges in the AMS herds
- The breeding program should be adjusted accordingly with respect to traits, trait definitions and weights in the total merit index
- Measures related to milking and cow traffic recorded in AMS that can be used to define new behavior- and milking efficiency traits
- Genetic improvement of such new trait would be beneficial also in other production systems

Conclusion

- Data from AMS can be used for genetic evaluations
- Data routinely recorded in AMS provide information on new traits that can supplement or replace current traits in genetic evaluation


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