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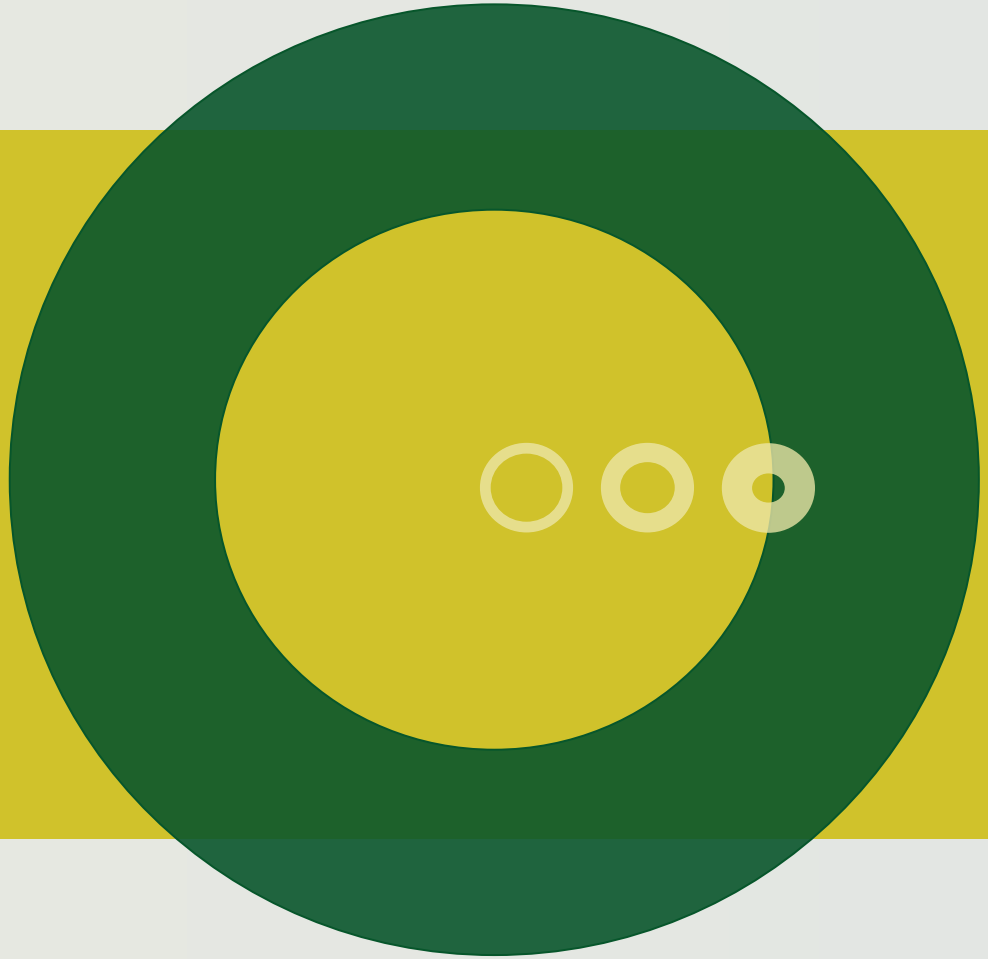
Data from milking robots open up new possibilities of genetic evaluations

Line Hjortø Buch,
Kevin Byskov and
Anders Fogh



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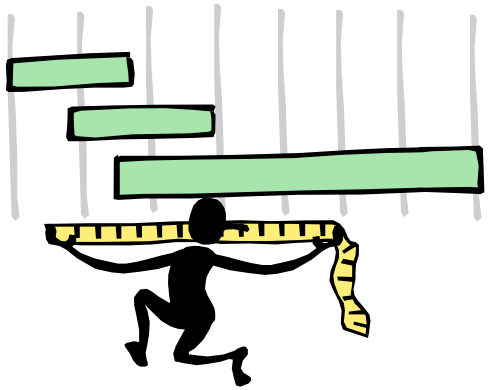
Outline

- Background and data collection
- Udder conformation
  - Teat co-ordinates
- Time usage
  - Fat and protein flow
- Other variables

Advantages of data from milking robots

- Repeated measurements of a variety of traits
- Objective measurements
- Measured on all cows in milk
- Measured over more lactations

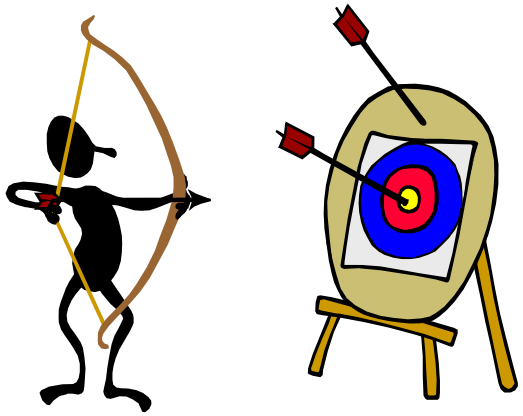


Data collection from AMS herds

- At present, data from milking robots are collected by four technicians in connection with milk recording
- Data are subsequently transferred to the national cattle database
- For the time being, it is only possible to collect data from Lely's milking robots
- Danish Cattle Federation collaborates with Lely in transferring data in real time – long-term strategy

Primary aim

- Development of EBVs for cows' suitability to use milking robots
- Optimization of existing EBVs for functional traits
- Small examples of both

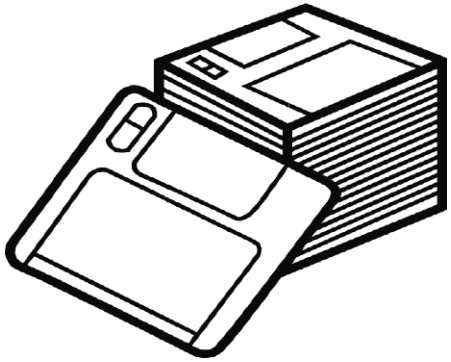


Data set and choice of model

- All analyses are based on a smaller data set
  - ~11 million observations (~16,000 cows)
  - 76 herds
- Data from May ‘05 to February ‘11
- We used linear animal models
  - One observation per cow

How to handle repeated measurements

- Great many observations
- Average of all measurements from 30 to 240 days in milk
- Presumably more sophisticated methods to utilize the information to the full



Udder conformation

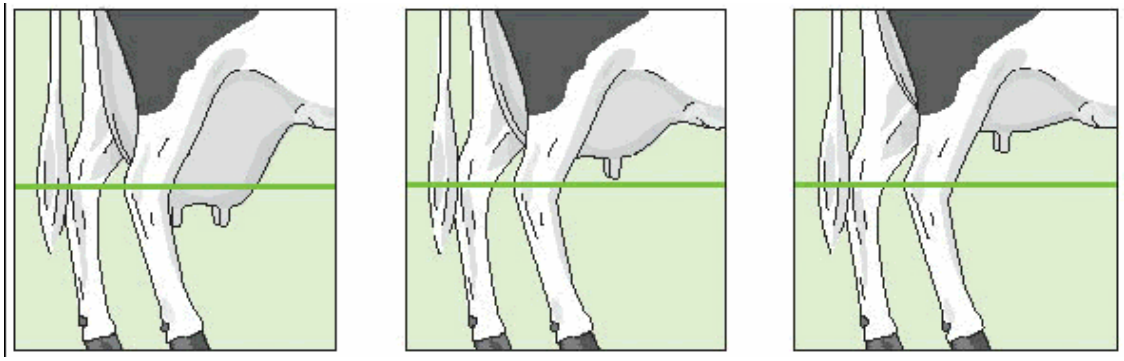
- Udder conformation is already included in NTM
  - Assessed by classifiers
- 120,000 Danish cows are classified per year
  - The majority of the cows are 1st parity cows
- A wish for EBVs based on later parities
- Is it possible to apply information on teat co-ordinates to the genetic evaluation?

Classification

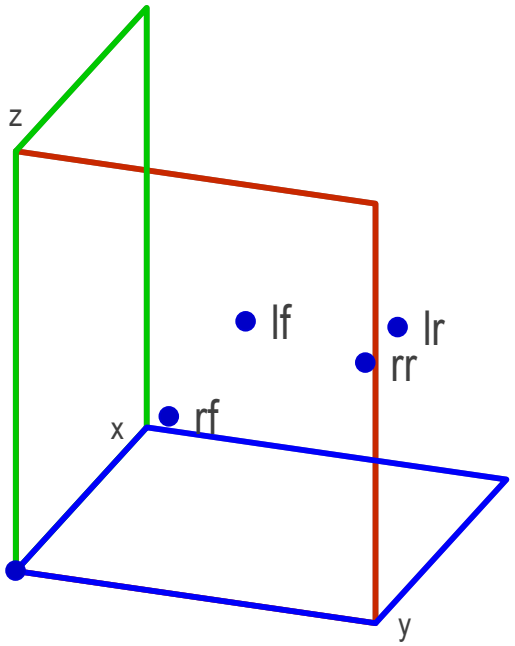
- The classifiers assess 10 linear udder conformation traits
  - Also 7 body and 5 feet and leg traits

- Trained classifiers
  - But still subjective assessments

Udder depth

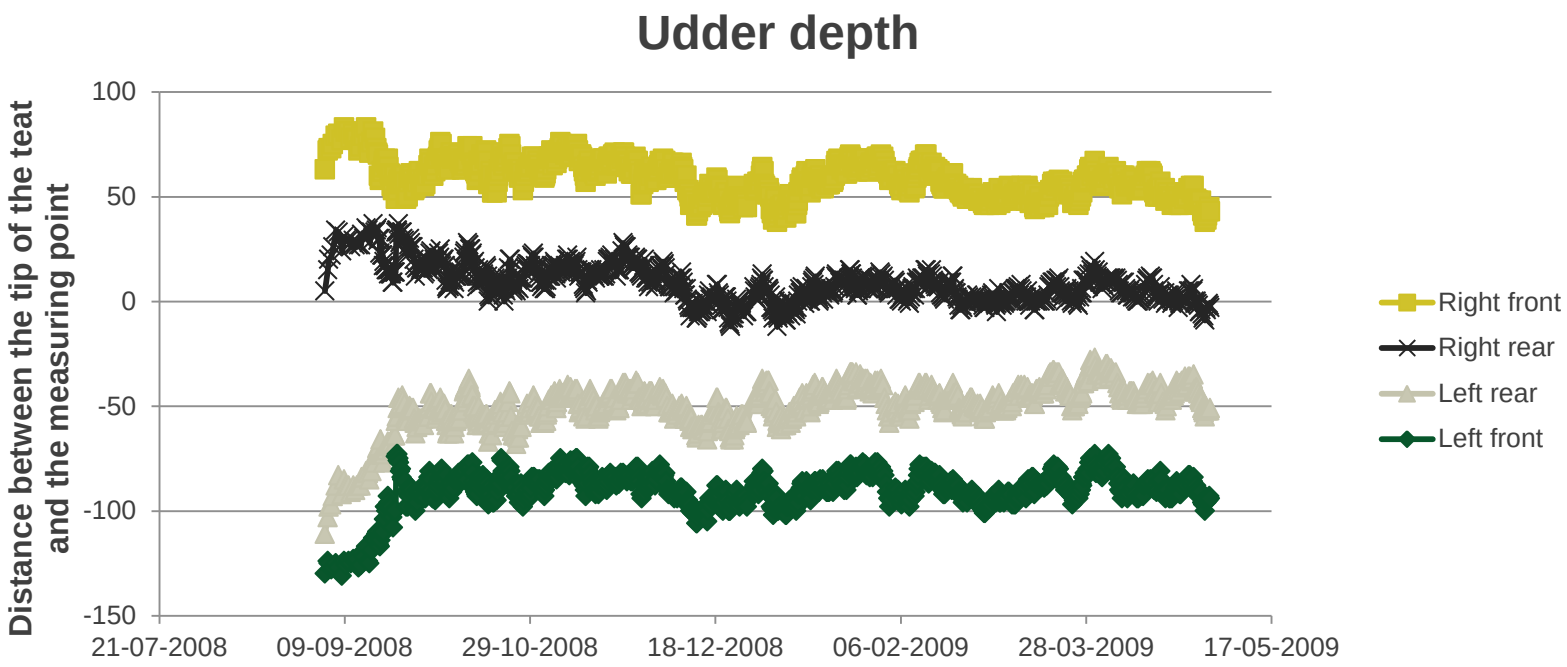


Teat co-ordinates



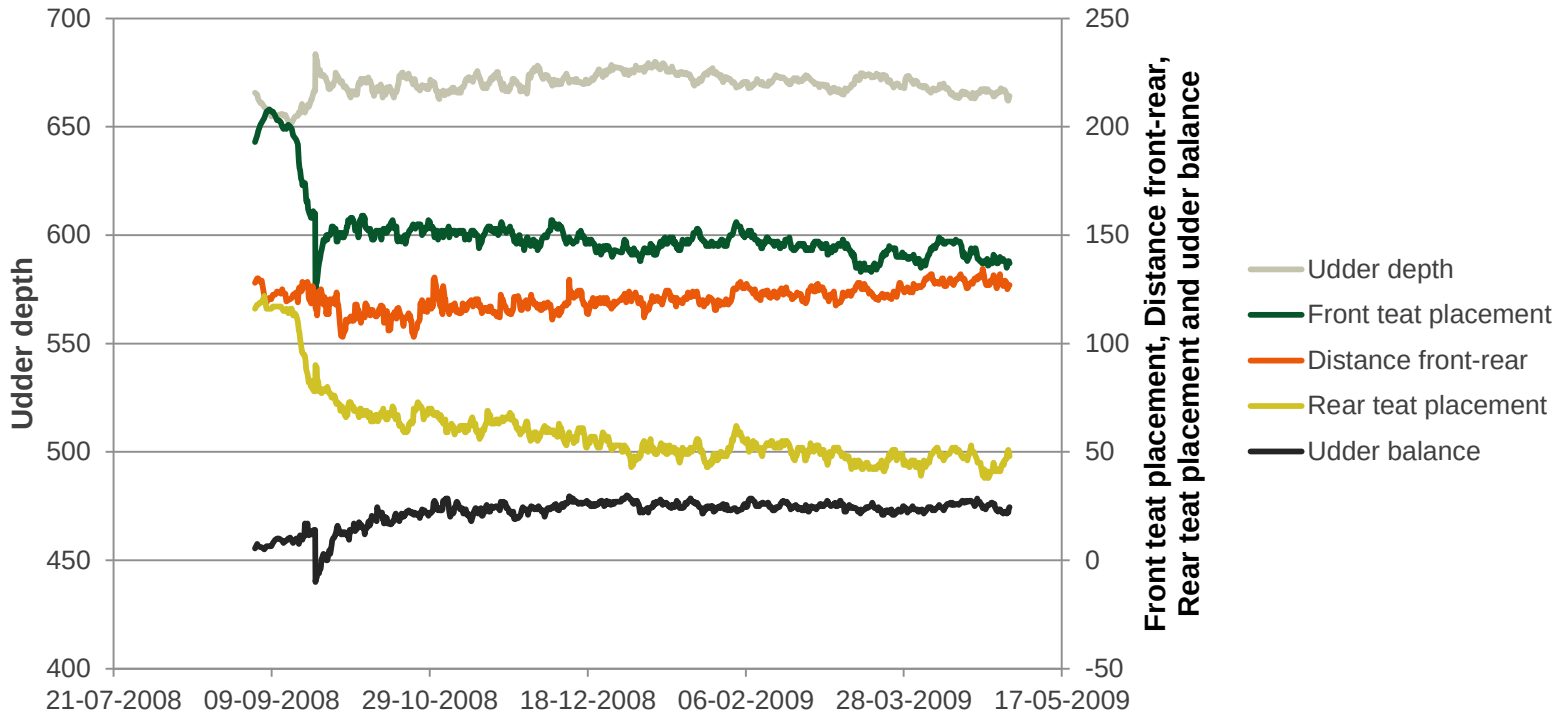
- Front teat placement
- Rear teat placement
- Distance, front - rear
- Udder balance
- Udder depth, tip of the teat - measuring point

X co-ordinates – Raw data from one cow



- Day-to-day variation
  - But co-variation

Relatively stable differences between co-ordinates through the lactation



- But co-ordinates change shortly after calving

Heritabilities for udder conformation traits measured in robots or assessed by classifiers

Trait	h^2 (S.E.) - Measurements	h^2 – Assessments
Front teat placement	0.51 (0.04)	0.20
Rear teat placement	0.28 (0.04)	0.26
Distance, front - rear	0.59 (0.04)	-
Udder balance	0.39 (0.05)	0.17
Udder depth	0.68 (0.04)	0.37

Based on measurements from approximately 5,500 1st parity Holstein cows

- High heritabilities
- High correlations between EBVs based on measurements and assessments

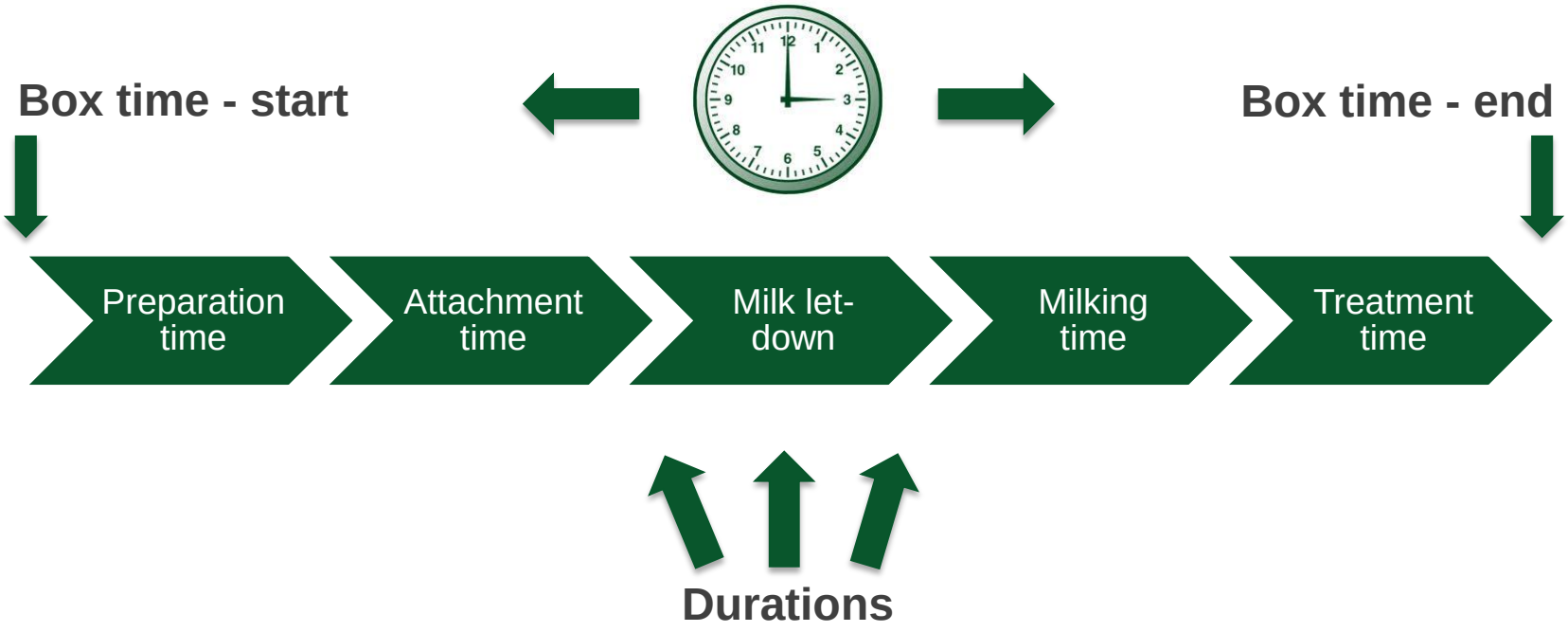
Partial conclusion – Udder conformation

- NAV is about to develop new multi-trait models for conformation traits
- NAV thinks of including teat co-ordinates from robots in the genetic evaluation
- This makes possible genetic evaluations of udder conformation traits in later parities

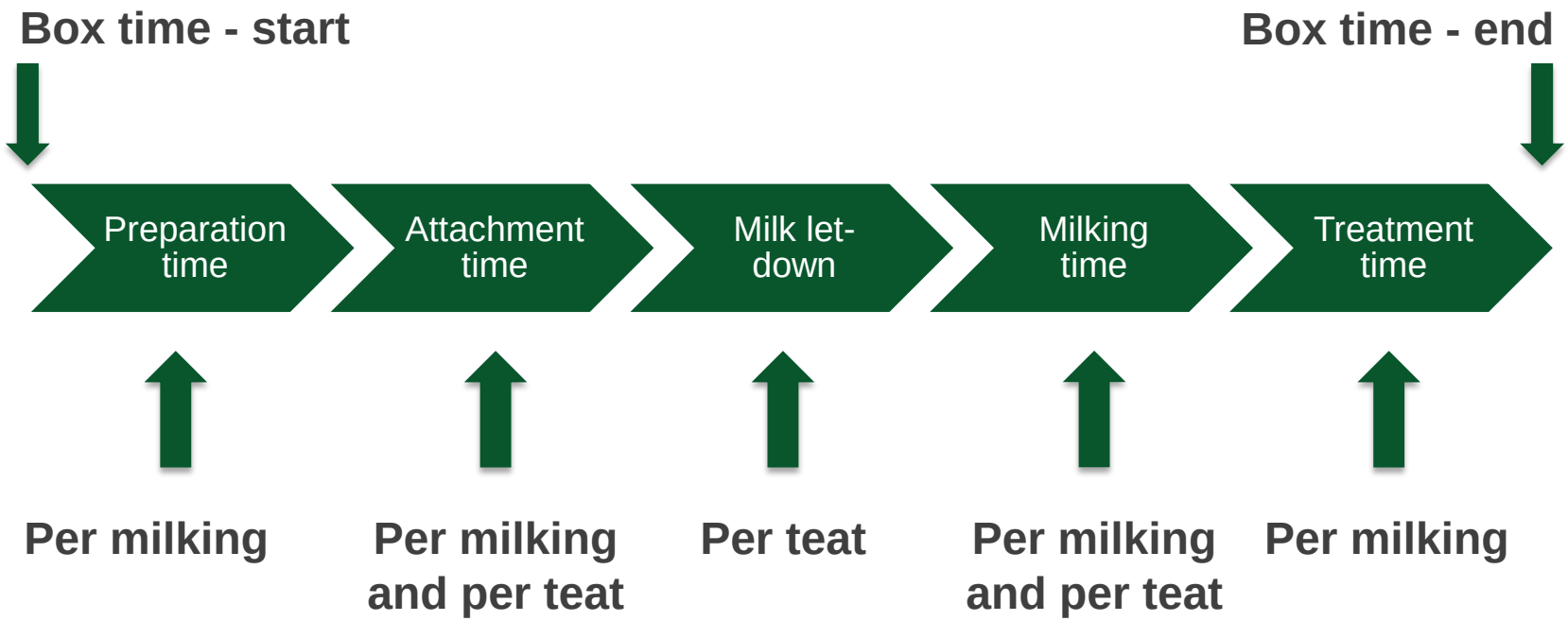
Time usage


Box time - start
Box time - end
Preparation time
Attachment time
Milk let-down
Milking time
Treatment time

Time usage


Box time - start
Box time - end
Preparation time
Attachment time
Milk let-down
Milking time
Treatment time
Durations

Time usage


Box time - start
Box time - end
Preparation time
Attachment time
Milk let-down
Milking time
Treatment time
Per milking
Per milking and per teat
Per teat
Per milking and per teat
Per milking

Milk yield + fat and protein percentages

- Milk yield per milking from robots
- Moving average of milk yield per milking
  - 7 days moving average for ≤ 30 days in milk
  - 14 days moving average for > 30 days in milk
- Fat and protein percentages from milk recording

Fat and protein flow in kg per minute

- Fat and protein flow is already included in NTM
  - Measured (DK) or assessed by dairy farmers
- Data from milking robots are not yet included in the genetic evaluation
- Is it possible to use information on fat and protein flow from milking robots?

Genetic parameters for flow

- h^2 for flow from robots and milk recording are high
- h^2 for assessments and flow from milk recording are very close to previous estimates
- High genetic correlations between the traits

- Heritabilities and genetic correlations (S.E.)

	h^2	Assessments	Flow, milk recording
Flow, robots*	0.63 (0.07)	0.91 (0.05)	0.94 (0.03)
Assessments	0.20 (0.02)	-	0.91 (0.02)
Flow, milk recording*	0.41 (0.01)	-	-

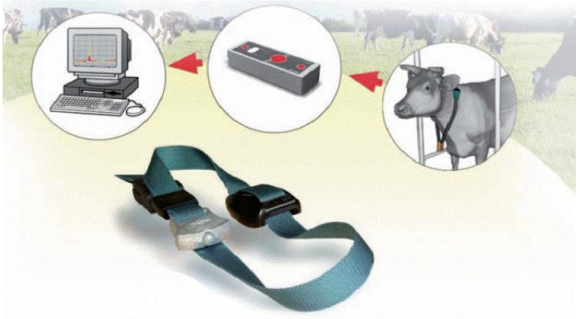
Based on measurements from 276,000 1st parity Holstein cows
* Based on information on the 1st milk recording after calving

Partial conclusion - Flow

- It is possible to use flow from robots in the genetic evaluation
- Limited effect on the EBVs of the bulls
  - There are already many observations
- Cows from AMS herds will be genetically evaluated

Variables related to health, reproduction and feed efficiency

- Automatic heat detection – Heatime
- Rumen activity – RuminAct
- Weight
- Conductivity



Conclusions

- According to the preliminary results it is possible to use:
  - Teat co-ordinates in the genetic evaluation of udder conformation
  - Fat and protein flow in the genetic evaluation of milking speed

- Data from milking robots may provide the opportunity for genetic evaluations of new traits – e.g. traits related to feed efficiency