



Requirements for future recording systems

NØK Conference, Iceland, 26 July 2010

Ole Kjærsgaard, Gert Pedersen Aamand, Ole Klejs Hansen

RECORDING MUST BE ATTRACTIVE

Attractive - only if it is useful

How is “useful” defined?

Examples:

- **Somatic cell counts**
- **Fat, protein**
- **Veterinary results (PCR, paratuberculosis, salmonella, etc.)**
- **Management tools**
- **Etc.**



**LIVESTOCK REGISTRATION
AND MILK RECORDING**



Nordic Cattle Genetic Evaluation

RECORDING DISADVANTAGES

The “not-attractive” part

Examples:

- Work
- Expenses
- Paper/data
- Etc.



**LIVESTOCK REGISTRATION
AND MILK RECORDING**



Nordic Cattle Genetic Evaluation

WHAT KIND OF TECHNICIANS IN THE FUTURE??

The farmers contact to yield recording is the technician

Personality often means more than the skills:

Advantage for the technician:

- a. Smiling personality
- b. Get along with all kind of farmers and their staff
- c. Authoritative personality
- d. Service-minded
- e. Skilled
- f. Loyal to “the system”

Do we have the right education?



**LIVESTOCK REGISTRATION
AND MILK RECORDING**



Nordic Cattle Genetic Evaluation

WHAT KIND OF RECORDING??

Traditional thinking:

- Pedigree
- Milk recording
- Classification
- Beef recording



**LIVESTOCK REGISTRATION
AND MILK RECORDING**



Nordic Cattle Genetic Evaluation

WHAT KIND OF RECORDING??

What about:

- **Health**
- **Welfare**
- **Veterinary treatment**
- **Milk ability**
- **Weight after each milking**
- **PCR**
- **Milk temperature**
- **Animal activity**
- **Etc. etc.**



**LIVESTOCK REGISTRATION
AND MILK RECORDING**



Nordic Cattle Genetic Evaluation

WHY AND HOW??

Increasing herd size

- Herdsman knows less about each animal

Automated milking systems

- Herdsman knows less about each animal

Technology (on-farm or in recording devices)

- Increasing possibility for automated data recording

Reports based on recorded data will be the future tool

- Support (or replace) herdsman's memory
- Everyday routines for immediate recording required
- Availability of recorded data will be a key issue
- Data standards important



**LIVESTOCK REGISTRATION
AND MILK RECORDING**



WHAT DO WE NEED ??

Management tools:

Production

1. Documentation
2. Prognosis

Health

1. Symptoms: Observed or automatically recorded
2. Treatments: Own and veterinarian
3. Reasons for deaths, culling and killings

Reproduction

1. Cows in heat and inseminations
2. Animal activity and milk temperature

Welfare

- Indicators at herd level based on individual cow data



**LIVESTOCK REGISTRATION
AND MILK RECORDING**



Nordic Cattle Genetic Evaluation

WHAT DO WE NEED ??

Breeding value estimation:

- Genomic selection impossible without recorded data
- Even genomic selection needs an ongoing calibration by real recorded data
- Milk ability based on objective data provided by milk meters
- Possible new traits based on new data



**LIVESTOCK REGISTRATION
AND MILK RECORDING**



Nordic Cattle Genetic Evaluation

WHAT DO WE NEED ??

Farmer wants:

- **Management data**
- **Spend as little time as possible on recording**
- **All information needed should be available**



**LIVESTOCK REGISTRATION
AND MILK RECORDING**



WHAT DO WE NEED ??

Automated data capture can help provide both

- **Without sensors on or in animal**
- **Electronic identification and electronic milk meters**
- **Collect data on milk ability from AMS systems**
- **Collect data from mandatory hoof trimming programmes**
- **Automatic weighing of cows leaving milking**
- **With extra sensors on or in animal**
- **Automatic recording of animal activity**
- **Automatic recording of animal temperature**



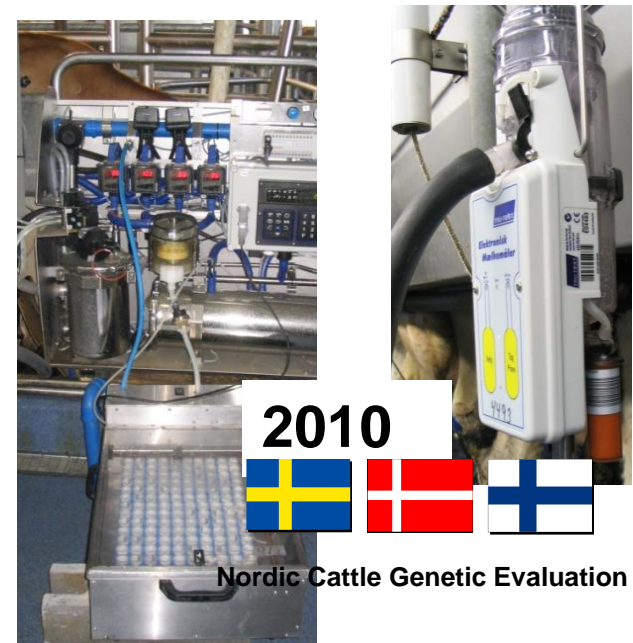
**LIVESTOCK REGISTRATION
AND MILK RECORDING**



Nordic Cattle Genetic Evaluation

2000 – 2010 (Denmark)

	2000	2010
Producers	10,500	4,250
•Dairy cows	660,000	572,000
•Average herdsize	63	135
Recorded herds	8,850	3,800
•Recorded cows	593,000	530,000
•Average herdsize	67	139
•Manual recording	8,800	300
•Automatic recording, herds	50	3,500
•% cows in AMS systems	0.5 %	27 %
•Robotic herds	50	830

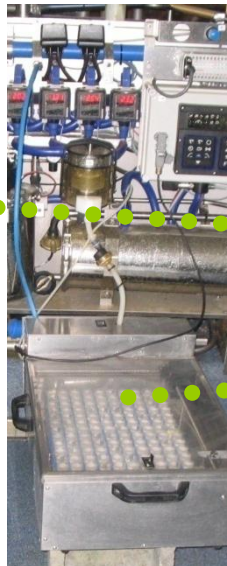


Nordic Cattle Genetic Evaluation

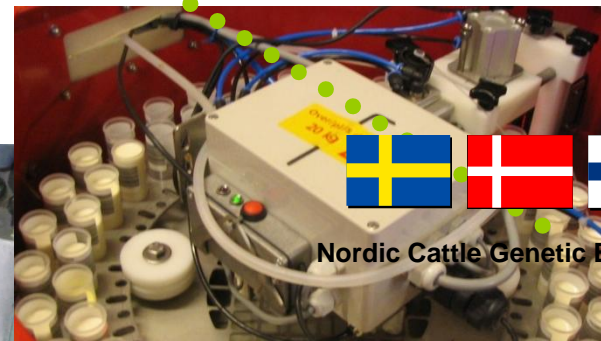


LIVESTOCK REGISTRATION
AND MILK RECORDING

**The center is the sample
- not the meter!**



**LIVESTOCK REGISTRATION
AND MILK RECORDING**



Nordic Cattle Genetic Evaluation

Analysis on DHI samples

Standards:

Fat, protein, SCC

Options:

Paratuberkulose (Johnes)

Salmonella Dublin

PCR

Urea

Lactose

Fatty Acids

Lactoferrin

Inhibitors

Minerals

Hormones



...% F - ...% P -
...SCC
ELISA...PCR

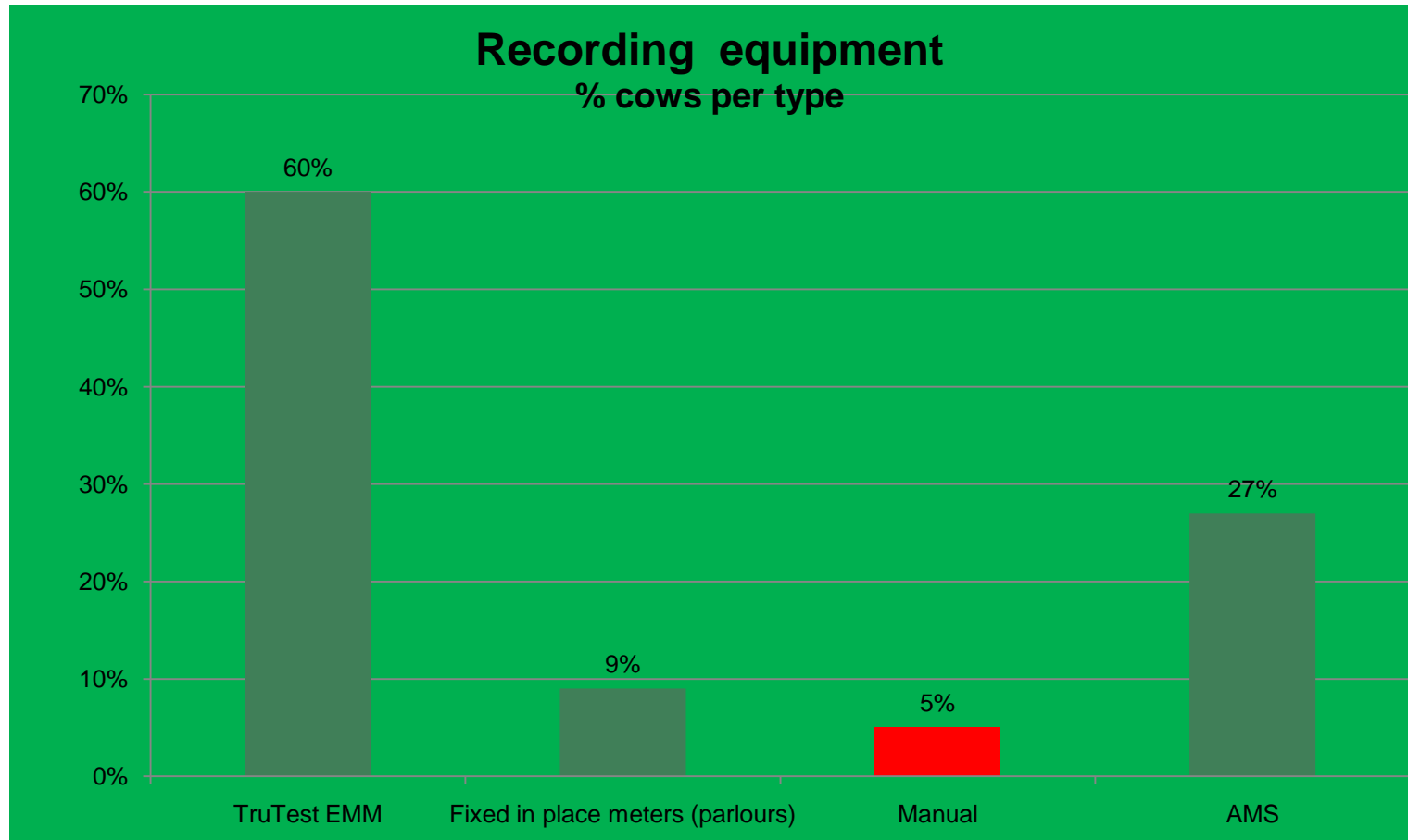


LIVESTOCK REGISTRATION
AND MILK RECORDING



Nordic Cattle Genetic Evaluation

Recording status 2010 (Denmark)

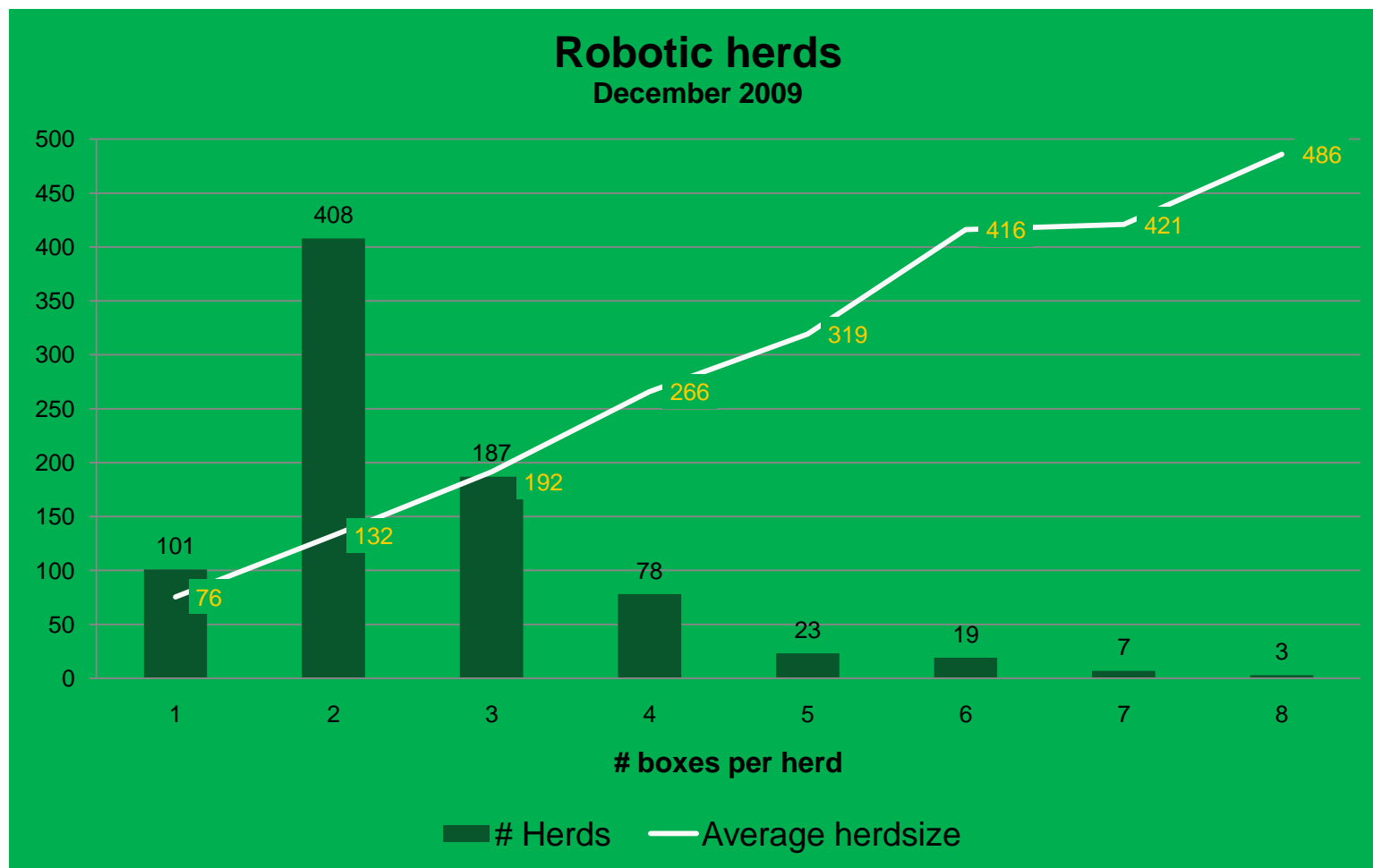


**LIVESTOCK REGISTRATION
AND MILK RECORDING**



Nordic Cattle Genetic Evaluation

Recording status 2010 (Denmark)



**LIVESTOCK REGISTRATION
AND MILK RECORDING**



Nordic Cattle Genetic Evaluation

Example: Milking speed

Data collection

95 % recordings through automatic data capture

Transfer and handling by recording staff

Validation on the farm

New parameters links to existing logistic systems

Use of data, example

Milking speed registered manual has a heritability of app. 0.20

Milking speed registered by the milk meter, has a heritability of app. 0.30 and we get more registrations per cow and more cows recorded



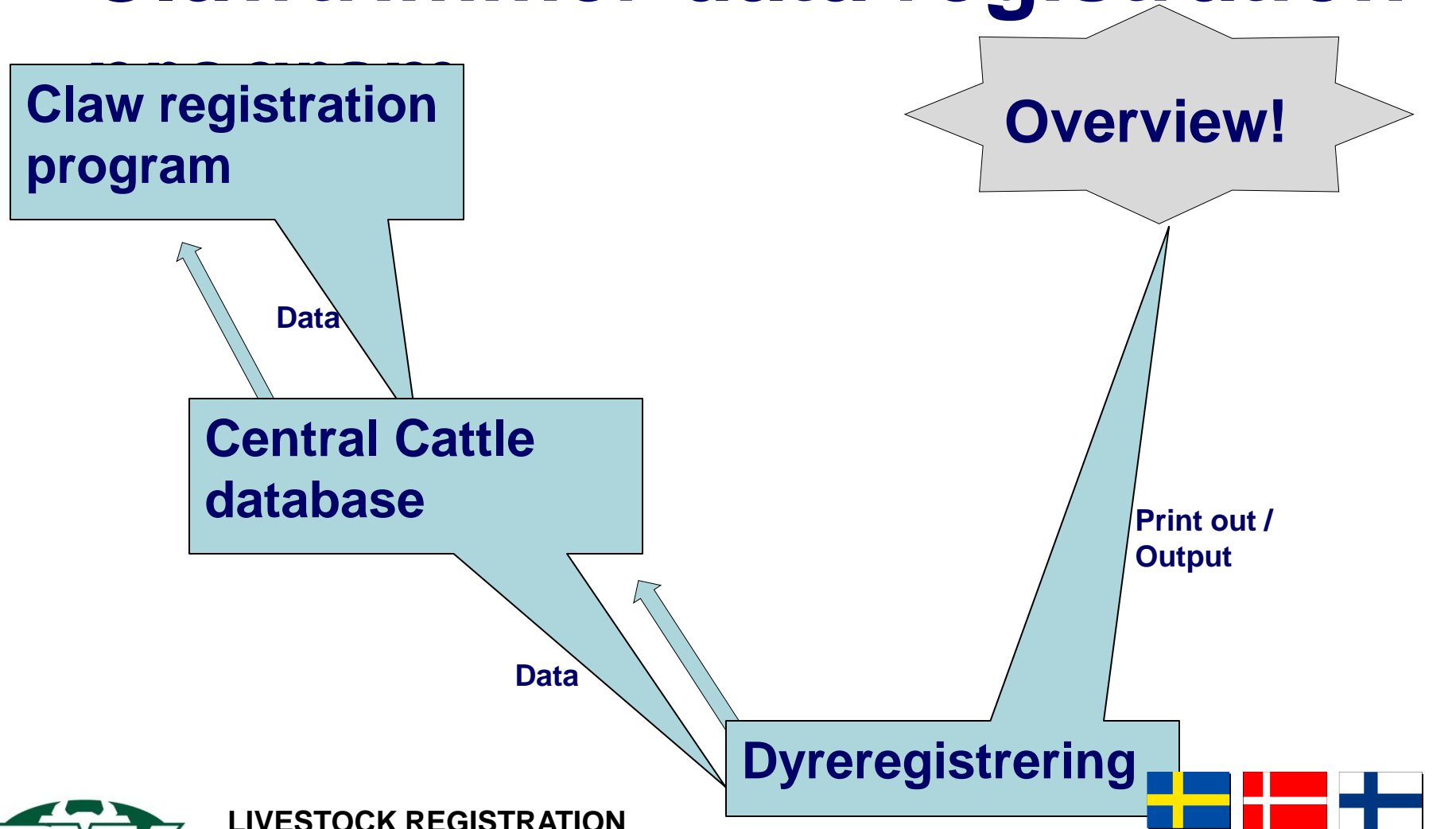
LIVESTOCK REGISTRATION
AND MILK RECORDING



Nordic Cattle Genetic Evaluation

Example :

Clawtrimmer data registration



LIVESTOCK REGISTRATION
AND MILK RECORDING



Nordic Cattle Genetic Evaluation

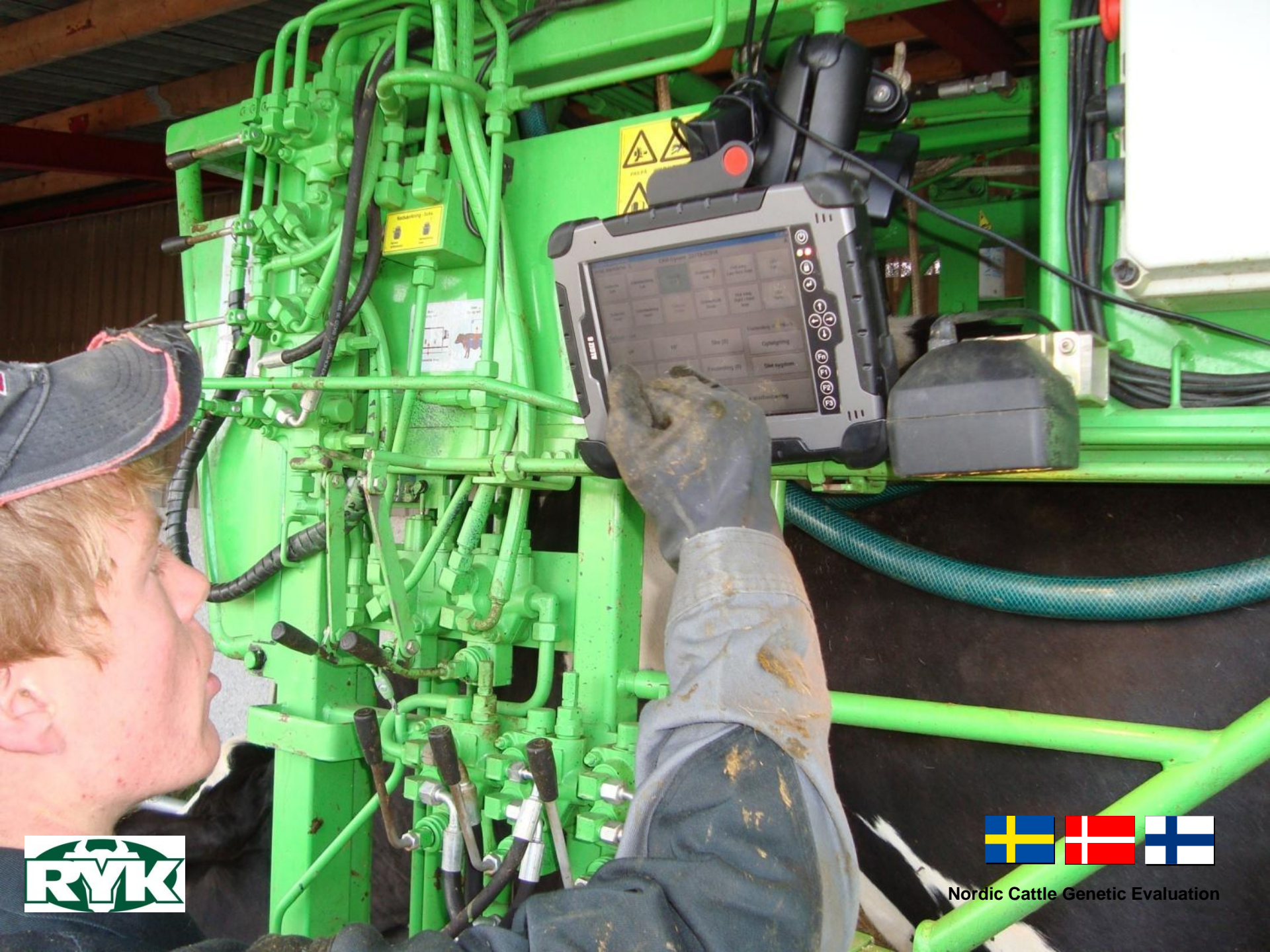
Started spring
2010



LIVESTOCK REGISTRATION
AND MILK RECORDING

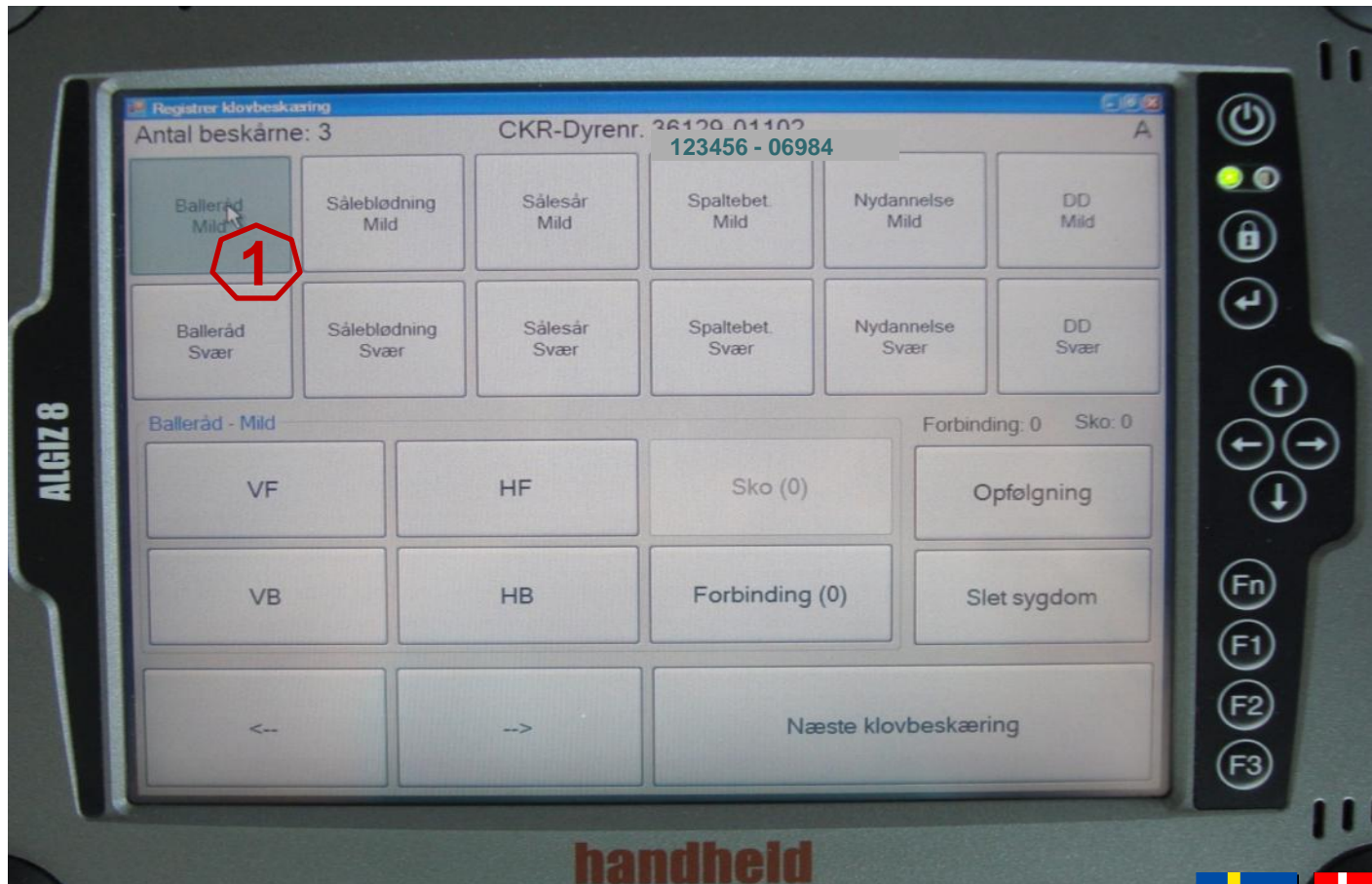


Nordic Cattle Genetic Evaluation



Nordic Cattle Genetic Evaluation

Claw disease registration. One claw disease and the severity can be registered by one touch

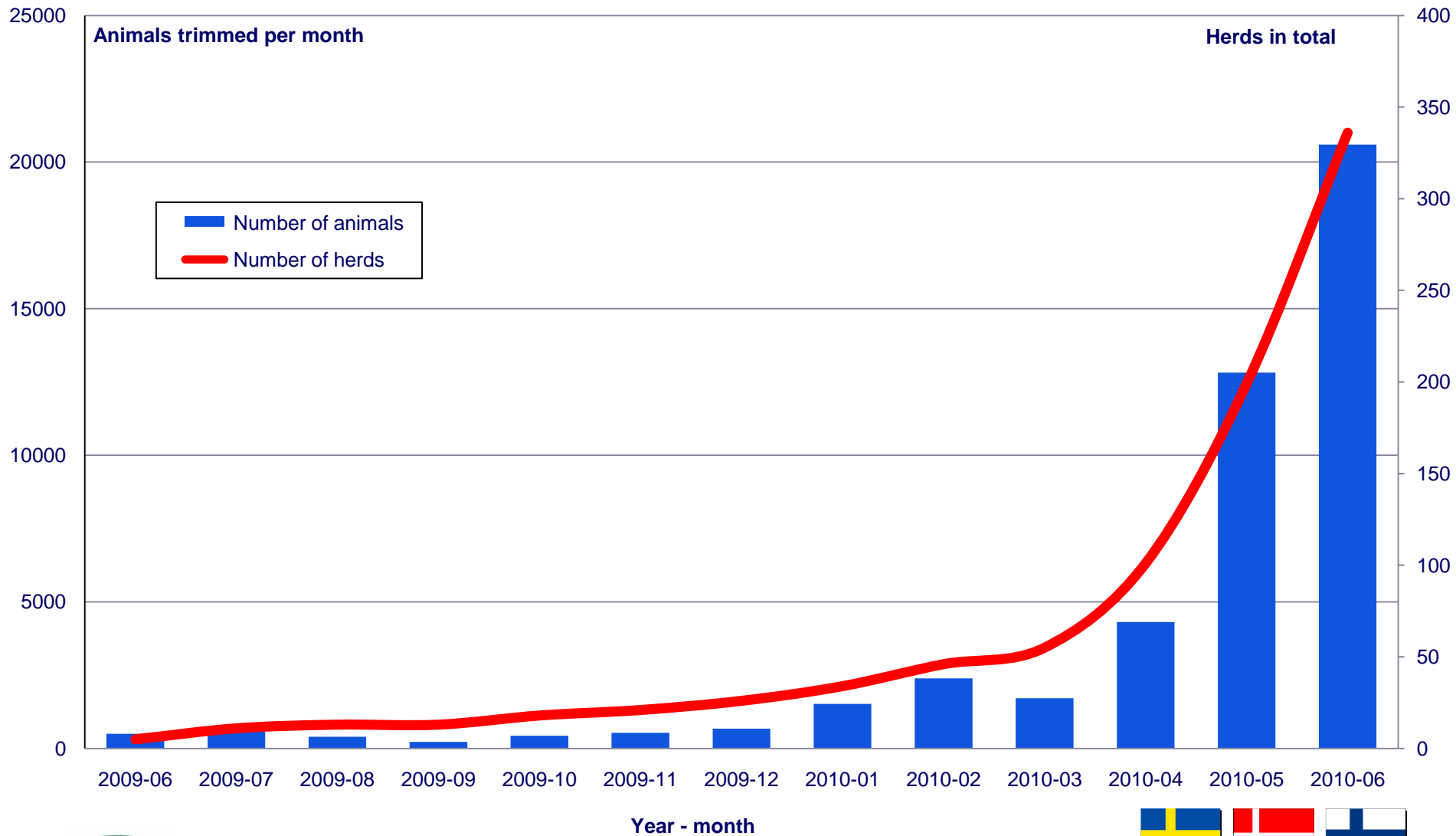


LIVESTOCK REGISTRATION
AND MILK RECORDING



Nordic Cattle Genetic Evaluation

Claw trimmings recorded in the "Klovregistreringsprogram" 1 July 2010



**LIVESTOCK REGISTRATION
AND MILK RECORDING**



Nordic Cattle Genetic Evaluation

**Example:
Collection of DNA a integrated part of the
future registration system?**



**LIVESTOCK REGISTRATION
AND MILK RECORDING**



Nordic Cattle Genetic Evaluation

Today

Bulls with known EBVs and SNPs create the "DNA-dictionary" (reference pop.)



SNPs



EBVs

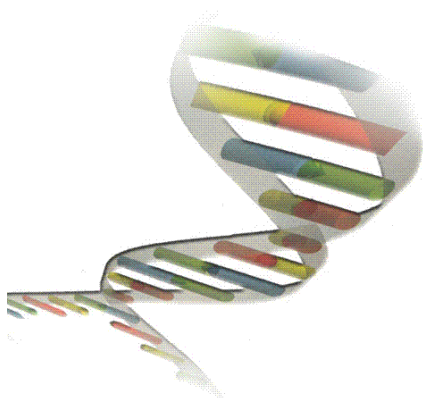


**LIVESTOCK REGISTRATION
AND MILK RECORDING**



Nordic Cattle Genetic Evaluation

SNPs from young animals can be translated to DGVs



One dictionary per breed

**Reliability today
“50-60%”**

SNPs from young animals



Genomic EBVs



**LIVESTOCK REGISTRATION
AND MILK RECORDING**



Nordic Cattle Genetic Evaluation

Bulls with known EBVs and SNPs create the "DNA-dictionary"



The quality of the dictionary is correlated to the size of the reference population

SNPs



EBVs



LIVESTOCK REGISTRATION
AND MILK RECORDING



Nordic Cattle Genetic Evaluation

Future



SNPs
3K,50K,700K
(whole genome)



Phenotypes

Number of animals tested depends on prices:

- Today in total about 300 Euro
- Future prices for 3K, 50K, 700K?



**LIVESTOCK REGISTRATION
AND MILK RECORDING**



Nordic Cattle Genetic Evaluation

Future



SNPs ↔ EBVs

Low prices →



Large scale testing/screening

Large scale DNA collection

DNA available on females with new registrations 3 years ahead!

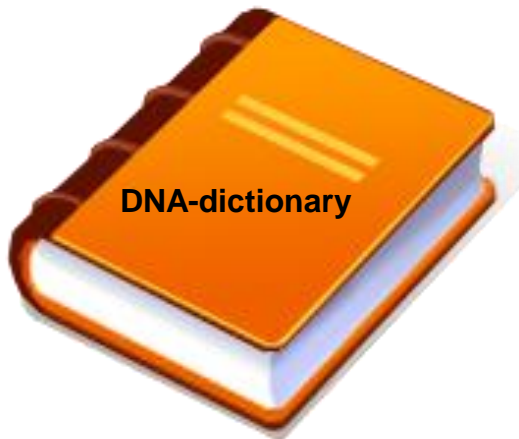


LIVESTOCK REGISTRATION
AND MILK RECORDING



Nordic Cattle Genetic Evaluation

Future



SNPs  EBVs



It is time to plan for a large scale DNA collection - the first countries make already plans

E.g.

New registrations available in 2014 – DNA collection has to start in 2011, if it takes place along with ear tagging



**LIVESTOCK REGISTRATION
AND MILK RECORDING**



Nordic Cattle Genetic Evaluation

Future collection of DNA samples

Will be

- An integrated part of the recording system
- Give benefit genetic progress
- Give new possibilities in relation to trace ability

Systems have to established soon in Nordic countries:

- How to collect and store DNA on farm, how to collect/send it/use of DNA from ear tags, storage etc.?



LIVESTOCK REGISTRATION
AND MILK RECORDING



Nordic Cattle Genetic Evaluation

Access to data?

- a. Data available to everybody through Internet ?**
- b. Only a few sensitive personal data are protected?**
- c. What do the farmers think about it??**
- d The farmers use the opportunities themselves?**



**LIVESTOCK REGISTRATION
AND MILK RECORDING**



Nordic Cattle Genetic Evaluation

Recording/registration and use of data

Once registered data should, when possible, be reutilised in other applications

Coordination of requested data necessary

Less bother – More precision

Open minds on all sides (Authorities, Farmers, Industry)

Data for estimating of breeding values: *E.G:*

- a. Data from AMS: Udder health and conformation*
- b. Data from claw-trimmers*



**LIVESTOCK REGISTRATION
AND MILK RECORDING**



Nordic Cattle Genetic Evaluation

RECORDING IN THE FUTURE:

Only attractive if useful !

Fulfilled ?

- a. Gives a lot of information**
- b. New equipment gives even more data**
- c. Demands for collecting the data**
- d. Profit: Management tools**
- e. New traits (e.g. udder, claws)**
- f. Useful for others (e.g. research, authorities)**

The answer:

YES



**LIVESTOCK REGISTRATION
AND MILK RECORDING**



Nordic Cattle Genetic Evaluation