Requirements for future recording systems
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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.
RECORDING DISADVANTAGES

The “not-attractive” part

Examples:

- Work
- Expenses
- Paper/data
- Etc.
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?
WHAT KIND OF RECORDING??

Traditional thinking:

• Pedigree
• Milk recording
• Classification
• Beef recording
WHAT KIND OF RECORDING??

What about:

• Health
• Welfare
• Veterinary treatment
• Milk ability
• Weight after each milking
• PCR
• Milk temperature
• Animal activity
• Etc. etc.
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
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
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
WHAT DO WE NEED ??

Farmer wants:

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

#### 2000 – 2010 (Denmark)

<table>
<thead>
<tr>
<th>Category</th>
<th>2000</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Producers</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Dairy cows</td>
<td>660,000</td>
<td>572,000</td>
</tr>
<tr>
<td>• Average herd size</td>
<td>63</td>
<td>135</td>
</tr>
<tr>
<td><strong>Recorded herds</strong></td>
<td>8,850</td>
<td>3,800</td>
</tr>
<tr>
<td>• Recorded cows</td>
<td>593,000</td>
<td>530,000</td>
</tr>
<tr>
<td>• Average herd size</td>
<td>67</td>
<td>139</td>
</tr>
<tr>
<td>• Manual recording</td>
<td>8,800</td>
<td>300</td>
</tr>
<tr>
<td>• Automatic recording, herds</td>
<td>50</td>
<td>3,500</td>
</tr>
<tr>
<td>• % cows in AMS systems</td>
<td>0.5 %</td>
<td>27 %</td>
</tr>
<tr>
<td>• Robotic herds</td>
<td>50</td>
<td>830</td>
</tr>
</tbody>
</table>

**Nordic Cattle Genetic Evaluation**
The center is the sample - not the meter!
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
Recording status 2010 (Denmark)

Recording equipment

% cows per type

- TruTest EMM: 60%
- Fixed in place meters (parlours): 9%
- Manual: 5%
- AMS: 27%

LIVESTOCK REGISTRATION
AND MILK RECORDING

Nordic Cattle Genetic Evaluation
Recording status 2010 (Denmark)

Robotic herds
December 2009

# boxes per herd

# Herds  Average herd size

1  101  76
2  408  132
3  187  192
4  78  266
5  23  319
6  19  416
7  7  421
8  3  486

Nordic Cattle Genetic Evaluation
LIVESTOCK REGISTRATION AND MILK RECORDING

Farmer

Milk recorder

Registration office

Paper based

Electronic transfer

Cattle database

Veterinarians

Abattoirs

Meat Council

AI Center

Dairy Board

Dairies

AI technicians

AMD

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
Example: Management tools for reproduction

- Activity
- Temperature in milk
- Live weight
- Registration of diseases
- AI data
- Rumination time
- Reproduction on herd level

LIVESTOCK REGISTRATION AND MILK RECORDING

Nordic Cattle Genetic Evaluation
Example:
Clawtrimmer data registration
program

Claw registration
program

Central Cattle
data database

Dyreregistrerering

Overview!

Data

Print out/
Output

LIVESTOCK REGISTRATION
AND MILK RECORDING
Nordic Cattle Genetic Evaluation
LIVESTOCK REGISTRATION
AND MILK RECORDING

Started spring
2010

RYK

Nordic Cattle Genetic Evaluation
Claw disease registration. One claw disease and the severity can be registered by one touch.
Claw trimmings recorded in the "Klovregistreringsprogram" 1 July 2010

Animals trimmed per month

Herds in total

Year - month

Antal dyr
Antal besætninger
Example: Collection of DNA a integrated part of the future registration system?
Today

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

SNPs ↔ DNA-dictionary ↔ 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 → DNA-dictionary → Genomic EBVs
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 \(\rightarrow\) DNA-dictionary \(\rightarrow\) EBVs
SNPs 3K, 50K, 700K (whole genome)

Number of animals tested depends on prices:
- Today in total about 300 Euro
- Future prices for 3K, 50K, 700K?
Future

SNPs ↔ EBVs

Low prices

Large scale testing/screening

Large scale DNA collection

DNA available on females with new registrations 3 years ahead!
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
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.?
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?
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:  \textit{E.G.}:

- \textit{Data from AMS: Udder health and conformation}
- \textit{Data from claw-trimmers}
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