What is precision livestock farming (PLF)?

Why is it important for the future dairy farmer?

Charlotte Hallén Sandgren Gråsten 2012

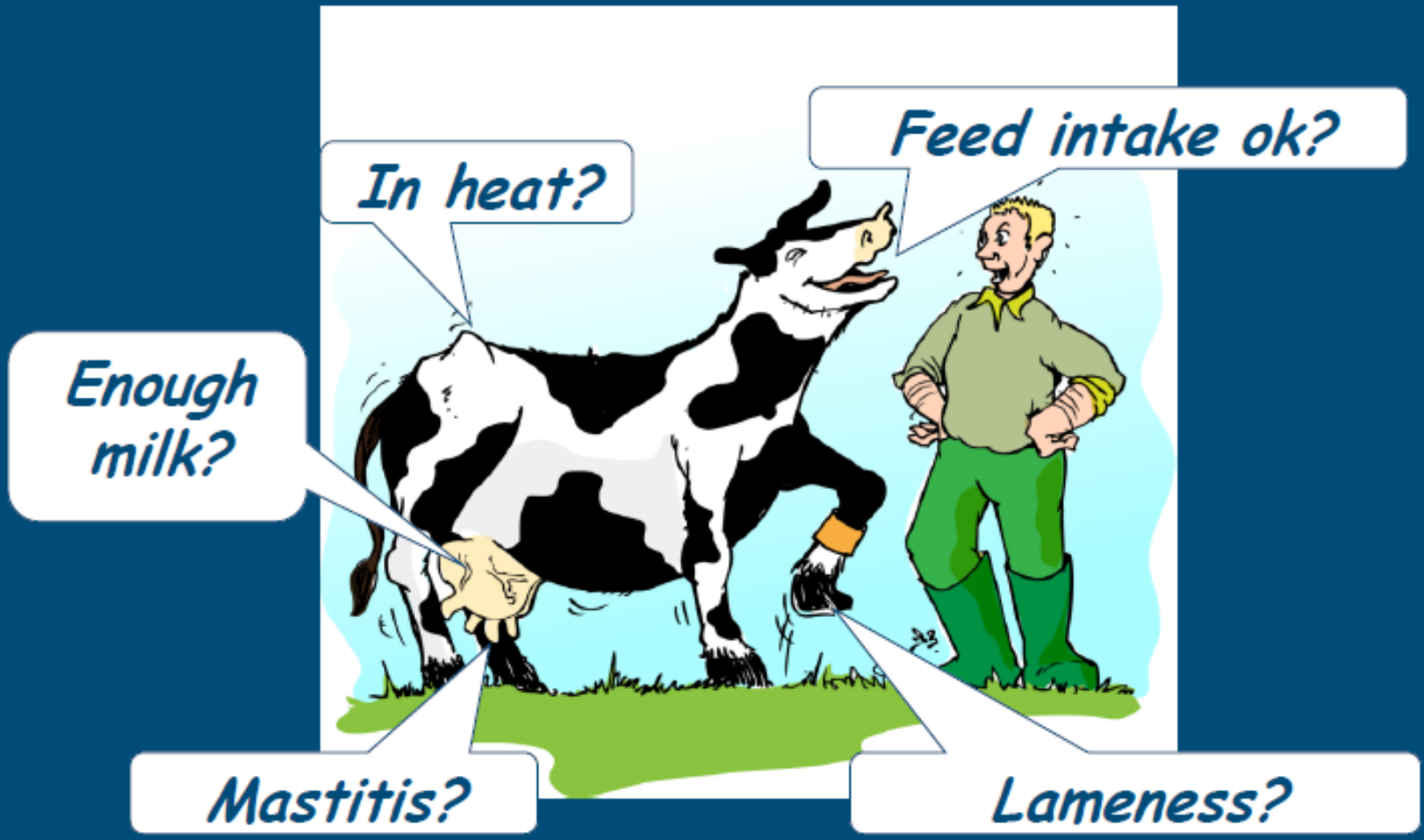
Outline

- Background
- Definition
- Sensors
- The future
- Final comments

Profitability is the well deserved reward to a professional dairy farmer

- Success is not random
- Accurate data – a prerequisite!
- Early detection and action on disturbances of individual animals – You earn money
- Draw conclusions and prevent in the future – **You earn more money!**

Precision farming? Individual approach in large herds…



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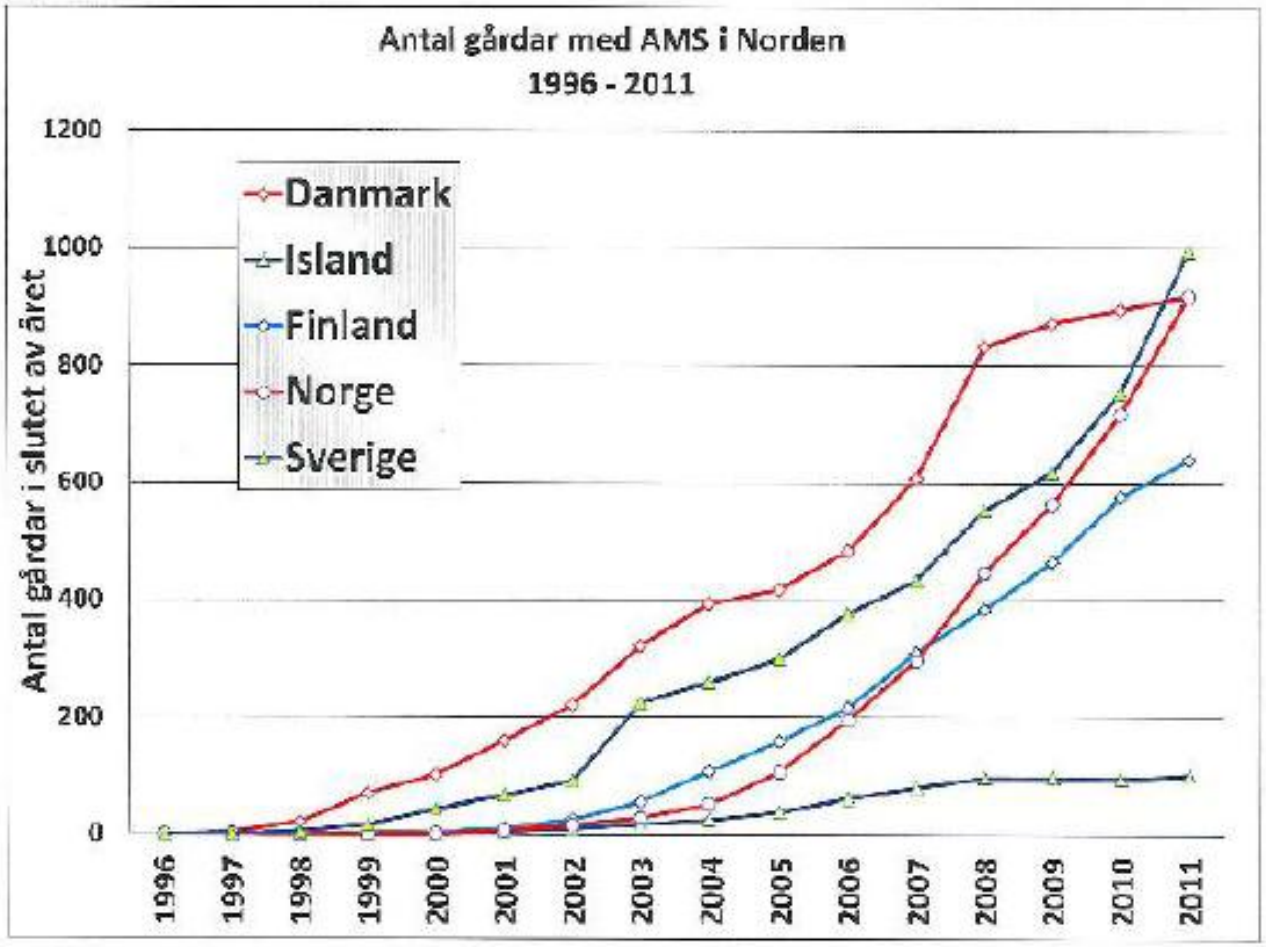
AMS ans Free-stalls in Norway



NMSM, Mats Gyllensvärd, Svensk Mjölk, 12.5.2010

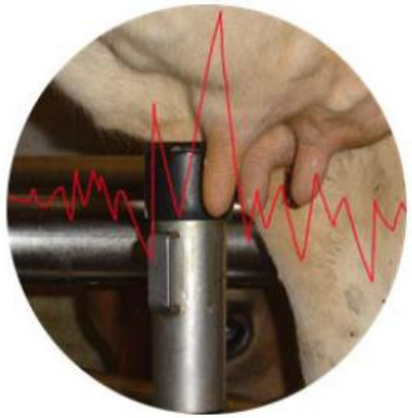
40 % of the free-stalls have AMS, and 50 % of the cows in free-stalls are milked with AMS,

35 % of the barns are free-stalls, and 50 % of the cows are in freestalls.

Which means that 25 % of the cows in Norway are milked with AMS

AMS opportunities – not only relief from daily milking routine.

- Potential to provide continuous monitoring of performance and analysis.
- Automatic sensors for monitoring udder health, milk production, reproductive status, feed intake, BW changes etc. provide continuous detailed information about each cow.



Definition Precision livestock farming

- **Precision Livestock Farming (PLF)** is the use of advanced technologies to optimize the contribution of each animal. Through this "per animal" approach, the farmer aims to deliver better results in livestock farming.
- PLF is a technology that applies the principles of process engineering to livestock farming and has the potential to support of:
  - efficient utilization of feed and nutrients
  - early warning of bad health
  - reduction in pollutant emission…

Goals

- Profitable production
- Quality and Safety
- Sustainable livestock farming

Tools

- EID stands for Electronic Identification
- Sensors
- Fresh data and software
  - Algoritms and Predictions
- Standard routines

Milk components on-line

Explosion of new in sensors in research and on the market!

- All kinds of Milk constituents.
- Eating behavior, Respiration rate, Rumination, chewing behavior, Stress responses, Deep body temperature, Body weight, Udder health, Oestrus, Breath emissions, Biting rate in grazing cows, Lying behavior, Weight, Lameness, Activity etc…..

“We are drowning in data but starving for information” John Naisbett

For the farmer to consider..

- Technical accuracy
  - How are cases defined and when?
  - -- Proportion of true cases found (sensitivity)
  - Proportion of false cases identified (specificity)
- Decision support
  - Interpretability, Education, Support and Software are extremely important parts!
- Cost benefit (all costs included)
- Robustness and calibration to be defined

Modern milk recording herds

- Cow ID, electronic milk meters, computer systems, Internet Access
- Need for information on SCC, urea, fat, protein, lactose, progesteron,
- Day to day management
- External analysis samples in well organized laboratories
- In-line and on-farm sensor developments – threat or opportunity?
- Time gain, quality of data versus costs

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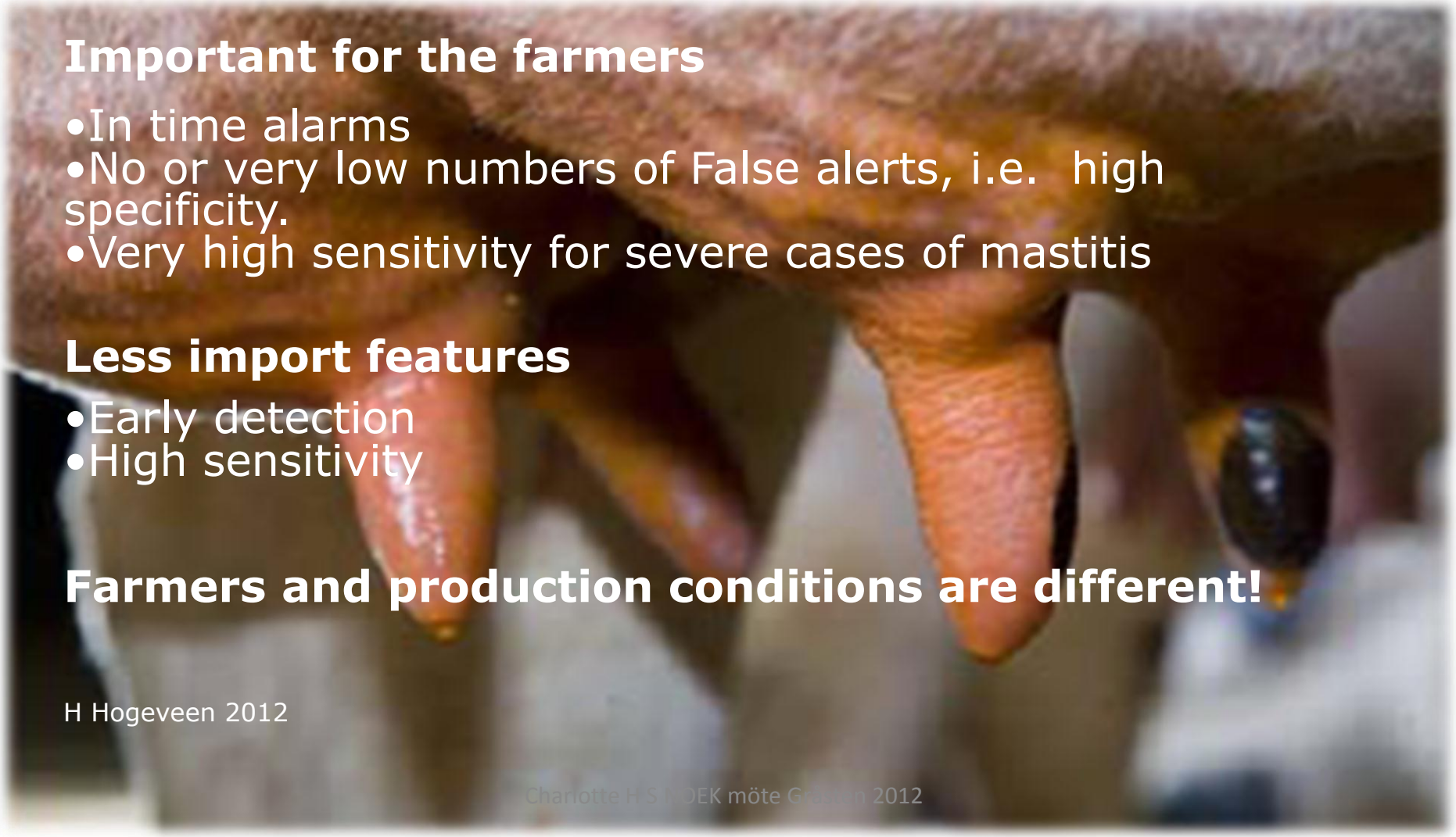
Dutch farmers expectations on mastitis sensors



Important for the farmers

- In time alarms
- No or very low numbers of False alerts, i.e. high specificity.
- Very high sensitivity for severe cases of mastitis

Less import features

- Early detection
- High sensitivity

Farmers and production conditions are different!

H Hogeveen 2012

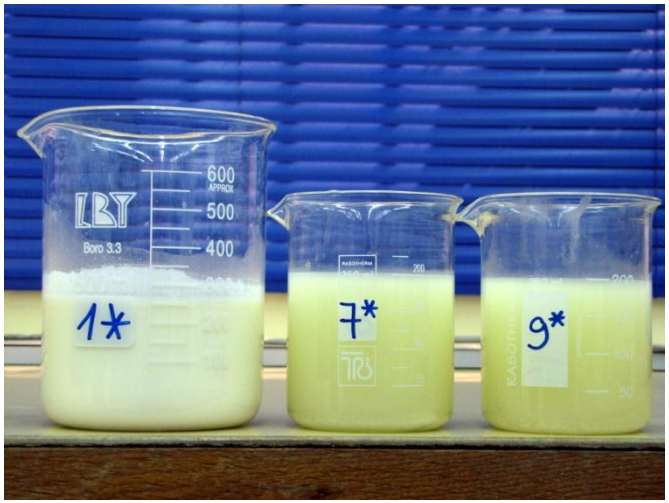
Solutions for the future – only fantasy sets the limit..

- Food safety, composition, health and welfare status, antibiotic therapy, genetic evaluations
- Combination from several sources of information on individual cow level
- On farm processing of milk
  - Differentiation, use of colostrum, milk refinery
- Benchmarking
  - Within /Between herds
- Provide information to different entities
- Facilitating farm labor
  - Automated prevention / treatments?
  - Supervision of non milking animals (ex transition period)

Behavior data may add valuable information!

1. Reproduction – oestrus detection in limited conditions
2. Health – early detection of health problems
3. Cow well-being and Comfort – monitoring and assessment

Optimal product separation:



The future brings big opportunities but with some bottlenecks

- Reliable and accurate and interpretable sensors still are not to many
- Cost Benefit of each sensor system to be proven
- Change of management practices on the farm in order to extract the potential of the technique

Thanks for the attention!