WG functional traits

**ICAR 2014 Conference, Berlin / Germany (May 19-23, 2014)**

# Harmonization of recording and use of direct health data as basis of sustainable improvement of dairy health and longevity

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# Dairy health & longevity

- functional traits as integral parts of dairy breeding programs
- increasing weights on functionality aspects in selection indices
- improved trait definitions for more targeted breeding progress
  - direct rather than indirect traits
  - specific rather than global traits
- direct health traits and health monitoring
  - productivity and production efficiency / profitability (economics)
  - animal welfare and responsibility (politics, public reputation)
  - transparency and reliability (food safety, product quality)

# Health data recording (I)

- different starting points
  - long tradition of health improvement programs in Scandinavia (Norwegian Cattle Health Recording System since 1975)
  - more recent implementation of routines for direct health traits in some other countries
  - remarkable R&D activities worldwide to consider direct health traits in future dairy breeding programs

# Health data recording (II)

- different starting points
  - …
  - remarkable R&D activities worldwide
    to consider direct health traits in future dairy breeding programs
- similar general framework
  - decreasing heterogeneity of legal requirements,
    increasing pressure on the whole livestock sector
  - need for new traits for targeted improvement of dairy health,
    few settled routines for working with disease information
  - standardization & harmonization of phenotype data collection
    as basis of reliable genetic and genomic evaluations

# Functional traits WG

ICAR working group on "recording, evaluation and genetic improvement of functional traits in dairy cattle" (FTWG; ICAR 2000)

- recommendations (standards and guidelines) on recording schemes, evaluation procedures and genetic improvement schemes for functional traits
- portfolio for functional traits in dairy cattle
- FTWG activities / working focusses 2011-2014
  - direct health traits
    guidelines (approved 2012), health data conference (2013)
  - female fertility
    guidelines (2013)
  - feet and legs (claw health / use of claw trimming data)
    information collection, overview

# Health guidelines

- health traits in the focus of work of FTWG in 2010/2011
  → **ICAR guidelines for Recording, Evaluation and Genetic Improvement of Health Traits** (approved in 2012)
- starting point
  - existing health data recording systems with different approaches
    → heterogeneity of recording schemes (broad range of number of traits with 1 to > 900 documentation options)
  - worldwide distributed experience with little exchange, sparse interdisciplinary collaboration

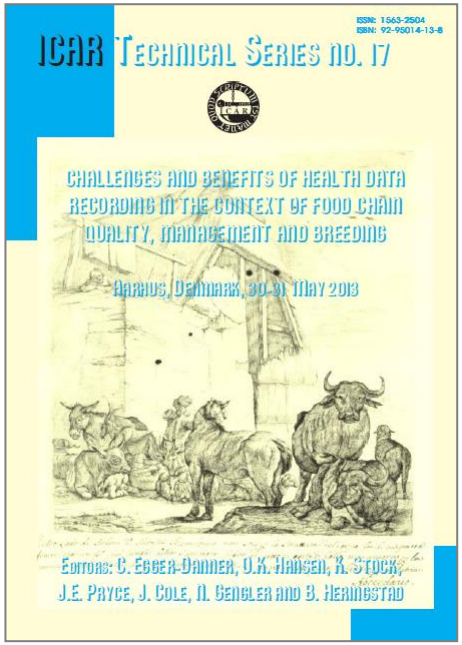
***Who is documenting?*** → *veterinarians, farmers, staff of performance recording agencies, claw trimmers, ...*

***What is documented in which context?*** → *veterinary diagnoses (reasons for drug use), disease observations during routine work on farm, ...*

***Specific challenges of the recording approach*** → *legal framework (obligatory vs. facultative documentation), motivation / personal interests of thorough documentation, ...*

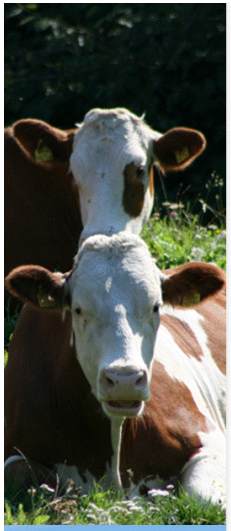
# Health data conference

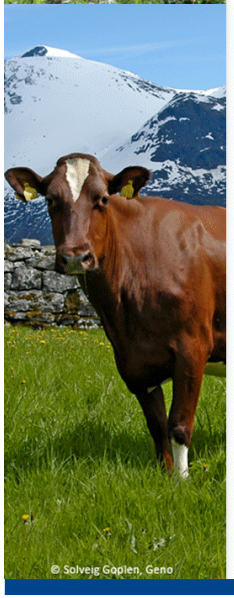
- requested support by ICAR FTWG
  - guidelines
  - direct exchange (workshops, ...)
- concept
  - interdisciplinary
  - broad coverage
    (management / animal husbandry, veterinary medicine, breeding, research, politics and society)
  - visualization of collaboration options
- response:
  about 145 participants from >30 countries

## ICAR 2013 Health Data Conference

# Conference topics






### Programm I

**Thursday, 30th of May, 2013 – Joint sessions with ICAR Technical Workshop**

- **Welcome and introduction:**
  13:30 – 13:45
  ICAR - President
  Chairperson ICAR - FTWG
- **General aspects – Part 1**:
  13:45 – 15:30
  Chair: O. Hansen
- **General aspects – Part 2**:
  16:00 – 18.00
  Chair: N Gengler

### Programm II

**Friday, 31th of May, 2013**

- **Logistics of recording**: 08:00 – 10:00
  Chair: J. Cole
- **Data validation**: 10:30 – 12.30
  Chair: J. Pryce
- **Benefits**: 14:00 – 16.00
  Chair: K. Stock
- **Roundtable - Wrap up and conclusion**:
  16:30 – 18.00
  Chair: C. Egger-Danner

**ICAR 2013 | health data conference**

**Pavon, S.** (European Comm. DG Health & Consumer Protection)
**Putz, M.** (Bay. Staatsmin. für Ernährung, Landwirtschaft & Forsten / GER)
**Frandsen, J.** (Knowledge Centre for Agriculture / DK)
**Dupont, N.H.** (Univ. of Copenhagen, Faculty of Health & Medical Sci. / DK)

**Heringstad, B.** (Norw. Univ. of Life Sci., Dept. of Anim. & Aquacult. Sci. / NOR)
**Pryce, J.** (Dept. of Primary Industries, Agribio / AUS)
**Gengler, N.** (Gembloux Agro-Bio Tech, Univ. of Liège / BEL)
**Pinard, M.** (Animal Genetics Division, INRA / FRA)

**Stock, K.** (vit / GER)
**Kyntäjä, J.** (Agricult. Data Processing Centre Ltd. / FIN)
**Maltecca, C.** (North Carolina State Univ. / USA)
**Van 't Land, B.** (CRV / NL)

**Emanuelson, U.** (Swedish Univ. of Agricult. Sci., Dept. of Clinical Sci. / SWE)
**Miglior, F.** (Agricult. & Agri Agri-Food Can., Can. Dairy Network / CAN)
**Egger-Danner, C.** (ZuchtData EDV-Dienstleistungen GmbH / AUT)
**Kelton, D.** (Univ. of Guelph & Strategic Solutions Group / CAN)

**Clay, J.** (Dairy Records Management Systems / USA)
**Obritzhauser, W.** (Univ. of Veterinary Medicine Vienna / AUT)
**Bradley, A.** (Quality Milk Management Services Ltd. / UK)
**Cole, J.** (Anim. Improvement Prog. Lab., Agricult. Res. Serv., USDA / USA)

**Lefebvre , D.** (Valacta / CAN)
**David, X.** (Unceia / FRA)
**Hansen, M.** (dairy farmer / DK)
**Mansfeld, R.** (LMU München / GER)
**Moder, S.** (Bundesverband prakt. Tierärzte / GER)

# Conference outcome



- agreement regarding the important role of animal health and the challenges related to working with health data
  - legislation, information / transparency, data security
  - data recording and logistics
  - data quality, validation, data processing and analysis
- ICAR health guidelines as up-to-date international standard, applications benefitting from interdisciplinary exchange of experiences, transparency and harmonization
- intensification of collaborative efforts to establish sustainable concepts for animal health improvement
  - practical feasibility → broadening of health monitoring
  - long-term strategy (management, breeding; international perspective)

# Data integration

- no lack of direct health information on individual animal basis, but limited accessibility for analyses
- new phenotypes (in breeding)
  = appropriate data collection + optimized usage of data

**not necessarily new, but possibly adjusted**

**smart solutions for maximum data integration in data bases for dairy cattle**

| Type of data | Data source |
|---|---|
| Diagnoses of diseases - requiring medical treatment | veterinarian, farmer |
| - treated conservatively | veterinarian, farmer |
| Claw health information | claw trimmer, farmer |
| Reproduction data | inseminator, veterinarian, farmer |
| Outcome of special veterinary examinations | veterinarian, laboratory, farmer |
| Calving related disorders (cow, calf) | farmer |
| Culling reasons | farmer |
| Post mortem diagnoses | slaughterhouse |

# Trait definitions

- disease information, i.e. diagnoses,
  as primary basis for defining direct health traits
  (+ prerequisite for identification and calibration of biomarkers)
- certain findings and measurements
  as supplementary sources of information
  - observational (e.g. lameness)
  - automated screening
  - follow-up of suspicious cases

# Health traits in dairy breeding

Genetic evaluations (GE=routine, R&D=prospected) for direct health traits:

| Country | UDDER HEALTH | | FEMALE REPRODUCTION | | METABOLIC HEALTH | | HEALTH OF FEET & LEGS | |
|---|---|---|---|---|---|---|---|---|
| | GE | R&D | GE | R&D | GE | R&D | GE | R&D |
| Austria * | U1 | | R1,R3 | R4 | M1 | M4 | | F2,F3 |
| Canada | U1 | | | R3,R4,R5 | | M1,M2,M3 | | F2 |
| Denmark, Finland, Sweden | U2 | | R1,R2 | | M1,M2 | | F3 | F1 |
| Germany | | U3,U4 | | R4, R6 | | M1,M2,M3 | | F1 |
| France | U1 | | | | | | | F1 |
| Norway | U1 | | R4 | R7 | M1,M2 | | | F1 |
| Switzerland | | U1 | | R7 | | M4 | | F3 |
| The Netherlands | | | | | | | F1 | |
| USA | | U1 | | R3,R4,R5 | | M2,M3 | | F2 |

U1 mastitis, U2 clinical mastitis, U3 early mastitis, U4 late mastitis;
R1 early reproduction disorders, R2 late reproduction disorders, R3 cystic ovaries, R4 retained placenta, R5 metritis, R6 ovary cycle disturbances, R7 fertility-related disorders / reproduction disorders;
M1 milk fever, M2 ketosis, M3 displaced abomasum, M4 metabolic disorders;
F1 claw diseases (e.g. digital dermatitis, sole ulcer), F2 lameness, F3 feet and leg diseases
* joint GE for Austrian German Fleckvieh and Brown Swiss

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|---|---|---|---|---|---|---|---|---|
| | GE | R&D | GE | R&D | GE | R&D | GE | R&D |
| Austria * | U1 | | R1,R3 | R4 | M1 | M4 | | F2,F3 |
| Canada | U1 | | | R3,R4,R5 | | M1,M2,M3 | | F2 |
| Denmark, Finland, Sweden | U2 | | R1,R2 | | M1,M2 | | F3 | F1 |
| Germany | | U3,U4 | | R4, R6 | | M1,M2,M3 | | F1 |
| France | U1 | | | | | | | F1 |
| Norway | U1 | | R4 | R7 | M1,M2 | | | F1 |
| Switzerland | | U1 | | R7 | | M4 | | F3 |
| The Netherlands | | | | | | | F1 | |
| USA | | U1 | | R3,R4,R5 | | M2,M3 | | F2 |

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# Conclusions

- still relatively few established GE routines for direct health traits, further growing R&D activity
- confirmation of recommended concepts
  - success of collaborative, interdisciplinary and integrative approaches
    - agricultural sector (breeding, milk recording, farmers, ...)
    - veterinarians
  - development towards refined trait definitions (reproduction, feet and legs)
- continuing support of ICAR FTWG
  - universal references (comprehensive recording standards and guidelines)
  - workshops on special topics

**sustainable international dairy breeding with improved selection for healthy and durable cows**


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