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
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

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**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
  Chair: O. Hansen
- General aspects – Part 2: 16:00 – 18:00
  Chair: N. Gengler

Programm II
Friday, 31st 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

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)
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)
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)

Lefebvre, D. (Valacta / CAN)
David, X. (Unceia / FRA)
Hansen, M. (dairy farmer / DK)
Mansfeld, R. (LMU München / GER)
Moder, S. (Bundesverband prakt. Tierärzte / GER)
ICAR 2013 Health Data Conference

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

<table>
<thead>
<tr>
<th>Type of data</th>
<th>Data source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnoses of diseases - requiring medical treatment</td>
<td>veterinarian, farmer</td>
</tr>
<tr>
<td></td>
<td>veterinarian, farmer</td>
</tr>
<tr>
<td>Claw health information</td>
<td>claw trimmer, farmer</td>
</tr>
<tr>
<td>Reproduction data</td>
<td>inseminator, veterinarian, farmer</td>
</tr>
<tr>
<td>Outcome of special veterinary examinations</td>
<td>veterinarian, laboratory, farmer</td>
</tr>
<tr>
<td>Calving related disorders (cow, calf)</td>
<td>farmer</td>
</tr>
<tr>
<td>Culling reasons</td>
<td>farmer</td>
</tr>
<tr>
<td>Post mortem diagnoses</td>
<td>slaughterhouse</td>
</tr>
</tbody>
</table>
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:

<table>
<thead>
<tr>
<th>Country</th>
<th>UDDER HEALTH</th>
<th>FEMALE REPRODUCTION</th>
<th>METABOLIC HEALTH</th>
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<tr>
<td>Austria *</td>
<td>U1</td>
<td>R1,R3</td>
<td>R4</td>
<td>M1,M4</td>
</tr>
<tr>
<td>Canada</td>
<td>U1</td>
<td>R3,R4,R5</td>
<td>M1,M2,M3</td>
<td>F2,F1</td>
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<td>Denmark, Finland, Sweden</td>
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</tr>
<tr>
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<td>U1</td>
<td>R7</td>
<td>M4</td>
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<td>R7</td>
<td></td>
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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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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
THANK YOU