Survey on the recording and use of functional traits in dairy management and breeding

K.F. Stock¹, J. Cole², J. Pryce³, N. Gengler⁴, A. Bradley⁵, L. Andrews⁶, C. Egger-Danner⁷

¹ Vereinigte Informationssysteme Tierhaltung w.V. (vit), Verden, Germany; friederike.katharina.stock@vit.de;
² Animal Improvement Programs Laboratory, ARS, USDA, Beltsville / Maryland, USA;
³ Department of Primary Industries, Victorian AgriBiosciences Centre, Bundoora / Victoria, Australia;
⁴ University of Liège, Gembloux Agro-Bio Tech (GxABT), Animal Science, Gembloux, Belgium;
⁵ Quality Milk Management Services Ltd, Westbury-sub-Mendip, Wells / Somerset, United Kingdom;
⁶ Holstein UK, Rickmansworth / Herts, UK;
⁷ ZuchtData EDV-Dienstleistungen GmbH, Vienna, Austria
WG functional traits

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

• supply member organizations of ICAR with recommendations (standards and guidelines) on recording schemes, evaluation procedures and genetic improvement schemes for functional traits
• portfolio of recommendation sheets on recording, evaluation and genetic improvement for functional traits in dairy cattle

→ broader view: functional traits in cattle, i.e. dairy + beef
Recording & use of functional traits

• shifting focus of interest from production traits (milk yield, milk composition; weight gain) to functional traits, i.e. traits influencing production or production conditions

• "increasing importance of functionality in dairy farming"

• issues:
  – heterogeneous and often vague trait definitions,
  – considerable differences in environment and recording conditions,
  – non-standardized recording ("stand-alone solutions"),
  – limited knowledge about international activities concerning functional traits

ICAR survey of WG functional traits
ICAR Survey (rationale)

- overview about current and future role of functional traits
- interpretations of functionality / functional traits in different countries
- plans and actions to improve functionality
- identification of needs and options for exchange of information and experiences
- possible support by the ICAR WG functional traits (expectations, working priorities)
Survey response

- official mailing list of ICAR
  → all ICAR member countries (N=52)
- total no. of countries responding: N=27
  N=2 countries without functionality improvement programs
    - Chile, Greece
  N=25 countries with functionality improvement programs
    - only beef 1 country
      - Australia
    - only dairy 12 countries
      - Argentina, Belgium, Canada, Denmark, Estonia, Hungary, Jersey Island, Korea, Norway, Poland, Romania, Uzbekistan
    - dairy+beef 12 countries
      - Austria, Croatia, Czech Republic, Finland, France*, Germany, Ireland, Lithuania, The Netherlands, Portugal*, Slovenia, South Africa

THANK YOU!
Survey basics

Groups of functional traits

- calving traits,
- fertility traits,
- longevity,
- feet & legs,
- indirect health traits, i.e. health traits based on indirect measures of diseases (for example somatic cells for mastitis),
- direct health traits, i.e. health traits based on direct disease information (for example veterinary diagnoses ),
- others (milkability, temperament, BCS, feed intake)

Answering options

- project status ("will possibly", "will definitively"), routine
- room for comments, remarks, explanations, ...
I. General role of functional traits

Genetic evaluations (EBV) and genomic evaluations (gEBV) for functional traits in 23 countries:

<table>
<thead>
<tr>
<th>Group of functional traits</th>
<th>EBV P1 (gEBV N-P-R)</th>
<th>EBV P2 (gEBV N-P-R)</th>
<th>EBV R (gEBV N-P-R)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calving traits</td>
<td>2 (2 - 0 - 0)</td>
<td>3 (2 - 1 - 0)</td>
<td>18 (5 - 4 - 9)</td>
</tr>
<tr>
<td>Fertility traits</td>
<td>2 (2 - 0 - 0)</td>
<td>1 (1 - 0 - 0)</td>
<td>20 (5 - 6 - 9)</td>
</tr>
<tr>
<td>Longevity</td>
<td>2 (2 - 0 - 0)</td>
<td>4 (3 - 1 - 0)</td>
<td>17 (5 - 4 - 8)</td>
</tr>
<tr>
<td>Feet and legs</td>
<td>2 (2 - 0 - 0)</td>
<td>3 (2 - 1 - 0)</td>
<td>17 (2 - 7 - 8)</td>
</tr>
<tr>
<td>Indirect health traits</td>
<td>0 (0 - 0 - 0)</td>
<td>2 (1 - 1 - 0)</td>
<td>20 (7 - 4 - 9)</td>
</tr>
<tr>
<td>Direct health traits</td>
<td>10 (10 - 0 - 0)</td>
<td>1 (0 - 1 - 0)</td>
<td>7 (1 - 4 - 2)</td>
</tr>
<tr>
<td>Others</td>
<td>0 (0 - 0 - 0)</td>
<td>0 (0 - 0 - 0)</td>
<td>5 (1 - 0 - 4)</td>
</tr>
</tbody>
</table>

EBV P1 = possibly in the future, P2 = definitively in the future, R = routine;
gEBV N = no, P = project status, R = routine
II. Direct health traits

- general approach of health data collection
  - data sources (What ?, Who?, How?),
  - spectrum of health data,
  - aims of health data analyses

- health data analyses
  - current status,
  - primary target group,
  - structure of health reports,
  - genetic evaluations for direct health traits
II. Direct health traits

Data sources & contents

– basis of health monitoring systems (data)
  • single source (type) of health data: < 1/3 of countries
  • most frequent combinations: treatments & diagnoses (N=10)
    > treatments & lab. data (N=8) > diagnoses & health obs. (N=7)

health-relevant observations: on-farm recording as valuable (supplementary) source of direct health data
II. Direct health traits

People involved in data collection

- basis of health monitoring systems (people)
  - single group of people involved: 1/3 of countries
  - most frequent combinations:
    - recording farmer & vet. (N=10) > farmer or vet. & staff PRA (N=4)
    - sending vet. & staff PRA (N=6) > farmer & vet. or staff PRA (N=5)

<table>
<thead>
<tr>
<th>People Involved</th>
<th>Recording</th>
<th>Sending to Database</th>
</tr>
</thead>
<tbody>
<tr>
<td>farmer</td>
<td>14</td>
<td>10</td>
</tr>
<tr>
<td>veterinarian</td>
<td>13</td>
<td>9</td>
</tr>
<tr>
<td>staff of perf. rec. agencies</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td>experts (laboratory, …)</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>others (breeding org.)</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

clearly defined responsibilities: recording vs. sending to central database
II. Direct health traits

Methods of data collection

- basis of health monitoring systems (methods)
  - single method of recording: <1/3 of countries
  - most frequent combinations:
    paper & HM software (N=12) > paper & vet. software (N=8)

feasibility-oriented recording: combination of non-electronic + electronic documentation
II. Direct health traits

Data analyses & intentions

• spectrum of health traits (specificity)
  – few simple traits: <1/2 of countries
  – broad range: 1 to >900 health traits

• short-term + long-term benefits of health monitoring

multi-purpose analyses: visible benefits of health monitoring ensuring continuing engagement of involved parties (motivation aspects)
II. Direct health traits

Implementation of analyses

• implementation status
  – wide spread of health initiatives, but analyses mostly under development rather than routine
  – health reports: primarily for farmers, vertical + horizontal statistics

<table>
<thead>
<tr>
<th>Type of statistics</th>
<th>No. of countries (N=20)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within-herds (vertical) only</td>
<td>8</td>
</tr>
<tr>
<td>Between-herds (horizontal) only</td>
<td>1</td>
</tr>
<tr>
<td>Within-herds (vertical) + between-herds (horizontal)</td>
<td>10</td>
</tr>
<tr>
<td>Upon request</td>
<td>1</td>
</tr>
</tbody>
</table>

**competitive aspects:** visible advantages over existing monitoring systems (herd management) ensuring continuous data flow
II. Direct health traits
Breeding for improved health

• genetic evaluations for direct health traits
  – trait spectrum (advanced projects, routines) influenced by data collection approaches
  – dominance of traits with close relation to production, under-representation of locomotory diseases

Current role of health traits:
GE focusses ≠ disease focusses (main health problems)
III. Other functional traits / IV. Future perspectives

Functionality and breeding

- EBV for functional traits
  - publication of EBV for up to 43 functional traits in 24 countries
  - expected increase in 20 of 23 countries

- areas of functionality with most intense R&D activities
  - expectations only partly reflecting needs for catching up

**future role of functional traits:** continuing increase of importance with some shift of focusses
IV. Future perspectives
Functionality and role of ICAR

• main interferences with extended functionality orientation
  – implementation vs. continuation problems
  – options for ICAR activities?

challenges of functionality improvement programs:
"base work" (insurance of continuous data flow)
IV. Future perspectives

Functionality and role of ICAR

• main interferences with extended functionality orientation
  – implementation vs. continuation problems
  – options for ICAR activities?

• possible support by ICAR WG functional traits
  – limited demand for guidelines for new groups of functional traits
  – organization of (multidisciplinary) workshops or seminars

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challenges of future WG work:
coordination of expertise exchange
ICAR Survey (conclusions)

• agreement on the still-increasing importance of functional traits and functionality improvement programs
• intense R&D activities, particularly in health traits
  – at least some plans of health data analyses in 24 of 27 countries
  – different approaches, but similar challenges → ICAR guidelines
• improvement prospects within established groups of functional traits
  – reproduction → ICAR guidelines
  – ...
• request for specific ICAR workshops

Recent activities of the ICAR WG functional traits:
ICAR guidelines for Recording, Evaluation and Genetic Improvement of Health Traits
ICAR guidelines for Recording, Evaluation and Genetic Improvement of Female Fertility (draft)
THANK YOU

ICAR WG functional traits appreciates your valuable contributions:
Argentina,
Australia,
Austria,
Belgium,
Canada,
Chile,
Croatia,
Czech Republic,
Denmark,
Estonia,
Finland,
France,
Germany,
Greece,
Hungary,
Ireland,
Jersey Island,
Korea,
Lithuania,
The Netherlands,
Norway,
Poland, Portugal,
Romania,
Slovenia,
South Africa,
Uzbekistan
2014

IDF/ISO Analytical Week and ICAR/INTERBULL Conference

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IDF/ISO 15–20 May
ICAR 19–23 May
Interbull 20–21 May

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