



Network. Guidelines. Certification.

Improving animal health and welfare by using sensor data in herd management and dairy cattle breeding – a joint initiative of ICAR and IDF

Christa EggerDanner, ICAR Functional Traits Working Group
Session 42, EAAP Florence, 2.9.2024

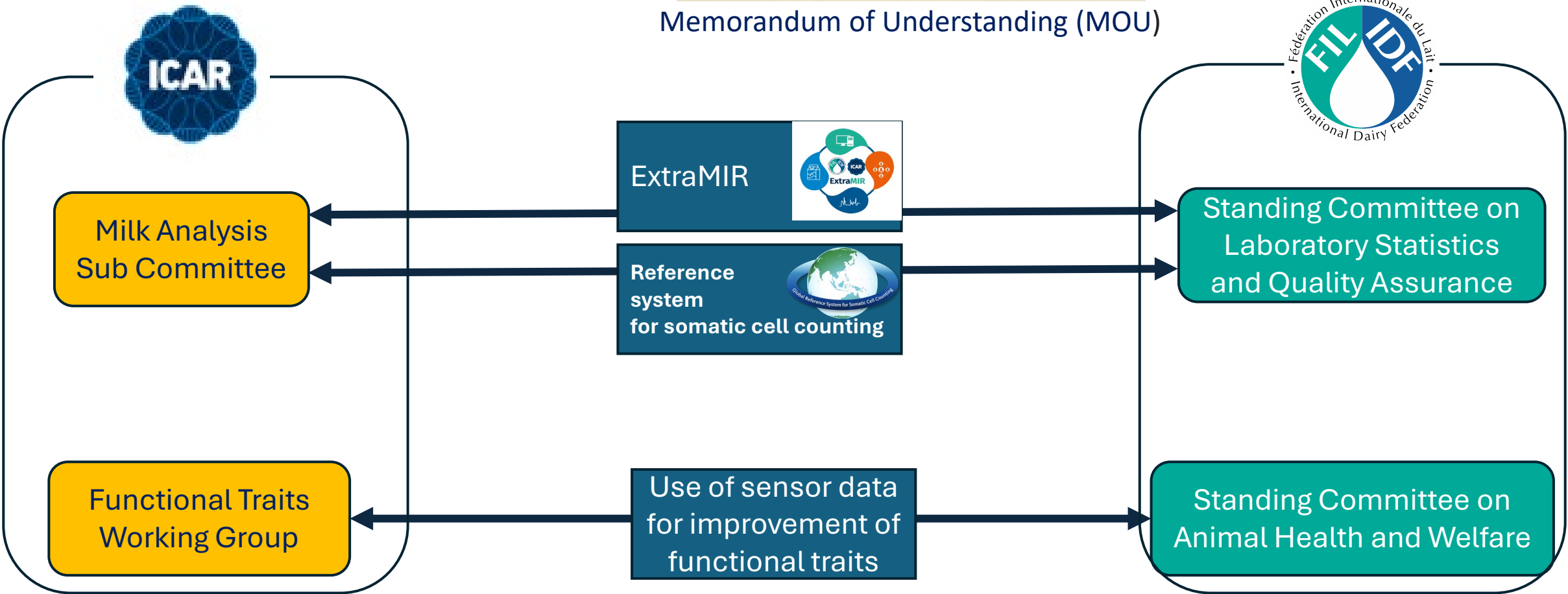
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**ICAR Functional Traits Working Group, IDF Standing Committee of Animal Health and Welfare,
international experts**

ICAR – IDF collaboration



Memorandum of Understanding (MOU)

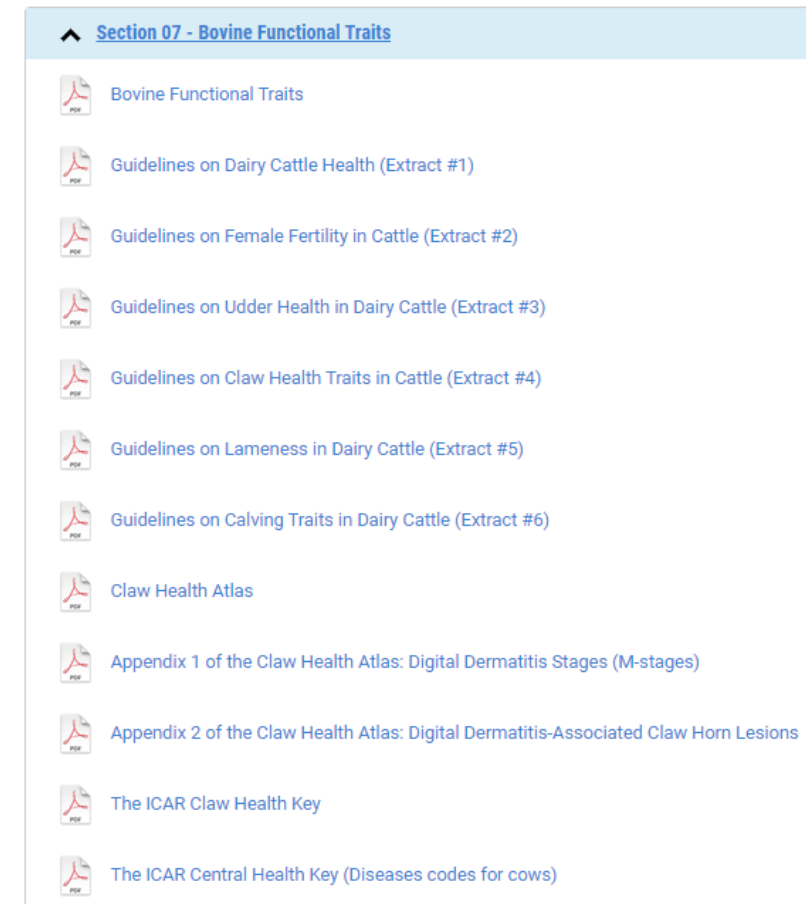


ICAR Functional Traits Working Group



Objectives

- **provide a forum for members of ICAR to collaborate, exchange information and learn from each other on all aspects of the recording of Functional Traits**
- **Maintain, update, promote and extend universal guidelines**
- **Develop, provide and promote standards for functional traits (services)**
- **Facilitate and co-ordinate international collaboration in research and development of the recording, herd management, benchmarking and genetic improvement of functional traits**





Standing Committee on Animal Health & Welfare

Role: To have dialogue and discussion on, and form consensus about new developments in the dairy sector field of animal health and animal welfare and their implications on prevention of diseases considering aspects relating to farm economics, food safety, human health, and dairy technology. To assess the effects of cattle diseases on animal welfare and dairy production for human consumption, as well as maintaining relations with intergovernmental and non- governmental bodies.

David Kelton (CA) – Chair

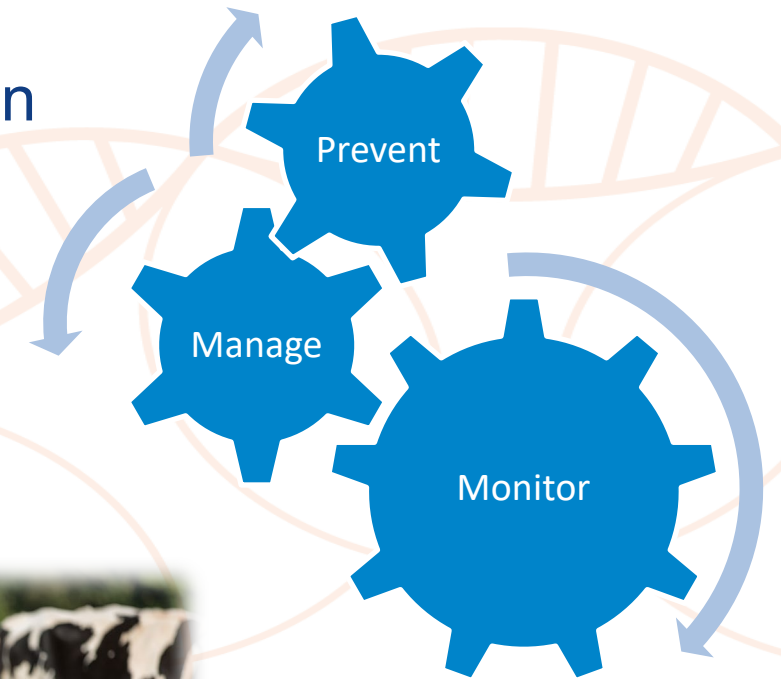


Ilka Klaas (DK) – Deputy Chair



Why this joint ICAR FTWG / IDF SCAHW initiative?

- High potential of Precision Dairy Farming
- Farmers are increasingly using sensors and other technologies
 - Health, reproduction, nutrition, behavior, production
 - Animal level & group level
 - Efficient way of working



THE GLOBAL STANDARD
FOR LIVESTOCK DATA

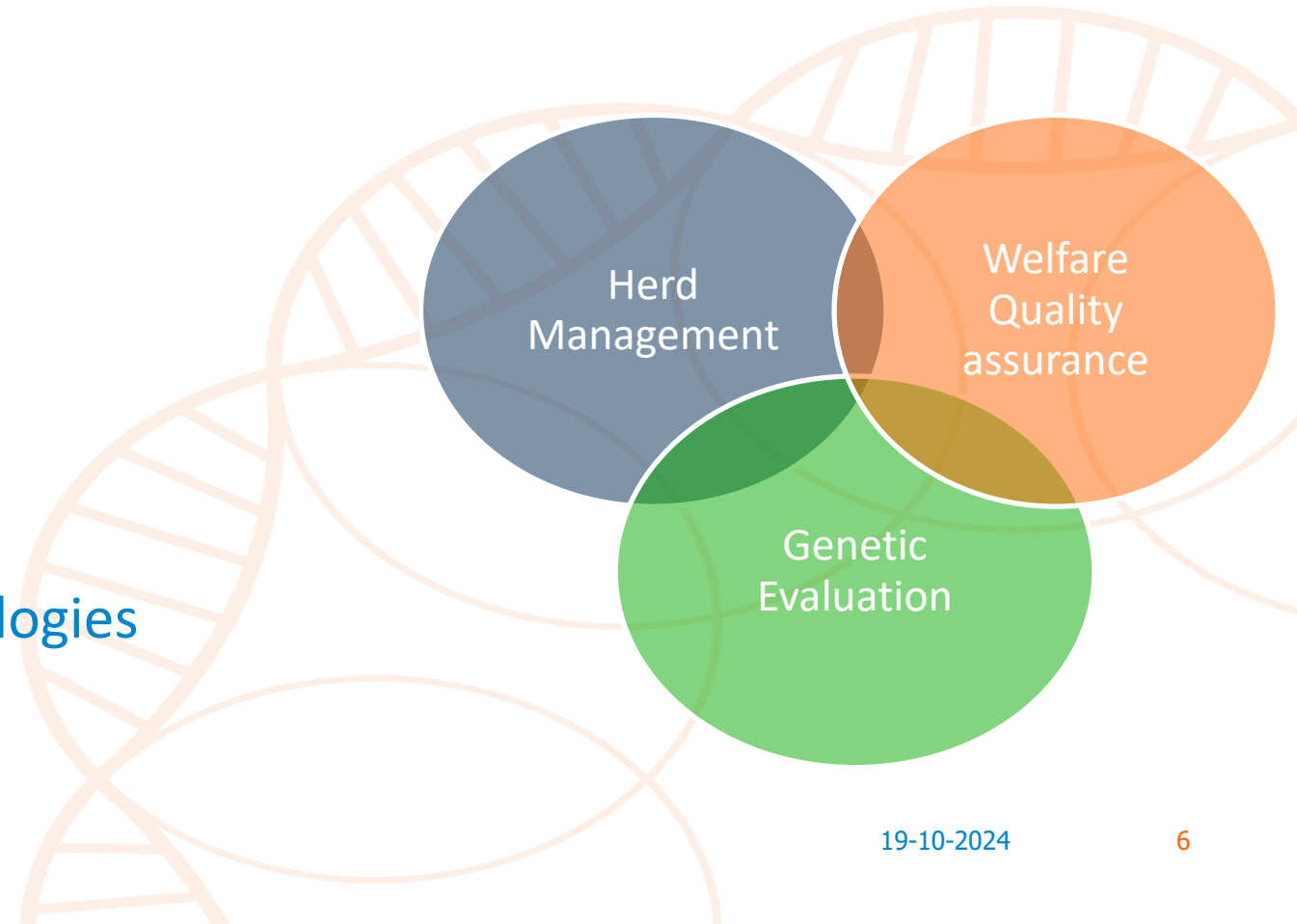
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IDF and ICAR see the need and potential of improved use of sensor data



- On-farm sensor systems collect large amounts of data, but just a **small fraction** is currently **used**
 - Veterinary & advisory services
 - Dairy processors
 - Milk recording organizations
 - Breeding organizations
 - ...
- **Huge potential for use**
 - Across farms and sensor technologies
 - Along the dairy value chain



Aim: develop guidelines to support adoption of novel technologies and use of sensor data for improving animal health and welfare, contributing towards higher sustainability in the dairy value chain.

- Standardized definitions, terminology for health and behaviour conditions of interest – same “language”
- Standardization to enable exchange across different farms, technologies,...

...using ICAR approach for standardization

...using IDF approach on mastitis as inspiration:

Novel ways to use sensor data to improve mastitis management – ScienceDirect

- Farmer centered
- Define relevant situations where sensor information is needed to make decisions and intervene
- Define required sensor performance for those situations



Specific objectives of ICAR FTWG / IDF SCAHW



- Address **sensor-based health and welfare traits** for improvement of **genetics, herd management and welfare quality assurance**
- Bring together **different stakeholders** as technology providers, users of information and scientists: common understanding and knowledge exchange towards our goals
- **Explore opportunities and challenges** for recording, standardization, validation, trait definition and use of this information
- **Develop agreed upon, evidence-based, definitions and standards that support innovation along** the dairy value chain

Promote further and extended use of sensor systems along the value chain to increase sustainability, animal well-being and efficiency in cattle production.



Monitoring cow behavior patterns – the case of Rumination

Important indicator to manage feeding & health

- Different technologies by different manufacturers available
 - Necklaces, ear tags, boluses...
- What is the definition of rumination when adapted to sensor technology?
- What is 'normal rumination time'?

Factors influencing Rumination

- Feed intake
- Feed composition
- Feed availability
- Appetite and well-being
 - Estrus
- Factors affecting the whole group

...



RumiWatch



SenseHub



smaXtec



Tru-Test Active Tag

DeLaval
Behavioural Analysis

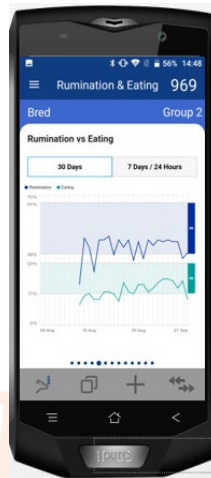
Heatime



SensOor



CowControl





Sensor data – example rumination

3 subgroups: reference standards; genetics; data cleaning

- **Analytical performance**

Reference standards for validation – certification?

- **Biological implications**

- What is normal, what is abnormal and which condition does this indicate on cow and group level? What has an influence on rumination?
- Detect acute sick cow
- Detect feed efficiency
- Describe welfare status

data – information – actionable for farmer





Subgroup - Reference standards

- **Definitions and terminology:** What is *sensor-based rumination*, ...?
- **Suitable reference for the situation of interest**
 - Sensors were developed for herd management purposes
 - Adjust for application in welfare assessment and genetic evaluation
- Reference standards that work **across different technologies**
- **Feasibility**
- **Clear benefit for farmers & manufacturers**
- **Clear benefit for stakeholders**

**Evidence-based, definitions and standards
that support innovation and implementation along the dairy value chain.**



Subgroup - Sensor data cleaning



Steps for data cleaning

- Validate the data merging process
- Get to know your data
- Check completeness of data
- Evaluate plausibility of sensor measures
- Detect and remove outliers
- Check for technology related noise
- Document your approach
- Outline context and purpose of further use of data

**In process:
to elaborate BEST
PRACTICES and
Guidelines**





Subgroup - Genetic Improvement

- Large number of variables recorded by sensors
➔ great opportunity for **deriving novel traits** for selection purposes
- Novel traits (desirable):
 - **Cost-effective** to be measured on a large number of animals
 - Ideally measured in a **non-invasive** way
 - Moderately-to-highly **heritable**
 - Moderately-to-highly **repeatable**
 - Capture key **biological mechanisms** of interest

**In process:
to elaborate BEST
PRACTICES and
Guidelines**

**Trait definition and
models,
integration of data
from sensors with
other data sources,
genetic parameters,**

...



Next steps:

Communications & alignment towards GUIDELINE



- Collaboration with manufacturers of sensor systems
- Subgroups drafting papers for peer reviewed journals

Conclusion of
Manufacturer workshop 21st May:
We want to collaborate and
continue discussions.
Further work in process.

Communications 2024:

- ICAR conference May 2024
- ECPLF conference August 2024
- ISRP conference August 2024
- EAAP conference Sep 2024



We want to hear from you!

ICAR WGFT, IDF SCAHW and experts

Use of sensor data for improvement of functional traits



Coordinators & contact

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