INTEGRATION OF NEW RECORDING DEVICES INTO ANIMAL RECORDING AND ICAR STRUCTURES

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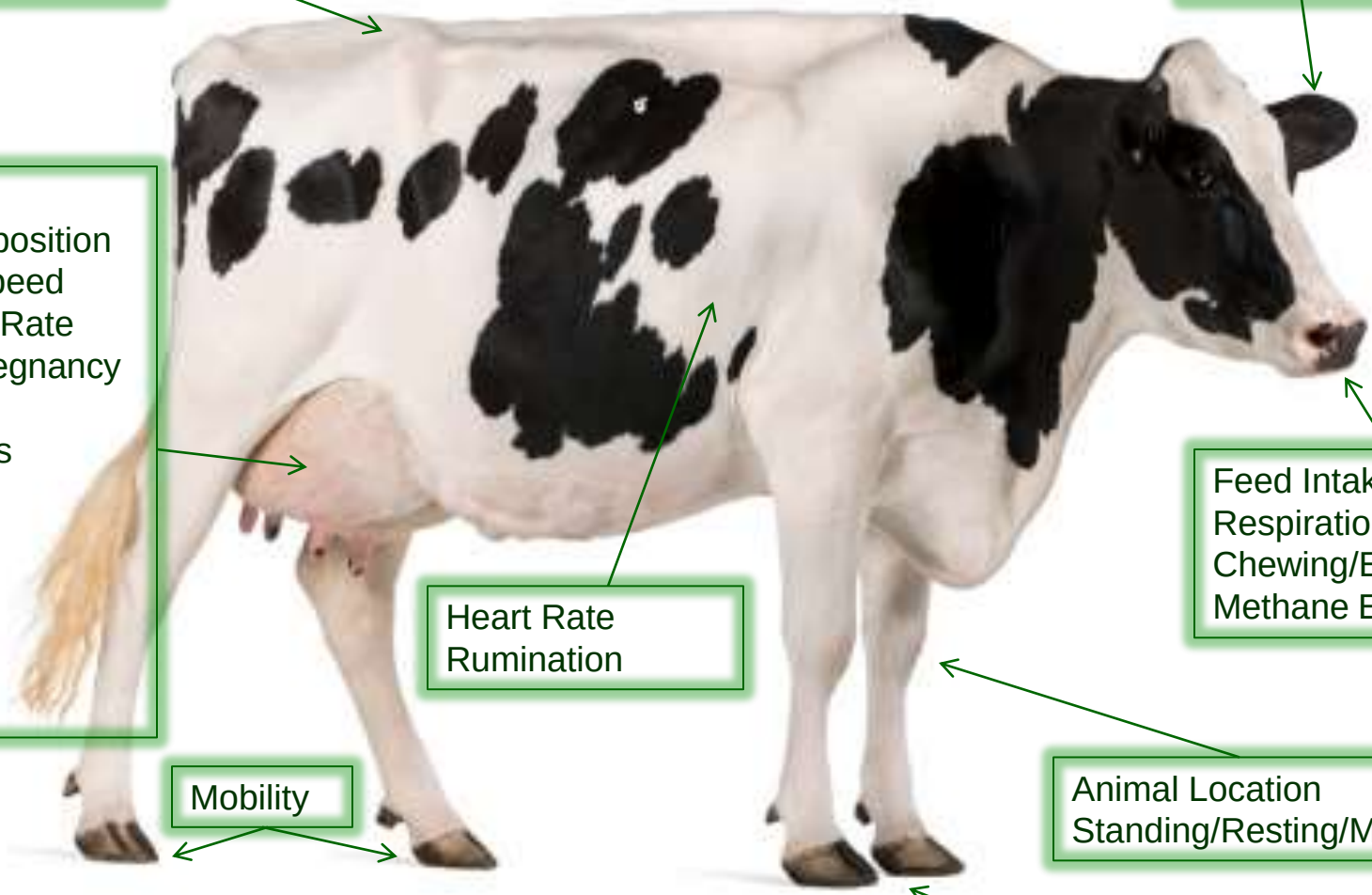
Challenges in Modern Herd Recording

Livestock are ideal candidates for repeated measures – **What can I tell you?**

Producers are saying I made the investment - **How are you going to use my farm/herd data?**

Recording organizations are looking for guidance – **What do we do?**

What Can We Measure?



Body Condition
Body Weight

Temperature

Milk Yield
Milk Composition
Milking Speed
Milk Flow Rate
Estrus/Pregnancy
Mastitis
Pathogens
MUN
Ketosis
VFAs
Johne's
BVD
BLV

Feed Intake
Respiration
Chewing/Eating
Methane Emission

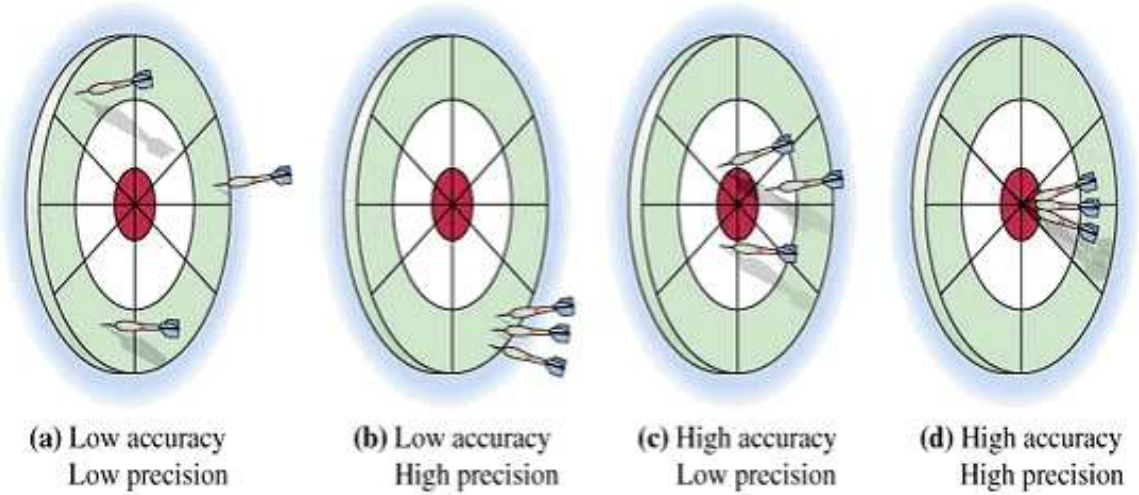
Heart Rate
Rumination

Mobility

Animal Location
Standing/Resting/Movement

Hoof Health

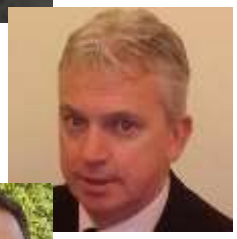
Accuracy & Precision



- **Cannot simply assume that you can be less accurate in measurement just because you have more data observations**
- Improve accuracy by calibration & design
- Improve precision by quality control
- **What are the accuracy & precision compared to the 'gold standard' for the industry?**
- Cannot simply assume that accuracy & precision are acceptable when compared to other measures on the farm

Sensor Devices Task Force

Steven Sievert, US



Martin Burke, ICAR

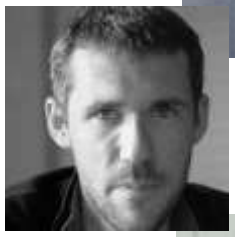
Kees de Koning, Netherlands

Uffe Lauritsen, Denmark

Karl Zottl, Austria

Harrie van den Bijgaart, Netherlands

Friedrich Reinhardt, Germany



Clement Allain, France

Brian Wickham, Ireland/NZ

Jeroen van den Ban, Lely

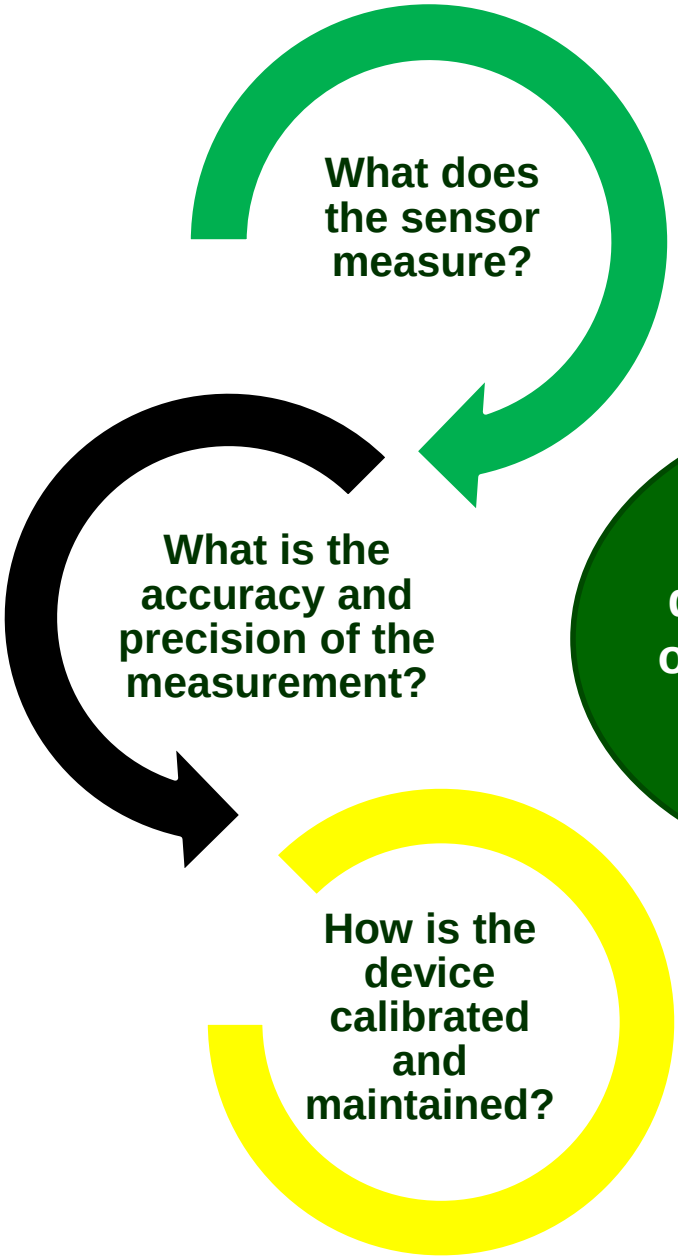
DeLaval

Henrik Idensjö, DeLaval

Goals of the Sensor Devices Task Force

Producers, breeding companies, herd books, recording organizations, and manufacturers are looking to ICAR to establish research-based standards and guidelines for the usability of sensor device data in their programs.

Review & Classification of Sensors

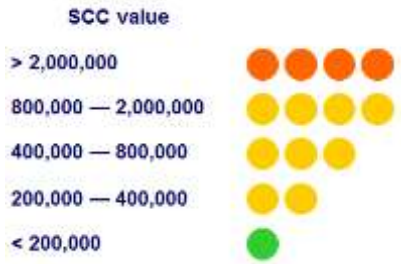


ICAR and its members cannot determine suitability of data until we know and understand the measurement

What are We Measuring?

Multiple Indicators of Mastitis or Milk Quality

- Automated CMT/WMT
- Electrical conductivity
- L-lactate dehydrogenase
- N-acetyl-beta-D-glucosaminidase
- ATP luminescence
- Thermal imaging
- Visible, NIR, MIR spectroscopy



Milk quality measures are affected by sampling time, temperature, milk viscosity, calibration

Data Definitions and Validation Questions

Data Definitions

- Define the recording period for a parameter
  - [7 consecutive days]
  - [10 consecutive milkings]
  - [fraction of the milking]
- Precision of recording
  - [4.2% vs. 4.22% vs. 4.222%]
- Other data to be captured
  - [animal ID]
  - [date/time stamp]

Data Validation

- Handling of missing data points
- Decision rules for handling and/or exclusion of outliers
- Distribution of errors
- Range of accurate measurement
- Evaluation of algorithm
- Data smoothing

Sensor Device Approval & Routine Procedures

ICAR Guidelines for Device Approval

- **Development of ICAR guidelines for sensors**
- **Testing & validation protocols**
- **Co-innovation & cooperation with manufacturers**

Routine Procedures & Best Practices

- **Installation protocols**
- **Routine calibration and monitoring procedures**
- **Development of best practices for recording organizations**

Animal ID is Key

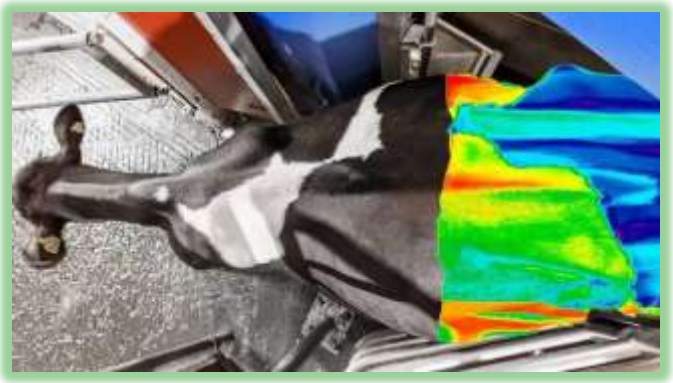
- The 'official ID' of an animal most likely will not be the same as ID associated with sensor measures
- Animals may have multiple IDs over their lifetime
- Animals may have multiple IDs on their body at once

- **Databases will need to have protocols for ID cross-referencing and validation**

- **Recording Organizations will need a protocol for on-farm validation of ID system and for data transfer**

Potential New Streams of Data

Body Condition Scores



- Device approval(s)
- Standard scale for BCS
- Standards for data capture and transfer from local computer to national databases

Milking Speed, Motility, Activity & Others

- Can we use this data?
- How do we use this data?
- Define the measure(s)
- Data on local computers used for daily management decisions
- Data transfer to national databases for research, benchmarking, genetic evaluations

Managing Multiple Streams of the Same Data

- **Producer may contribute information for the same parameter from different measuring devices**
- **Need to capture not only data point(s) but also source of the data**

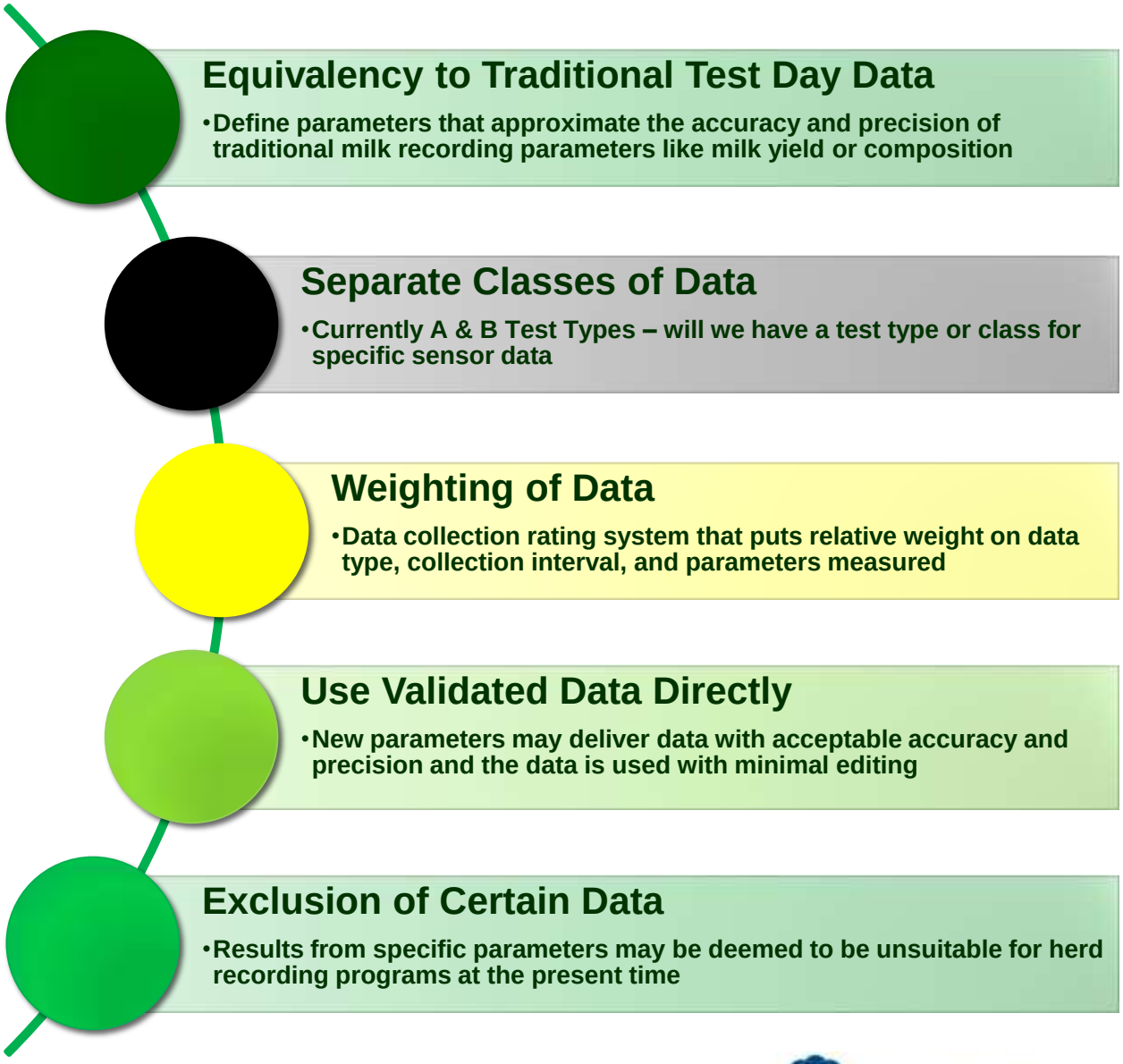
How will we value each data point?

How will we value the whole record?

What information will we deliver?

How Will We Value Sensor Data?

The Same Parameter May Be Estimated by Different Methods with Different Data Values Assigned for Each Method



Timeline & Delivery

Sensor Devices Task Force

May 2016
- ICAR Board approved creation of Sensor Devices Task Force (SD-TF)

September 2016
- Meeting of SD-TF in Amsterdam
- Plan of action approved
- Review of devices implemented

Winter 2016 – Spring 2017
- Conference calls/web-based meetings
- Identification of additional expertise
- Development of initial guidelines/standards

June 2017
- Presentation – ICAR 2017 in Edinburgh
- Initial concepts on best practices for review

Mid-Late 2017
- Work continues on guidelines for sensor devices
- Collaboration with manufacturers and database administrators
- Dissemination of proposed guidelines to members and manufacturers

February 2018
- Proposed revisions to guidelines presented to the General Assembly at ICAR 2018 in Auckland for approval

Summer 2018
- Validation of uptake and solicitation of feedback by member survey

We Are Listening!

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