



THE GLOBAL STANDARD  
FOR LIVESTOCK DATA

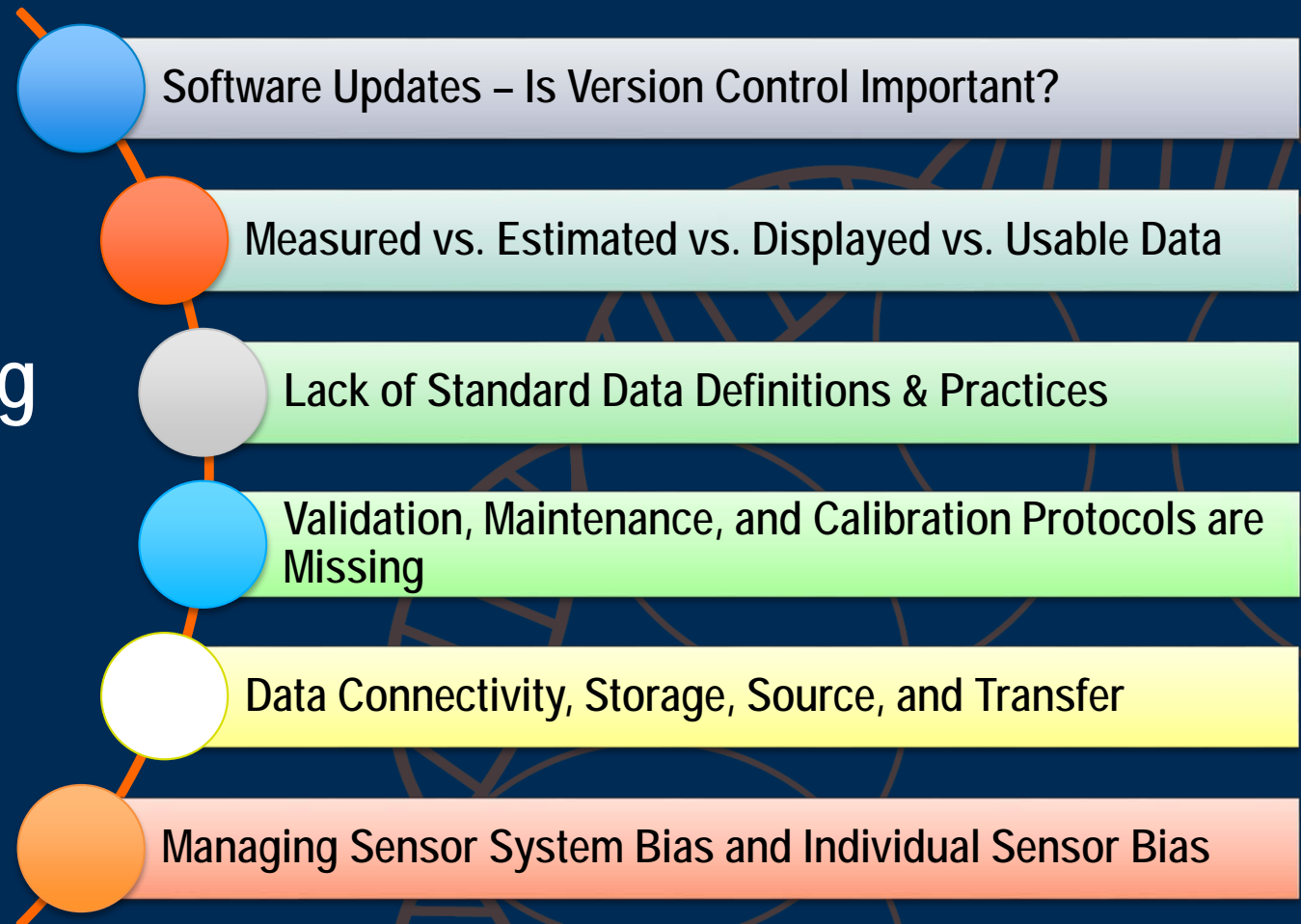
Network. Guidelines. Certification.

# Ensuring Quality in Data from Sensor Systems and Devices

Steven Sievert  
Technical Director, National DHIA  
Chair, ICAR Measuring, Recording & Sampling Devices Subcommittee



# Sensor Devices Bring More Challenges

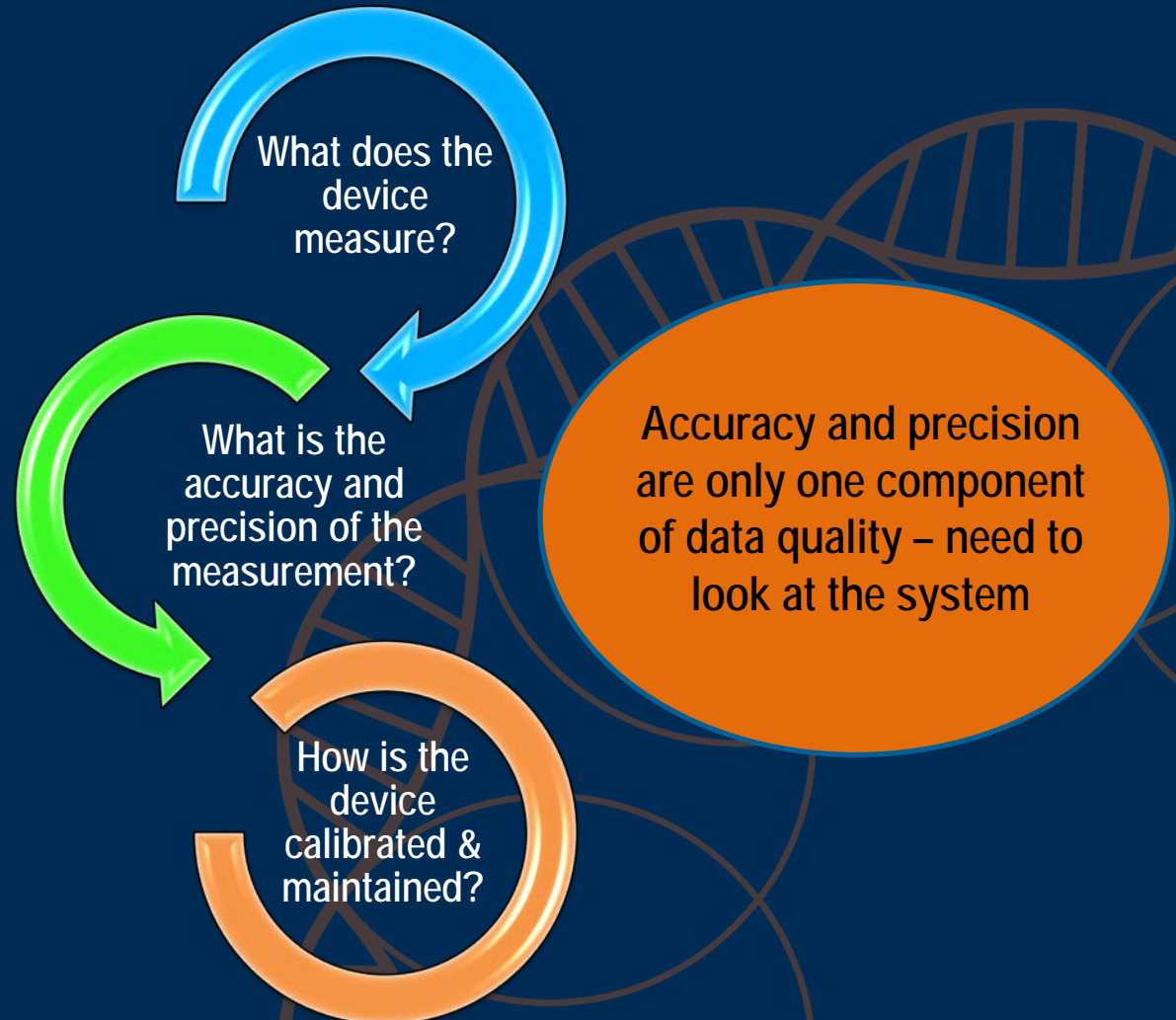




# THE GLOBAL STANDARD FOR LIVESTOCK DATA

Network. Guidelines. Certification.

## Reviewing Recording & Sampling Devices or Systems





THE GLOBAL STANDARD  
FOR LIVESTOCK DATA

Network. Guidelines. Certification.

## Multiple Ways to Classify On-Farm Data

### Management Data

- Yield
- SCC
- Milking Speed
- Feed Efficiency

### Animal Health Data

- Locomotion
- Reproduction
- Disease
- BCS/Weight

### Animal Welfare Data

- Activity
- Mobility
- Eating, Resting
- Heat Stress

### Data for Genetic Evaluations & Official Programs

## Do We Know What We Want or Need?

### Data Linked to Direct Farm Payments

- Yield
- Fat, Protein
- SCC

### Alarm Data

- Heat Detection
- SCC
- Locomotion
- Location

### Yes/No Data

- Pregnancy
- Disease

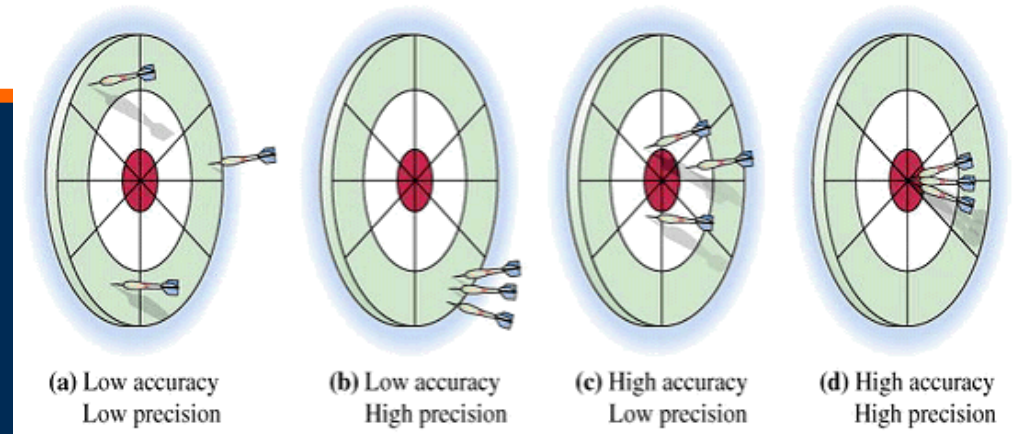
### Trend Data

- BCS/Weight
- Milk Flow/Speed
- Feed Efficiency
- Eating, Resting



## THE GLOBAL STANDARD FOR LIVESTOCK DATA

# Accuracy & Precision



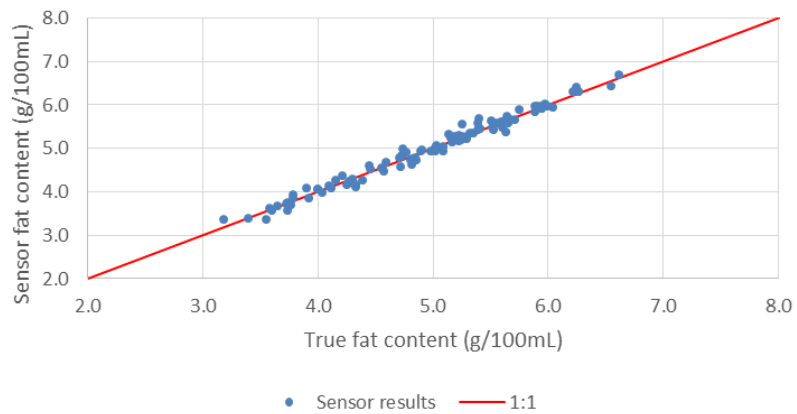
- Cannot simply assume that you can be less accurate in measurement just because you have more data observations
  - Improve accuracy by calibration & design
  - Improve precision by quality control
- What is the accuracy compared to the “gold standard” for the industry?
- Cannot simply assume that accuracy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



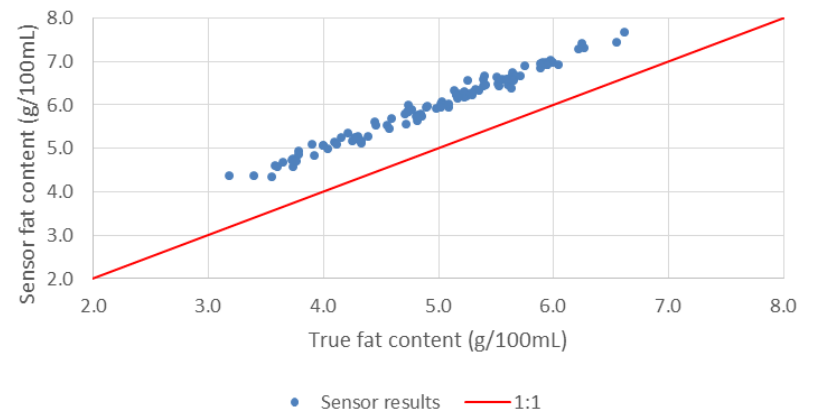
# THE GLOBAL STANDARD FOR LIVESTOCK DATA

Network. Guidelines. Certification.

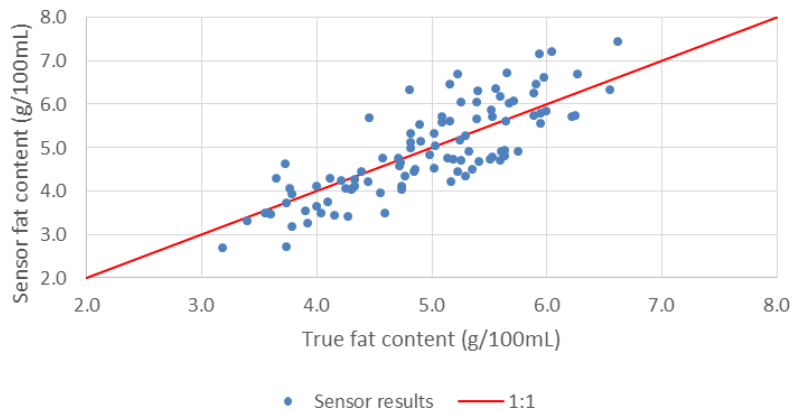
Good precision, low bias



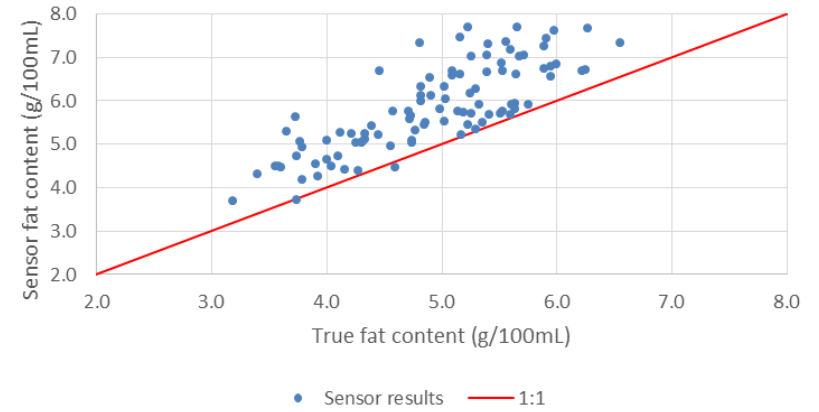
Good precision, high bias



Poor precision, low bias



Poor precision, high bias





## THE GLOBAL STANDARD FOR LIVESTOCK DATA

Network. Guidelines. Certification.

# Data Quality VS. Data Accuracy

### Data Quality – System Level/Standards

the term used for information that has all five elements of quality at once:

- completeness
- consistency
- accuracy
- integrity
- standards-based

### Data Accuracy – Device Level/Standards

the element of data quality that deals with the information being exact (bias & precision) when describing the physical characteristics or measurements



THE GLOBAL STANDARD  
FOR LIVESTOCK DATA

Network. Guidelines. Certification.

## The Need for Quality Data

## How Good is Good Enough?

- Focusing on quality of data system includes completeness - **animal ID**, **trait measurement**, **missing data handling**, **calculations**, **transfer**
- DHI programs should look at quality of various data sources as a whole rather than focus on accuracy of individual measurements
- Opportunity to merge like data from various sources together and deliver quality information to producers and the DHI system



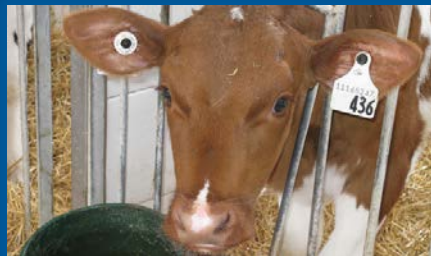


THE GLOBAL STANDARD  
FOR LIVESTOCK DATA



Network. Guidelines. Certification.

# Animal ID is More Important Than Ever

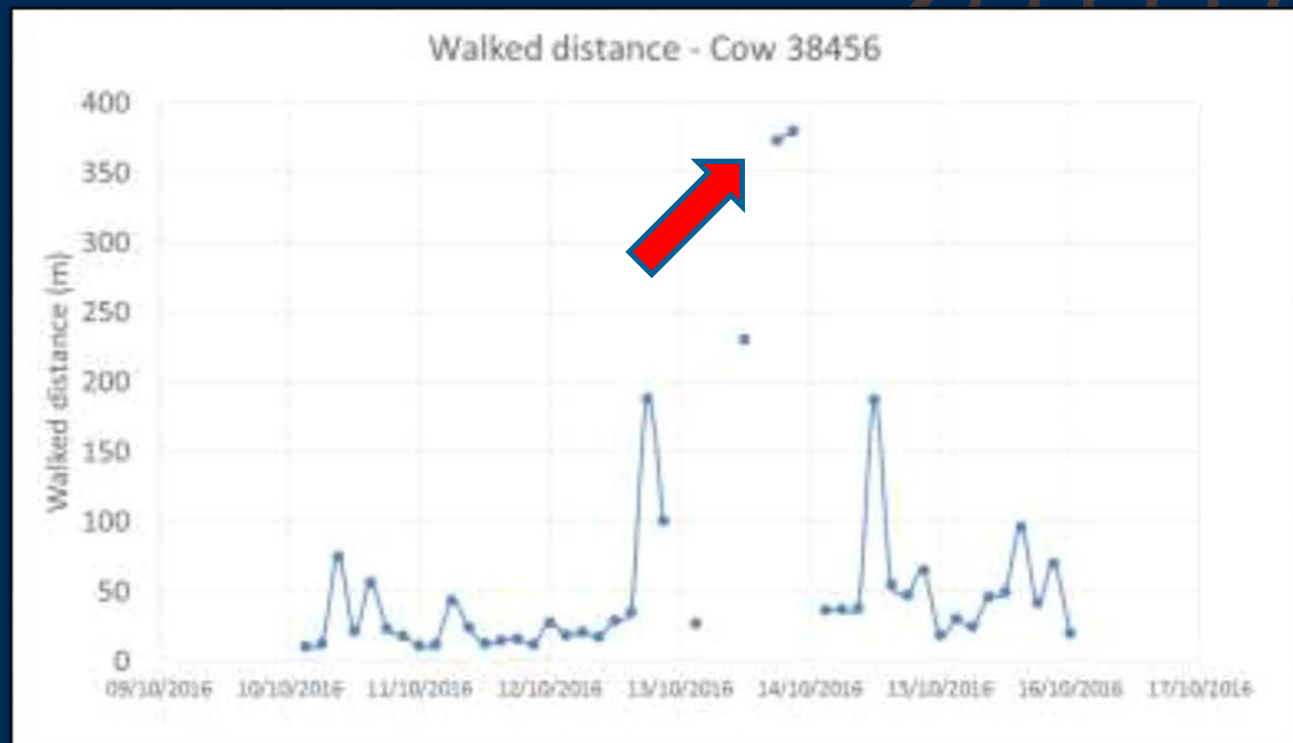


- The 'official ID' of an animal most likely will not be the same as ID associated with sensor measures
- Animals may have multiple IDs over their lifetime
- Animals may have multiple IDs on their body at once
- Databases will need to have protocols for ID cross-referencing and validation
- Need protocols for on-farm validation of the automatic ID system and for data transfer/custody



# System Connectivity & Data Capture is a Concern

- How are values computed for missing data points?
- Estimates?
- Mean values without missing data?
- Component of the quality of data entering the system





THE GLOBAL STANDARD  
FOR LIVESTOCK DATA

Network. Guidelines. Certification.

## What is the Difference?

Measuring one variable & reporting another

Handling of missing data points

Outlier handling and exclusion

Data smoothing

Range of accurate measurement

Precision of data recording & rounding

Data transfer, custody, accessibility

Raw Data

VS.

Estimated Data

VS.

Displayed Data

VS.

Usable Data



THE GLOBAL STANDARD  
FOR LIVESTOCK DATA

Network. Guidelines. Certification.

# Challenges with the Next Generation of Devices

We are  
Looking at  
Systems  
Instead of  
Devices

New  
Systems  
Measure  
More than a  
Single  
Parameter

System  
Measures  
One  
Variable and  
Reports  
Data as a  
Different  
Trait

Reliance on  
Automatic  
ID Systems  
and  
Association  
with the  
Correct Cow

Speed of  
Commerce  
is Faster  
than ICAR  
Testing



## THE GLOBAL STANDARD FOR LIVESTOCK DATA

Network. Guidelines. Certification.

# The Future of DHI

# What is Needed?

