

## ICAR member's needs regarding the use of robots and sensor data

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### Abstract

A survey was conducted among 13 ICAR full members (mainly milk recording organisations) about their needs and how they use robot and sensor data in their services. Main aims of the survey were to inventorise the purpose, availability and needs of the use of robot and sensor data and the role that ICAR can play for members in using these data for their services.

The survey was also conducted among 4 ICAR associate members (manufacturers of robots or sensor devices) about the value of ICAR certification and their needs for ICAR approval of robot and sensor devices.

All full members that participated in the survey are using daily milk yields from robots for at least the calculation of the milk yield at the day of milk recording. Few other organisations use some robot measured traits like milking speed and teat conformation traits in their genetic evaluation. Other robot or sensor data is hardly used for official milk recording or genetic evaluation, but are used for heat or health alerts with some robot data reported back to the farmer for management purposes.

For members, the main traits of interest from robot and sensor data are the standard milk recording components, (for management and genetic evaluation), as well as body weight, milking time and milking speed.

Not being able to use robot and sensor data in their services is a hurdle members would like to overcome. Members expressed the need for harmonisation of robot and sensor outputs, to help with the uncertainty about the quality of data (e.g. is calibration, maintenance done). Many members are in the process of implementing ICAR Animal Data Exchange standards to solve issues with harmonisation of output.

For data from sensors, like activity meters, there is the question of which modifications to the data needs to be done and how to incorporate that information into genetic models or services.

The need for ICAR certification of devices, especially for official milk recording was seen as a key, as also it is to maintain data quality in general. If devices would not meet the standards for certification, there is still value in ICAR assessing and validating the accuracy level of the data from such devices. The ICAR validation of devices or systems should be clear for all stakeholders (manufacturers, members and users).

For manufacturers the value of ICAR certification is high. It enables them to get access to certain markets, it enables their customers to use data generated by the devices in milk recording or genetic evaluation. It also proves the ability of the device to generate quality data.

Regarding the value of ICAR approval of sensor or robot devices, manufacturers ask the question for who is the benefit of ICAR approval. And what the value is for farmers.

There needs to be a balance between costs and benefits for them. Another remark was that sensor devices and certain traits measured by robots are generally designed for herd management, the development of these devices was not targeted on ICAR certification. Manufacturers see the risk that approval of lower accurate devices would dilute the value of current ICAR certification.

## Introduction

ICAR has a long history in providing certification of devices and guidelines for the recording of quality animal data. For official milk recording, data is collected with ICAR certified milk meters and samplers. Nowadays, the recording of animal data is rapidly expanding. Farmers have invested in robot or sensor devices and are often asking ICAR members to use these data for services like milk recording. But getting access to these data and being able to include these data in existing or new services can be challenging. Therefore, ICAR conducted a survey among 13 ICAR full members (mainly milk recording organisations) and 4 ICAR associate members (manufacturers of robots or sensor devices). Aims of the survey were to inventorise members needs of the use of robot and sensor data, the value of ICAR certification or approval for manufacturers and members and manufacturers needs regarding ICAR certification or approval of devices.

## Material and methods

The list of questions for this survey were composed by the ICAR staff. The survey for ICAR full members consisted of 9 questions (see Appendix 1). Questions asked to the members were about the services they offer to their clients, the current use of and needs for use of robot and sensor data in their services, the main hurdles they face in not being able to use these data and their needs for certification or validation of robot and sensor devices by ICAR.

The survey for manufacturers consisted of 5 questions (see Appendix 2). Questions asked to the manufacturers were about the devices or products they sell to their customers, their need for and the value for them of ICAR certification or approval.

The questions were mainly open questions. The survey was conducted during March through May 2022, by video meetings asking the questions to the participants. There were 16 full ICAR member organisations approached, involved in at least milk recording, and 4 ICAR associate members.

## Results and discussion

A total of 13 full members from 11 different countries participated in the survey. These participants were from Australia, Canada, Czech Republic, Denmark, Finland, France, Germany, Ireland, The Netherlands, Norway and the United States. All the participants are involved in processing milk recording data. Most of the organisations also carry out related services like animal recording, milk analysis in the lab and genetic evaluations.

All participants collect milk yields from robot devices. Some of them also collect other data like fat and protein percentage, somatic cell count, milking speed and teat coordinates. As main reasons for not using more traits than milk yields are mentioned a lack of standardisation of the output of robot devices across manufacturers, a lack of ICAR certification and problems with linkage between observation and official ID. Most participants use the milk yield data only to calculate the milk yield at the day of milk recording, some use daily milk yields also to calculate lactation yields. But other

traits than milk yield, measured by robots or sensors, are not used for other official services like milk recording, genetic evaluation or pedigree certificates.

Some members are investigating opportunities to include milking speed data from robots in the genetic evaluation of milking speed. Daily yields, heat alerts and other sensor alerts or data are used by some members for management reporting. Many members are considering to implement the ICAR ADE/iDDEN standards, some of them already have started implementing.

The data from robot or sensor devices that members would like to use for their services are components (fat and protein), milking time, milking speed, box time, body weight, body condition, activity data, rumination data. For components that are measured by robots (or any other on-line or in-line device) two conditions are mentioned though, the accuracy of the components measured needs to be known and there needs to be a frequent calibration of the device. Many members would like to use these components data for the milk recording and some also indicated to want to use it for the genetic evaluation.

Some of the most frequent hurdles mentioned that prevent the use of robot and sensor data for services to dairy farmers include; access to data, data collection (in regard of demand of time for milk recording), lack of advantage for the farmer to share data, lack of harmonisation of outputs, getting the same information from different systems, quality of data (accuracy, consistency, calibration and maintenance of device), source of information (version of software and hardware) not always available, missing certification of data and output and missing information about definition of data value and missing documentation.

Members clearly state that ICAR certification is important to maintain the quality of data at the current level. The quality of data is especially important to them for use in the genetic evaluation. Members are also interested in ICAR approval of devices that record data that does not meet criteria for ICAR certification, provided that:

1. They know the accuracy of the data measured.
2. They know with which type of device the data is measured.
3. ICAR provides recommendations about the required quality of data for certain purpose (e.g. genetic evaluation, milk recording, herd management etc.)
4. ICAR provides guidelines or recommendations about how members could use these data for different purposes.
5. Manufacturers provide information about the quality of the recorded data, about the relationship between the measured and real data value, about the proper use, maintenance and calibration of the device etc.
6. Data output across manufacturers of data measured on the same traits will be standardized as much as possible.

An important point of discussion is how ICAR could approve devices that do not meet current certification criteria. An even more important question is probably what kind of approval to assign to a potential ICAR test for these devices. The outcome of the test should be valuable for the manufacturer and the costs of the test should be balanced with the value for them. ICAR and ICAR test centres should be able to come up with clear and consistent test plans for these devices.

## Needs of ICAR members regarding certification of sensor or robot devices

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There were 4 manufacturers participating in the survey. All of the manufacturers are producing ICAR certified devices for milk recording, some of them are also producing other recording devices like sensors.

For manufacturers the value of ICAR certification is high. It enables them to get access to certain markets, it enables their customers to use data generated by the devices in milk recording or genetic evaluation. It also proves the ability of the device to generate quality data.

Regarding the value of ICAR approval of sensor or robot devices, manufacturers ask the question for who is the benefit of ICAR approval. And what the value is for farmers. There needs to be a balance between costs and benefits for them. Another remark was that sensor devices and certain traits measured by robots are generally designed for herd management, the development of these devices was not targeted on ICAR certification. Manufacturers see the risk that approval of lower accurate devices would dilute the value of current ICAR certification.

## Summary and conclusion

Daily milk yields from robots are widely used by ICAR members to calculate milk yield at the day of milk recording. Robot measured traits like milking speed and teat conformation traits are used by a few members in their genetic evaluation. Other robot or sensor data is hardly used for official milk recording or genetic evaluation, but e.g. heat or health alerts or some robot data are reported back to the farmer for management purposes.

Main traits from robot and sensor data that members want to use for their services are the components for milk recording and for the genetic evaluation, body weight, milking time and milking speed.

The main hurdles preventing ICAR members from using robot and sensor data in their services are: 1) need for harmonisation of robot or sensor output, 2) uncertainty about the quality of data and 3) unknown which modifications to the data needs to be done to incorporate this information into genetic models or services. Many members are in the process of implementing ICAR Animal Data Exchange standards to solve issues with harmonisation of output.

ICAR certification or validation is important for ICAR members to maintain the quality of data at the current level, especially for milk recording. If data recorded by devices does not meet criteria for ICAR certification, members are still interested in ICAR approval of these devices to use these data. In that case it is important to know the accuracy of recorded data, the type of device that recorded the data and to get recommendations how and for which purpose to use the data.

Manufacturers play an important role in providing information about the quality of recorded data and about maintenance of the device and by standardising data output. The ICAR validation of devices or systems should be clear for all stakeholders (manufacturers, members and users).

ICAR certification enables manufacturers to get access to certain markets. Therefore, the value of ICAR certification is high for them. It also enables their customers to use data generated by the devices in milk recording or genetic evaluation. ICAR certification also proves the ability of devices to generate quality data.

The main question of manufacturers about the value of ICAR approval of sensor or robot devices is who will benefit of it. What is the value for farmers, for manufacturers and for milk recording or related organisations? For manufacturers, there needs to be a balance between costs and benefits. Manufacturers also see a potential risk that approval of lower accurate devices would dilute the value of current ICAR certification.

Which services do you offer to your clients?

1. Animal identification
  - Milk recording (cattle)
  - Beef recording (cattle)
  - Herdbook recording
  - Conformation recording
  - Data processing
  - Laboratory analysis (milk)
  - Laboratory analysis (DNA)
  - Genetic evaluation (dairy cattle)
  - Others...
2. Do you make use of/include robot data in your milk recording service? If so, which data and how many herds/cows/records?
3. Do you flag/mark the data coming from sensors or robots to discern it from data sourced from approved milk recording sampling?
4. Do you restrict the use of sensor data? e.g. Ok for management but not for genetic evaluation / pedigree certs?
5. Do you make use of/include other robot or sensor data in other services? If so, which data for which service?
6. For which of these services do you want to make use of robot or sensor data and which data do you want to use?
7. What are the main hurdles to not be able to use robot and sensor data for your services?
8. What are your needs regarding certification of sensor or robot devices? What is the value for your organisation?
9. What do you want ICAR to develop regarding the use of robot and sensor data for your services?

**Appendix 1.**  
**Questions of**  
**survey among**  
**ICAR full members**  
**about their needs**  
**for use of robot**  
**and sensor data.**

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**Appendix 2.  
Questions of  
survey among  
manufacturers  
about the value of  
ICAR certification  
and their needs  
for ICAR approval  
of devices.**

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1. Which kind of devices do you produce/sell to your customers?
  - Milking robots
  - Sensor devices
  - Other recording devices
  - Data processing
  - Others...
2. Are there any of these devices you would like to be certified by ICAR?
3. What is the value for your company of ICAR certification?
4. Is there merit in ICAR certifying your sensor devices or specific traits measured by your robot?
5. Open discussion on the questions above.