



## Dairy cattle milk recording working group update. Short-term prospects for cattle milk recording

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This introduction to the ICAR Dairy Cattle Milk Recording WG was presented at the panel discussion during the ICAR Conference in Prague in June 2019. Entitled *What Next?*, the discussion involved representatives of several working groups and subcommittees including the Dairy Cattle Milk Recording Working Group, the Functional Traits Working Group, the Recording and Sampling Devices Sub-Committee, the Sensor Devices Task Force and the Animal Data Exchange Working Group. The panel discussed the future direction of the milk recording industry, approaches to the organisation of ICAR working groups, subcommittees and task forces, and how milk recording organisations (MROs) can respond to new trends and challenges.

### Introduction

Dairy Cattle Milk Recording Working Group members specialise in different fields, comprising technical personnel as well as practitioners employed by MROs involved in daily administration activities and herd management. The group is represented by all of the important geographic areas, informing the group's understanding of the needs of different territories around the world. Specialising in all aspects of dairy cattle recording, the group covers current and prospective farm systems, lactation calculation, sample transportation, databases, plausibility checks and quality management. Members:

### Membership

- Pavel Bucek – Czech Republic
- Franz Josef Auer – Austria
- Xavier Bourrigan – France
- Bruce Dokkebakken – USA
- Kai Kuwan – Germany
- Juho Kyntäjä – Finland
- Yaniv Lavon – Israel
- Filippo Miglior – Canada
- Danuta Radzio – Poland
- Friedrich Reinhardt – Germany
- Carlos Trejo Jimene – Chile

## Priorities

The group is currently in the process of making improvements to content in Section 2 of the Dairy Cattle Milk Recording Guidelines. The section is composed of three parts: Section 2 - Guidelines for Dairy Cattle Milk Recording, Procedure 1 – Computing 24-hour Yields and Procedure 2 – Computing Accumulated Lactation Yields. The most recent update of the Guidelines – approved in February 2018 at the ICAR Conference in New Zealand – was general in focus. Attention has now switched to developing Procedure 1. Significant progress is expected to be made in time for ICAR 2020, with the final version delivered at ICAR 2021. The goal is to make content more customer-oriented, clearer, and more practical toward assisting the daily practice of MROs. There will be a particular emphasis on providing practical recommendations to make 24-hour calculation methods more applicable for farmers.

## Key projects

The group is committed to monitoring practice among milk recording organisations worldwide. To that end, group members recently carried out a number of projects, notably a number of extensive global surveys:

- 24-hour calculation surveys of automatic and classical milk recording systems (52 organisations)
- World trends in cattle milk recording (3 parts/46 organisations)
- South American project
- Plausibility checks project (25 organisations)
- Management of milk recording organisations – current problems and future challenges (41 organisations)
- KPI development for the ICAR Certificate of Quality
- Big data project (milk recording x feeding)
- Special interdisciplinary projects
- Collaboration with ICAR WGs, SCs & TFs (Accuracy Task Force & Sensors Device Task Force), etc.

## Key Guidelines Research

With regard to 24-hour calculations, a number of the group's research projects have been aimed at simplifying methods used by cattle farmers. A new 24-hour calculations policy is due to be published, with recommendations for estimating coefficients and factors and evaluating methods. Below is a list of projects recently conducted:

- Recalculation of the Liu method – AM/PM sampling as the industry standard
- Research project on sampling scheme C calculations
- Detailed technical analysis of 24-hour calculations
- Comparing different 24-hour calculation methods
- Recalculation of coefficients for automatic milking systems (Galesloot method)
- Earmarking improvements for the Liu method adaptation of sampling scheme Z, a method that provides several benefits
- AfiLab Project – in-line analysis
- Comparison of different 24-hour calculation methods

Members continue to engage with MROs and stakeholders in the cattle MR industry, having established contact with 52 organisations globally. Members regularly liaise with experts outside the group at ICAR congresses and other events, including at:

- Technical sessions, where information is exchanged with MROs
- Practical workshops such as at ICAR 2019 (involving more than 140 participants)
- Meetings where advisory services are offered to resolve technical MR problems
- Meetings to discuss changes to the Guidelines
- Promotional events organised by ICAR and the WG abroad, e.g. trainings in Iceland, China, Poland, etc.
- Consultancy meetings for organisations from the UK, Russia, Romania, Afghanistan, etc.

## Collaboration with Industry

The group is actively seeking new approaches to MR data processing and to innovating 24-hour calculations. Big data, artificial intelligence, deep learning, and new software are all being explored, with a number of projects in the works.

AMS and MRO internal data are also becoming increasingly available from milk labs, including conformation data and other types of data from automatic milking systems (milking robots). The big challenge is to combine all of the data from different sources. Higher value is achieved when data is analysed in unison toward creating new services for milk recording customers. Proper ways of combining data from AMS with other animal information will be a very important task for milk recording organisations in the future.

The following indicators will also need to be measured: weights, feed intake, feed efficiency, metabolic problems, etc. As more and more information is set to be processed and analysed by MROs, suitable technologies will have to be integrated as part of the suite of services offered by MROs.

The efficiency of the milk recording process must be improved to aid daily practice on farms. More tests could be introducing at the beginning of lactations and less at the end of the process. Metabolic problems most commonly occur at the beginning of lactations. Accordingly, an innovative solution in this area could yet yield significant positive outcomes.

## The Future of Milk Recording

Analysing the needs of MROs worldwide, the group carried out a recent survey – 24-Hour Calculation Methods: Global Trends – gathering data from 52 organisations. Consisting of 90 questions, the survey covered the period December 2018 – March 2019. The responses from the survey participants are considered crucial to developing an updated version of the 24-hour calculations section of the Guidelines. Below are a series of statements by MROs in relation to the Guidelines ranked according to priority on a scale of 1 to 10 (1=low, 10=high):

- We need detailed descriptions of equations and examples (8.1)
- We need descriptions to be clearer and easier to use (7.8)
- We need practical examples on deriving factors and coefficients (7.3)

## Needs Analysis of MROs | 24-hour Calculations

- We need practical comments and recommendations for use (7.2)
- We need new methods to be included in the Guidelines (5.5)
- We want a completely different approach to 24-hour calculations and would like to see a new method introduced (4.6)

It is most common for MROs (18 organisations) to devise new methods internally or in collaboration with research institutes (15 organisations). Others collaborate with research institutes as well as commercial companies or, less commonly, with commercial companies exclusively.

### New 24-Hour Calculation Guidelines

Resulting from the group's discussions concerning the new version of Procedure 1, the following key issues were identified:

- Not all areas can be unified nor is it necessary to standardise all areas
- There are differences in the implementation of methods among MROs
- A degree of unity must be established
- Most MROs follow the ICAR Guidelines, but minor differences remain
- Future policy
  - ∅ Calculation – collaboration – sharing factors and coefficients, problems with calculations and estimating factors
  - ∅ Estimating coefficients: possible international project among ICAR members
  - ∅ New services for herds using AMS
  - ∅ New technologies, screening and possible additions
  - ∅ Do we need new ICAR services in this field? A new laboratory for verifying the quality of estimated factors, coefficients?
  - ∅ Lend support to countries in need, advisory services
  - ∅ Some MROs are unable to derive equations, providing an opportunity for ICAR to offer data check and outsourcing services in this field

### Consumer Focus

The group must improve the services offered to consumers. BV health traits are an important source of consumer data and welfare and there are various ways of meeting these requirements.

### Further discussion items

- Future innovations of the ICAR Guidelines, e.g. individual lactation qualification in France
- Project milk recording outputs and outcomes
- Daily milk recording
- New services for herds using AMS

- New technologies
- Quality Management Systems for Dairy Farming – Opportunities & Challenges for Recording Organisations. New services for MROs.
- Validation and certification, development of quality indicators, plausibility checks for multiple data sources; checks/validations
- Standardisation and calibration are expected to play a big part
- Data storage strategies
- Accuracy of different methods and intervals in milk recording
- Big data, integrating deep learning within MR practice
- Possible innovative approach in calculation for 24-hour on the base of big data
- For Dairy Cattle Milk Recording Working Group is resolving current problems & priority points for the MR Workshop in these field which were discussed during the milk recording workshop in Prague:
  - Ø How do we keep AMS customers happy?
  - Ø Whose milk is in the vial?
  - Ø How complex exactly is it to calculate daily yields?

A milk recording workshop organised by the ICAR Dairy Cattle Milk Recording WG took place on Tuesday 18/06/2019 in Prague (ICAR 2019). It was attended by more than 140 registered participants, representing milk recording organisations, manufacturers, universities, research institutes, and other bodies from around the world. The aim of the workshop was to shift from a science perspective toward resolving commonly encountered practical issues, and to explore the day-to-day business concerns of milk recording organisations with a view to stimulating discussion and improving practice. The workshop consisted of introductory presentations followed by discussion on each topic, with the main focus centred on engaging participants in meaningful and in-depth discussion.

**Executive summary from the discussion at the milk recording workshop**

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The milk recording workshop, which was chaired by Juho Kyntäjä and Xavier Bourrigan, revolved around three core topics.

1. How to keep AMS customers happy?

Four presentations, 15 minutes each.

- Denmark, Jonas Persson
- France, David Saunier and Xavier Bourrigan
- Switzerland, Eric Barras
- Norway, Tone Roalkvam

**Key discussion items during the workshop**

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Group discussion (15 minutes in groups, 15 minutes conclusion):

What steps can we take to improve services for AMS customers?

2. Whose milk is in the vial?

Three presentations, 15 minutes each.

- Poland, Danuta Radzio
- Canada, Richard Cantin
- Sweden, Nils-Erik Larsson

Group discussion (15 minutes in groups, 15 minutes conclusion):

What steps can we take to secure the cow-vial link?

3. How complex is it to calculate daily yields?

Two presentations, 15 minutes each.

- USA, Angie Coburn
- Italy, Mauro Fioretti

Group discussion (15 minutes in groups, 15 minutes conclusion):

What steps can we take to arrive at better 24-hour yield estimates?

How to keep AMS customers happy?

The following points were considered most pressing:

- Data from different sources should be integrated.
- All data should be available online.
- The advantage milk recording organisations have is that they store data not typically accessible from automatic milking systems.
- Simplicity.
- Outputs should be standardised.
- Big data and machine learning are challenges for the future in terms of creating new services.
- Added value of services is very important, e.g. benchmarking (including data not accessible from AMS)
- New breeding values can be gleaned from robot data.
- Easy-to-use services.
- Added value can improve innovation and the interpretation of results.
- Robots are excluded from MR practice in Israel.
- Slovenia saw a reduction in customers implementing automatic milking systems.
- Comfort of service and control.
- Cross contamination is relevant for the discussion and continues to pose a problem.
- Less samples, more user-friendly milk recording system.
- One exchange format could be valuable.
- Maintenance.

- Deep benchmarking based on all data available, graphic design.
- Improving 24-hour estimation of milk content.

## 2. Whose milk is in the vial?

Key items discussed during this part of the workshop:

- Minimise human error; well-trained staff specialised in the use automatic milking systems; training is very important.
- Cow IDs in parlours are not always 100% accurate.
- Improvements in software.
- Samples and barcodes should be scanned in one step (automatic scanning) simultaneously in the milking parlour (barcode, QR code). Reduce steps and human error.
- Milk DNA is another option, but is costly.
- Vial identification (barcode, RFID) and time stamps could be introduced.
- Connecting IDs with vial RFIDs.
- Eliminating human influence = less mistakes.
- Electronic support is very important in terms of reducing risk.
- Animal identification in milking parlours – individual cows should be identified on site at the milking parlour.

## How complex is it to calculate daily yields?

Summary of the discussion:

- Milk yields are based on a 96-hour period in the case of automatic milking systems.
- Fat should be corrected when using automatic milking systems.
- Sharing factors and encouraging collaboration between milk recording organisations remain a challenge and an opportunity for the future (data is not always readily available, costs, etc.).
- There is an opportunity to share experiences and knowledge in this field.
- Unifying different methods and identifying synchronicity in this area need to be prioritised.
- Large amounts of data are often required when estimating coefficients.
- For some methods, old coefficients can be consulted.
- ICAR should nurture in-house collaboration on the issue of 24-hour calculations.
- Calculations from sensors, where data is taken over multiple days, should be discussed.
- Calculation is a very complex and difficult task contingent on a range of influencing factors.



## Conclusion

Farmers need faster access to results and data processing centre delays need to be reduced. Farmer services need to be improved across the board and MROs need to create more value for customers, particularly in the area of herd management. The group recommends introducing just-in-time services to minimise delays, e.g. upload data one week and deliver results the next. The expectations on MR management need to be more clearly defined. We must give farmers reason to be involved in the milk recording system we advocate. We need to provide more benefits to MROs than to AMS manufacturers. Only with better services can we align ourselves with future development.