Worldwide trends in milk recording: milk recording and new technologies

J. Kyntäjä[1], P. Bucek[2], K. Zottl[3], P. Nordgren[4], F. Miglior[5], H. Leclerc[6], J. van der Westhuizen[7], K. Kuwan[8], Y. Lavon[9], K. Haase[10], C. Trejo[11], D. Radzio[12] and Elsaid Z.M. Oudah[13]

[1]ProAgria Agricultural Data Processing Centre, Urheilutie 6, 01370 Vantaa, Finland, (Corresponding author: juho.kyntaja@mloy.fi)
[2]Czech Moravian Breeders' Corporation, Inc., Benešovská 123, 252 09 Hradištko, Czech Republic
[3]LKV Austria, Dresdner Straße 89/19, 1200 Wien, Austria
[4]Växa Sverige, Kungsgatan 43, 63180 Eskilstuna, Sweden
[5]Canadian Dairy Network, 660 Speedvale Avenue West, Suite 102, Guelph, Ontario, N1K 1E5Canada
[6]IDELE, INRA UMR GABI, Equipe G2B - Domaine de Vilvert, Bât 211, 78352 Jouy en Josas cedex, France
[7]SA Studbook and Animal Improvement Association, Posbus 270, Bloemfontein 9300, South Africa
[8]VIT, Heideweg 1, 27283 Verden, Germany
[9]Israeli Cattle Breeder's Association (ICBA), P.O. Box 3015, 38900 Caesaria Industrial Park, Israel
[10]Northstar Cooperative Inc., P.O. Box 23157, 4200 Forest Rd. Bldg A, Lansing, MI, 48910, USA
[11]Cooprinsem, Freire 980, Manuel Rodríguez 1040, Osorno, 5310798, Chile
[12]Polish Federation of Cattle Breeders and Dairy Farmers, 22 Zurawia Street, 00-515 Warsaw, Poland
[13]Mansoura University, Department of Animal Production, Mansoura University, PC: 35516, Mansoura, Egypt

Abstract

Milk recording organisations are currently more interested in additional milk analyses from the recording sample than in extracting data from on-farm sensors. The most attractive additional analyses in the near future are pregnancy tests, milk ketones and mastitis pathogens. From automatic on-farm sensors, there is most interest for milking speed, activity monitoring, heat monitoring and body condition scores. The future is largely dependent on how the milk recording organisations will learn to extract and report the relevant figures in the information flood recorded on farms and also how to do that with minimal farmer effort..

Keywords: new technologies, milk recording, on-farm sensor, milk sample.

Introduction

Recent years have provided farmers and milk recording organisations with numerous new possibilities to gather data and measurements about their cows. In this study, we will look at how these possibilities are being utilised now by both farmers and milk

recording organisations, and how are the organisations planning to use them in the near future. We will consider automatic measurements on the farm but also new analytical services in the milk recording laboratory.

Materials and methods

This paper is part of the survey "World-wide trends in milk recording", initiated and carried out by the ICAR Working Group on Dairy Cattle Milk Recording. The survey was filled in by 46 organisations representing 287 milk recording providers who record data from a total of 21.5 million cows. The respondents and their respective organisations are listed in the main paper of this survey (Bucek *et al.*, 2015). The survey was conducted as an internet survey, with a possibility to answer the same questions on paper by request. This paper is limited to a couple of questions in the survey while the rest is covered by other presentations.

Farmers' use of automatic monitoring

Automatic monitoring is an important part of the new technologies relevant to milk recording organisations. Farmers' use of these technologies was studied by Borchers & Bewley (2014) in a study where 108 farmers from 10 countries listed what they are already monitoring automatically and also rated the potential usefulness of a number of data sets. Almost one third (31%) of respondents did not have any form of automatic monitoring. Milk yields and cow activity were monitored automatically much more often than any other features.

Table 1. Most common automatically monitored features by share of respondents (Borchers & Bewley, 2014).

Feature	Share of respondents, %
Daily milk yield	52
Cow activity	41
Mastitis	26
Milk components	25
Standing heat	21
Feeding behaviour	13
Body temperature	13
Body weight	11
Rumination	10

Table 2. Features considered by farmers to be most useful for automatic monitoring (Borchers & Bewley, 2014).

Feature	Average usefulness points[1]
Mastitis	4.77
Standing heat	4.75
Daily milk yield	4.72
Cow activity	4.60
Body temperature	4.31
Feeding behaviour	4.30
Milk components	4.28
Lameness	4.25
Rumination	4.08
Hoof health	4.05

[1]Scale 1 to 5 points (1= not useful, 5= very useful)

In the same study, farmers were also asked about how useful they would consider monitoring certain features automatically. Here we can see that most of these features concern daily and hourly management decisions: which cows to check, which cows to treat etc... . (Table 2).

Generally, one can say that robot and parlour data systems respond very well to farmer expectations: they are operating on cow and group level, helping to make daily and weekly management decisions. Milk recording data, on the other hand, extends from these to a more strategic management level (herd, farm) with a longer time span (Figure 1).

Not everything in on-farm data systems is interesting from milk recording, and some data that is relevant for milk recording, is not necessarily so for on-farm management systems. One important aspect in milk recording is to highlight differences between animals.

Table 3. Novel analyses from the milk recording sample by number of milk recording organisations (MRO= milk recording organisation).

Analysis	MRO's routinely analysing	MRO's planning to start analysing	MRO's total
Pregnancy	19	13	32
Ketones	11	13	24
Mastitis pathogens	15	5	20
Free fatty acids	9	9	18
Disease control	11	6	17
Infrared spectra	7	10	17
Unsaturated fatty acids	8	7	15
Casein fractions	7	6	13

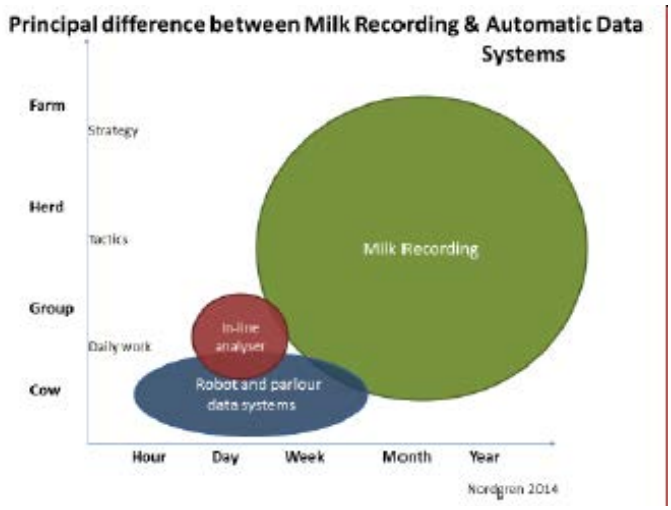

Figure 1. Relationship of milk recording and on-farm data systems to strategy levels and time spans (Nordgren, 2014).

Milk recording organisations and new technologies

In our study, milk recording organisations around the world were asked how they are utilising new technologies now and how they plan to utilise them in the near future. The new technologies were divided into two main groups: novel analyses from the milk recording sample, and data from on-line sensors on the farm (Table 3).

Additional analyses from the milk recording sample are generally seen as a convenient way of creating added value for milk recording without extra work on the farm. Some additional analyses were routinely done or planned in the near future by more than half of the respondent organisations.

Pregnancy diagnosis was by far the most common novel analysis routinely done in today's milk recording, followed by mastitis and certain other pathogens, and ketones. Biggest growth in the near future is expected in pregnancy diagnosis, ketones, milk infrared spectra, and free fatty acids. Pathogen arrays for mastitis, Johne's disease, salmonella etc. seem to already be in use in most of those organisations who have interest in them (Table 4).

Table 4. Data used from on-line sensors by number of milk recording organisations.

Feature	MRO's routinely using	MRO's planning to start using	MRO's total
Milking speed	11	11	22
Activity monitor (lameness)	3	11	14
Heat	4	8	12
Body condition score	2	10	12
Body weight	3	8	11
Teat placement	1	9	10
Milk conductivity	2	5	7
Milk yield by quarter	0	5	5
Rumen monitors	1	3	4
Body temperature	1	2	3

The number of organisations interested in data from on-line sensors is generally lower than with additional analyses. This is due to data being generally oriented towards day-to-day management than breeding and strategic planning, and the data only being available on those farms that have on-line monitoring systems in place. The interest will probably grow in the future as the on-line sensors become more common and the milk recording organisations find ways of utilising the data obtained from them.

Milking speed is by far the most commonly extracted on-line sensor data utilised in milk recording at the moment. Some organisations are also utilising heat, body weight and activity monitoring data. Many more milk recording organisations are planning to start using this data. The most popular traits to plan were, again, milking speed, followed by activity monitoring, body condition scores, and teat placement.

Milk recording organisations were also asked about their use of in-line analyser data. At the moment, only two MRO's are utilising them, while nine others are planning to. Most organisations are presently not interested.

Conclusions

There is great interest among the milk recording organisations to broaden the spectrum of recorded traits, especially towards novel analyses from the milk recording sample, but also towards traits and events recorded by on-line sensors on the farms. In the future, there will be more and more data available from a greater number of farms. The challenge is how to find the relevant figures and how to report them so that they will be interesting both for the farmer and the milk recording organisation. Another future trend certainly is that clients are less and less willing to put their own effort in data transfer. Therefore, automated data extraction is crucial, and where that is not possible, services to replace farmer effort should be offered.

Acknowledgements

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