



## Use of plausibility checks in milk recording organisations

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This survey looks at the plausibility checks used at data capture of a few key data sets in milk recording organisations around the world. The aim of these checks is to keep the data integral, with no internal discrepancies. We found that the most important plausibility checks are almost universal, but in the more novel methods to capture data the possibilities to check the data for integrity are not yet fully utilised.

### Summary

*Key-words: milk recording, data capture, plausibility check.*

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## Introduction

The ICAR dairy cattle milk recording working group has the responsibility to keep the relevant ICAR Guidelines up to date. In order to know how the milk recording organisations around the world are in fact working, the group has conducted studies on recording practices and on the management of milk recording during the last few years (Bucek *et al.* 2015, Bucek *et al.* 2016, Kyntäjä *et al.* 2015, Zottl *et al.* 2015, Zottl *et al.* 2016). After these studies, we still perceived a need for more data on how the integrity of data is managed.

## The survey

The survey was done on a survey tool website, and the participants were invited by email to fill in the form. The addresses were obtained from the ICAR membership list website. We received 25 acceptable answers from 22 very different countries, which gives a good overview on the overall situation. Some characteristics of the respondent organisations are given in tables 1 to 4.

Table 1. Size of the respondent organisations.

Number of recorded cows	Share of respondents, %
Less than 100,000	32
100,000 – 249,000	16
250,000 – 499,000	36
More than 500,000	16

Table 2. Organisation of data processing.

Organisation of data processing	Share of respondents, %
We process our data ourselves, and for no other organisation	40
We process our data ourselves, and also for other organisations	16
We outsource data processing as the sole client	8
We outsource data processing to a company that has several clients	36

Table 3. The most important data capture method in the organisation.

Data capture method	Share of respondents, %
Paper sheets	24
Specialised device	12
PC programme	32
Webpage or mobile app	24
Direct data transfer	8

Table 4. Person responsible for data capture.

Number of recorded cows	Share of respondents, %
Farmer or his representative	20
Technician	40
Shared responsibility	40

The events chosen for this survey were calving, milk recording and milk analysis, i.e. those events that are the basis for yield calculation and allow to make the necessary connections for pedigree purposes. In many countries calving data is not strictly speaking gathered by the milk recording organisation, but nevertheless it is a crucial element in yield calculations and was thus included.

## Plausibility checks for the most important milk recording events

The respondents were asked who registers calvings in their respective country and how data are synchronised between milk recording and an eventual government register. The existence of a government register was reported by 88% of all respondents. Farmers record calvings into the government register in 80% of the respondent organisations, and in 72% also for milk recording. In 52% of the organisations, one record from the farmer is enough for both milk recording and government purposes. Technicians record calvings into the government register in 8% of the respondent organisations, and in 28% of the organisations for milk recording purposes (Table 5).

### Calving

Plausibility checks for calving are quite similar across the respondent organisations, with more than 90% of respondents using the first seven checks asked. Most often these checks are performed when the data enters the milk recording database, but especially some of the simpler checks are done already at the capture device.

With herd recording, the checks are used for making sure all data from the herd is integral and captured. None of these checks were used in more than 76% of all respondent organisations (Table 6).

### Herd recording

Individual cow milk yields are usually checked with a comparatively identical set of plausibility checks in the respondent organisations. Depending on the check, these are done at the capture device or at the database entrance. With direct data transfer, there are some additional possibilities for data checks that are not yet fully in use. Direct data transfer is in use in 88% of the respondent organisations (Table 7 and 8).

### Individual cow recording

Milk analysis is largely done in separate laboratories who deliver the results through direct data transfer. For milk recording purposes, the results often have to be corrected in order to calculate a 24-hour average content and daily yields of solids. Most respondents correct fat contents either based on milking times only or on a more complex formula. A surprisingly high number of respondents also reports adjusting the analysed protein contents (Table 9).

### Milk analysis

The most popular plausibility checks done for milk analysis results are there to make sure we know which cow the analysis belongs to, and that the milk analysed is normal. Most organisation check the latter by fat and protein only, while some use or more sophisticated model (Table 10).

Table 5. Plausibility checks for calving.

Plausibility check	Total (%)	Where is the check done?		
		At capture device (%)	At transfer from farm (%)	At entrance to database (%)
Cow belongs to herd	96	48	8	40
Cow is female	96	48	8	40
Capture delay	92	44	0	48
Age of cow	92	28	8	56
Calving interval	92	36	0	56
Sire from AI	92	40	0	52
Calf breed	92	36	0	56
Days from service	88	32	0	56
Days dry	72	36	0	36
Synch with government	64	12	4	48

Table 6. Plausibility checks for herd recording.

Plausibility check	Share of respondents (%)
All registered cows are listed for recording	76
All milked cows have milk or an excuse	76
All samples have a milk weight	76
All milked cows have a sample	64
All milk weights have a sample	64
Total milk corresponds to bulk tank	24

Table 7. Plausibility checks for individual milk yields in a 2x setting without data transfer.

Plausibility check	Total (%)	Where is the check done?	
		At capture device (%)	At entrance to database (%)
Cow belongs to herd	96	64	32
Calving to recording	96	40	56
Recording interval	88	40	48
Daily yield within limits	88	44	44
Cow not already recorded	84	48	36
Cow not recorded as dry	84	48	36
Comparison to previous yield	64	20	44
Evening vs. morning milk	52	28	24

Table 8. Plausibility checks for individual milk yields in direct data transfer.

Plausibility check	Total (%)	Where is the check done?	
		At transfer programme (%)	At entrance to database (%)
Cow belongs to herd	76	40	36
Calving to recording	76	28	48
Recording interval	76	28	48
Daily yield within limits	76	28	48
Cow not already recorded	72	28	44
Cow not recorded as dry	72	28	44
Sufficient number of milkings	64	28	36
Comparison to previous yield	52	20	32
Capture starts with complete milking	48	28	20
Milk flow	28	12	16
Milk secretion rate	28	8	20

Table 9. Adjustment of analysed parameters for milk recording purposes.

Correction in place	Share of respondents (%)
Fat according to milking times	44
Protein	44
Fat according to a more complex correction	40
Cells	20
PAG	4

Table 10. Plausibility checks for milk analysis results.

Plausibility check	Share of respondents (%)
Vial ID is connected to a cow	88
Cow has a milk yield	88
Fat content within limits	88
Protein content within limits	84
Cow belongs to herd	80
Calving to sampling, days	52
Lactose content within limits	44
Cell count within limits	44
Urea within limits	28
pH within limits	12
Freezing point within limits	12

The survey shows that even though the milk recording organisations are very diverse as to size and technological advancement, the most important plausibility checks usually seem to be quite similar. Some checks are more dependent on the local situation. There are some possibilities with the more novel data capture methods that could be used wider than they are now.

## Conclusions

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