Alternated milk recording – recalculation, results and conclusion for future test planning

K. Kuwan

Vereinigte Informationssysteme Tierhaltung w.V. (vit), Heinrich-Schröder-Weg 1, 27283 Verden, Germany
Corresponding Author: Kai.Kuwan@vit.de

Abstract

Alternating test methods have been offered as an alternative to the standard method for more than 20 years in Germany. A periodic review of correction formulas for milk yield, fat (and protein) is necessary. For test planning it is important to get representative data for the population where the new model should be used. Especially milking interval, herd size should be analyzed before to get a good overview. To get valid data for the milking interval it is useful to extend the test sampling over three or four milking times.

For validation it is necessary to split the data randomly. Two thirds of the data should be used to estimate new formulas. The remaining data should be used as an independent data set to validate the new estimated formulas.

To exclude implausibly data is difficult and needs a lot of experience.

Keywords: Kuwan, alternated milk recording, test planning, validation.

Introduction

Driven by costs for DHI services, problems to require staff for DHI and retention against owner based milk recording, alternated milk recording was introduced in germany in the late 90’s.

To develop an own model dedicated and high motivated farmers participated at a large field study. For a period of one year separate samples from every milking time were taken and analyzed. All milk yield from morning and evening milking were separately stored for this research. As the result of this research Liu *et al* published in 2000 a method which also became part of the ICAR guidelines. With the introduction of this method into practice a very controverse discussion about accuracy, comparability of results and the influence of calculating breeding values starts. It ends up that during the first few years alternated milk recording was not allowed for herdbook farms. Nevertheless the proportion of alternated milk recording increased rapidely through the following years up to twenty-five percent. Since 2010 the amount of alternated milk recording is constant in Germany between 24 – 26 % of farms (19 – 20 % of cows).

Based on milk yield from single milkings which were collected with electronic devices on farms with standard methode during the years, in 2006/2007 the formulas for milk yield were recalculated easily. This new formulas for milk yield were introduced into practice in 2008. The complaints about dubious results for fat and protein content have increased in recent years. New formulas for the calculation of fat (and other ingredients) were also necessary.

Development of DHI farms in the north west and east part of Germany

Table 1 shows the development of the DHI farms over the years from 1995 to 2018. Because of the former historical development the table is divided in two parts, the northwest region with more family based farms and the east part of Germany with much bigger farms based on cooperatives.

As expected and typically for central Europe the number of farms has decreased dramatically. In total the number of farms has fallen by almost more than 60 percent. The slightly decrease of number of cows is influenced by the European milk market policy. While the number of cows per farm in East Germany has risen by 50 percent, it has tripled in the northwest part of Germany.

Over time and both regions we have an increase of milk yield (~ 3.000 kg), a decrease of fat content

(~ 0,38 % point) and a stable protein content. The changes in the ratio milk yield and ingredients may possibly influence the correlations between them. This could be one reason for the complaints about dubious results for fat and protein content. Also large herds mean more employed staff and a changing in milking intervals. In comparison to the data of 1995 the average milking interval between evening and morning milking is more than 20 minutes shorter and we have a higher number of farms now that have milking intervals of 12 hours. This we took into account during test planning.

Test planing

To estimate new formulas we preselected 135 farms with different milking interval and different herd size. The total number of cows was 20,810.

During the test period of three month every four weeks samples were taken at every milking time on two consecutive days starting with the evening milking. This gives us the opportunity to calculate three daily milk yields.

1. Evening milking – Morning milking (First day)
2. Morning Milking – Evening milking (Mix out of first and second day
3. Evening Milking – Morning milking (Second day)

We derive a set of formulas, each formula is estimated for a special situation of the relevant cow and takes into account:

- Herd based milking time (evening/morning).
- Herd based milking interval (8 classes).
- Cow individual lactation (first and higher).
- Cow individual days in lactation (7 classes of 60 days, last class open).

For validation we used a set of 700.000 milkings, collected in Schleswig-Holstein with lactocorder. There we got evening and morning milk yield, two separated sample and for every cow the individual milking time in the evening and the morning.

Table 1. Development of DHI farms

	Northwest Germany						East Germany					
Year	Nr farms	Cows	Cow/farm	Milk kg	Fat %	Protein%	Nr Farms	Cows	Cow/farm	Milk kg	Fat %	Protein %
1995	29.462	961.223	33	6.908	4,27	3,33	4.764	948.510	199	5.702	4,44	3,48
2000	23.686	930.044	39	7.674	4,25	3,38	4.404	850.044	193	7.388	4,26	3,46
2005	18.751	924.470	49	8.118	4,17	3,41	3.794	780.480	206	8.362	4,09	3,42
2010	13.474	814.705	60	8.619	4,13	3,40	3.073	718.806	234	8.900	4,07	3,39
2015	12.797	1.042.037	81	8.705	4,05	3,39	2.496	747.422	299	9.404	3,97	3,38
2018	10.799	1.046.752	97	9.106	4,00	3,42	2.072	672.056	324	9.750	3,93	3,41

Results and conclusion

At first we used the validation data set to check the sequence the cows are milked at the test day. The mean correlation was 0,8 with a wide variation. Farms with tied cows had a correlation near 1.

Particularly bigger herds with milking groups had less correlation (depending on group size and group sequence of milking). In praxis there is less chance to verify the information about the previous milking time and the sequence the cows are milked.

The results of the new formulas are different to the results of the old formulas but show better accordance for cows with high milk yields. More milking interval classes represent better the real situation on farms in germany. The new formulas are used since January 2019 and we have a subjectively smaller saw-tooth-effect for milk yield and fat when changing the milking time (evening/morning) from one testday to the other. Subjectively we also have less reclamation of farmers for unlikely results, after implementing the new formulas.

A correct estimation for extrem yields (for example 10 kg in the evening – 40 kg at the morning milking) is not possible.

It is not appropriate to use more information for derivation of formulas as later in routine application available.

An estimation of formulas every 5-8 years is necessary. Especially if there is a significant increase in average yields or a significant change in correlations between milk yield fat or protein content.

We need data from representative herds, i.e. herds in which we adopt the estimated formulas later.

Data for calculation should cover all environmental subgroups resulting potentially in different formulas, i.e. breeds, regions, milking intervals, lactations, etc.

The dataset should be large enough for splitting into a learning/estimation sample (2/3) and a validation sample (1/3). For estimation the minimum number of observations per subclass should be >1000 (better 2000).