Using daily data from electronic milkmeters: First results of field tests

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Electronic milkmeters, installed in traditional milking parlours or in robotised ones, make it possible to estimate the milk yield for each cow and each milking. It is thus interesting to test what is the required level of precision, considering that data from the electronic equipment are supplied milking after milking and how to use them for milk recording purposes. Moreover it is not advisable to use an electronic milkmeter as if it were a pair of scales.

Materials and methods

The test was carried out in 1990 on the "Ghezzi" farm near Milan, equipped with a 6-unit tandem milking parlour, in which 70 cows are usually milked. The low-line milking parlour was provided with electronic milkmeters ("Metrolat 2", manufactured by Proseat).

The test spanned over 30 days. Data concerning milk yield for each cow and for each milking were provided by the milkmeters and by the weight of milk collected in a pail connected downstream in relation to the milkmeter, for each individual milking. The milk weight was determined by means of a pair of scales.

Results

Data were grouped under:
- milkmeters;
- cows;
- milkings.

Graphs were made of the error (in%) of the milkmeter in comparison with the scales (Figure 1) and related real milk yield (Figure 2) considering all the milkmeters.
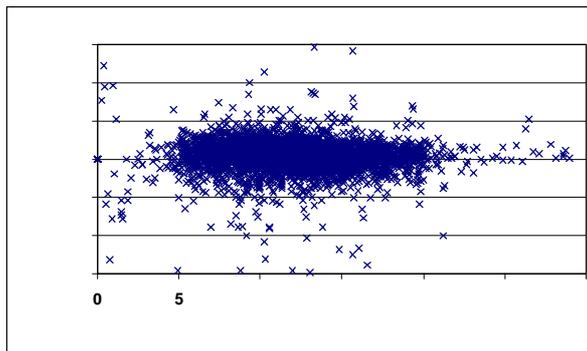
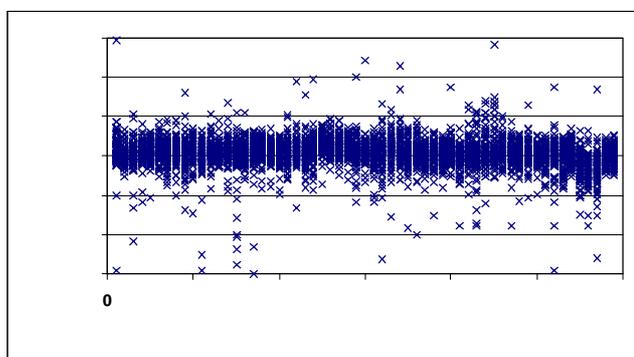*Figure 1. Error (in%) of the milkmeter in comparison with the scales.*

Figure 2. Error (in%) of all the milkmeters during the month (2 milkings a day for 30 days).

The average concerning milk yield for each day of milking was calculated in order to obtain the herd's average daily yield (Figure 3) in relation to real yield and the one read off the milkmeter.

Afterwards the monthly (30 days) yield was assessed by using an ever increasing number of daily data (1 to 30) and by comparing it with real yield.

Figures 4 and 5 were made of the errors obtained (in % and in kg) in relation to the number of days on which the estimate of monthly yield was based.

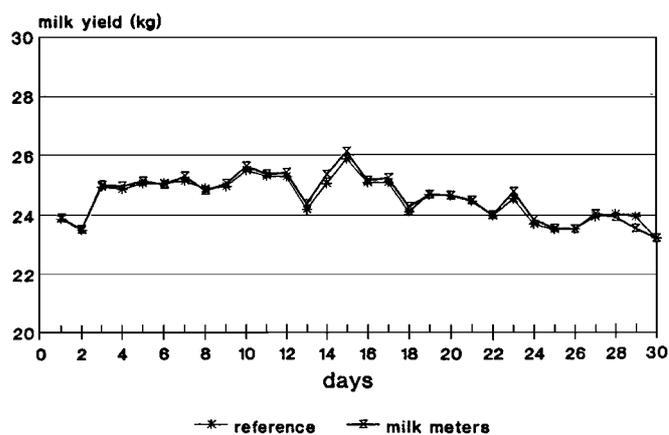Figures from 6 to 9 refer to four individual cows taken as examples.

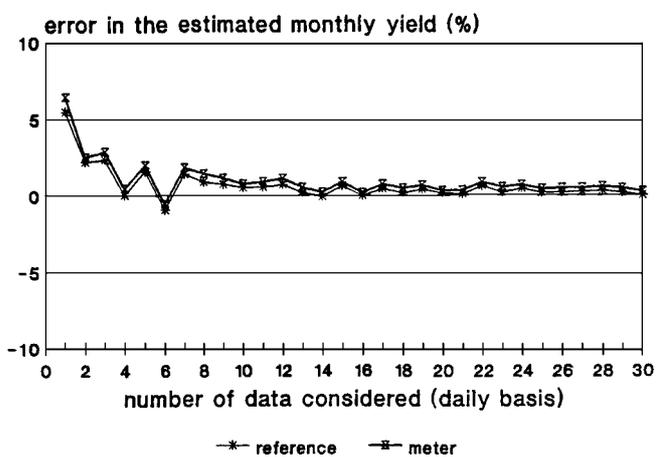*Figure 3. Average daily yield recorded by scales and milkmeters.*

Figure 4. Error in the estimated montly yield (in %) both for scales and milkmeters by using increasing numbers of data (daily basis), taken at regular intervals.
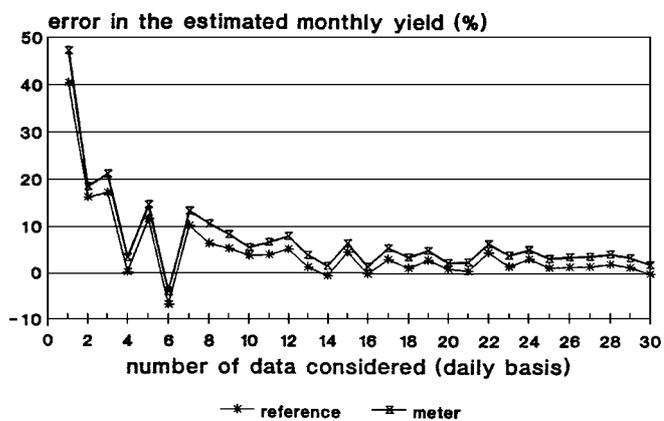

Figure 5. Error in the estimated montly yield (in kg) both for scales and milkmeters by using increasing numbers of data (daily basis), taken at regular intervals.

Discussion

As for real milk yield the analysis of milkmeter errors shows that all electronic milkmeters perform in the same way. That is to say that the mean error being small, some data indicate a considerable random error, which is sometimes as much as 15 %.

If only one daily datum, provided by these instruments, was used for milk recording there would be a risk.

In fact the monthly yield estimate would depend on one datum only with a likely considerable error. On the other hands it should be pointed out that even if the datum concerning the real yield of only one day a month is used, it may entail an estimate of the monthly milk yield, in excess of 5 %.
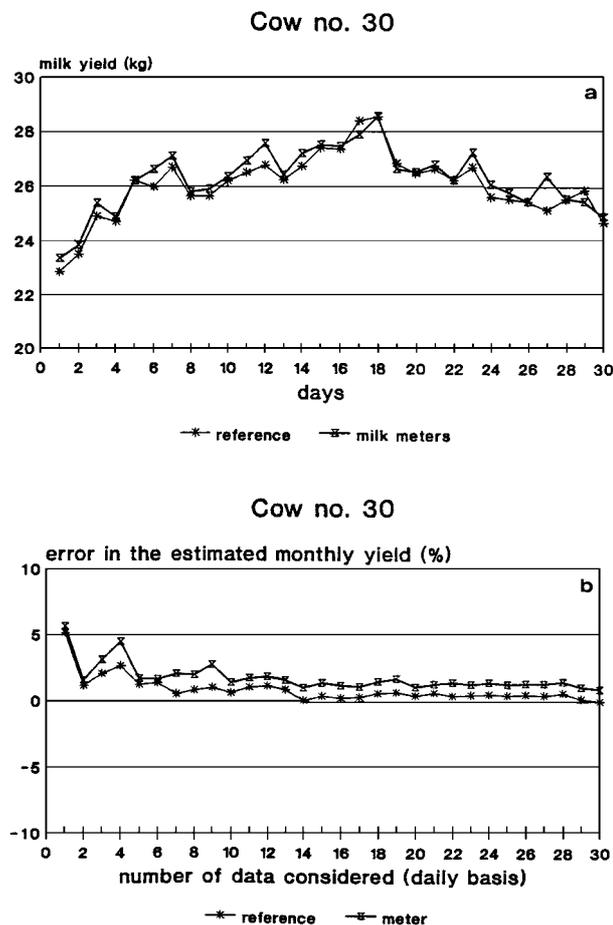
Cow no. 30

Cow no. 30

Figure 6. Cow no. 30.
a) Daily milk yield data recorded from scales and milkmeters
b) Error in the estimated montly yield (in %) both for scale and milkmeters by
 using increasing number of data (daily basis), taken at regular interval.

Cow no. 35

milk yield (kg)

Cow no. 35

error in the estimated monthly yield (%)

Figure 7. Cow no. 35
a) Daily milk yield data recorded from scales and milkmeters
b) Error in the estimated montly yield (in %) both for scale and milkmeters by
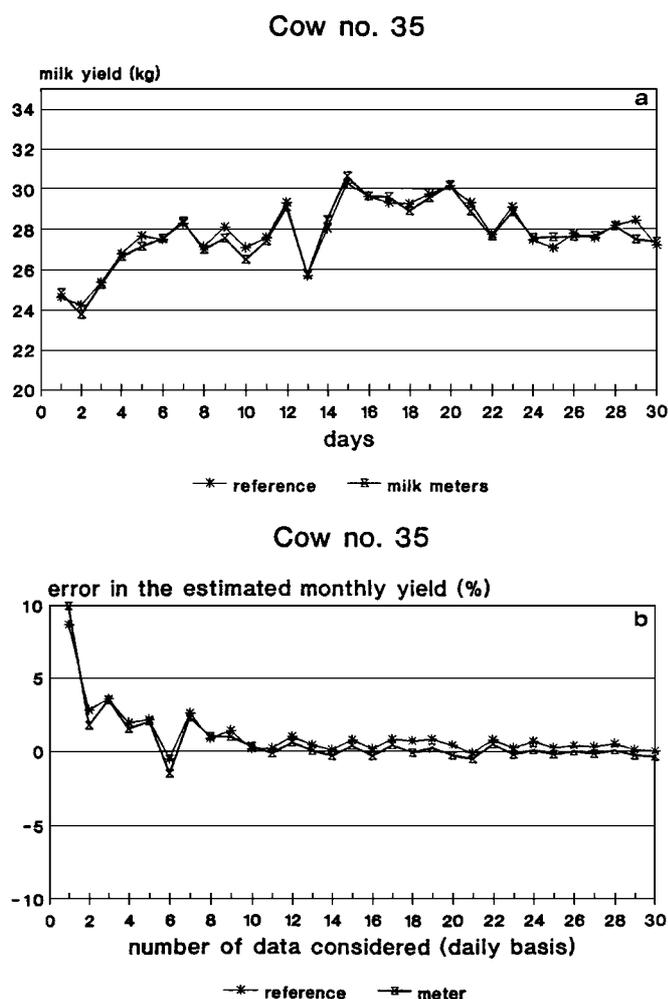*   using increasing number of data (daily basis), taken at regular interval.*

If a greater number of daily data are used it is possible to reduce their errors (less than 1 % for 10 monthly data or more) by taking into account figures provided both by the scales and milkmeters.

Considering the estimate related to each individual cow characterised by different production levels and physiological conditions we can observe:

- from figure 6 that cow n° 30 shows an increase in milk production during the month. With just 4 - 5 daily data it is possible to keep the error below 2.5 %;
- from figure 7 that with cow n° 35, 8 daily data are necessary to keep the error below 2.5 %;
- from figure 8 that with cow n° 37, characterised by an even production curve, also with only one datum is sufficient;
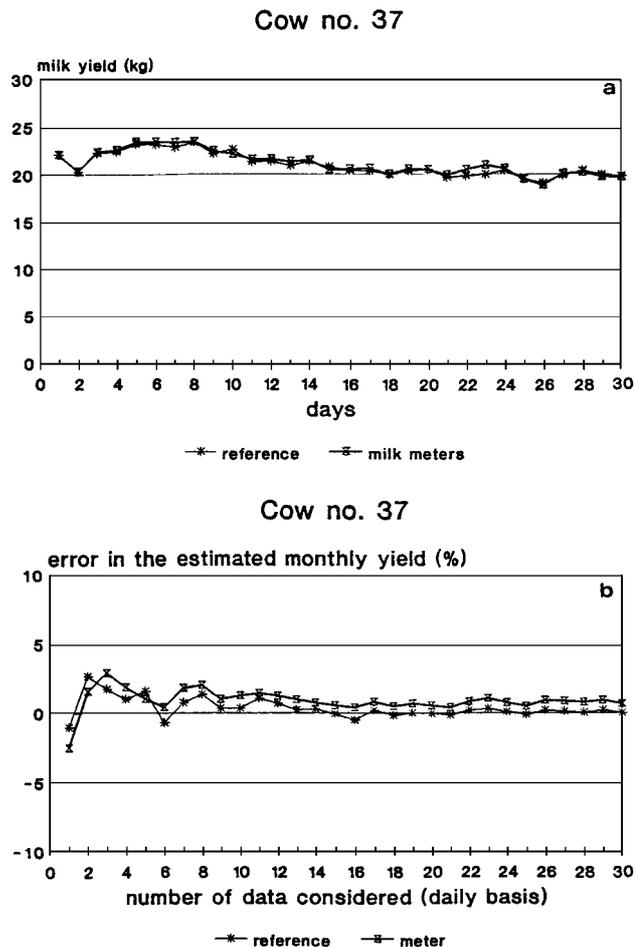
Cow no. 37

Cow no. 37

Figure 8. Cow no. 37
a) Daily milk yield data recorded from scales and milkmeters
b) Error in the estimated montly yield (in %) both for scale and milkmeters by
  using increasing number of data (daily basis), taken at regular interval.

- from figure 9 that with cow n° 52, that shows high variation in milk production due to udder health problems, it is necessary to gather at least 10 daily data.

Conclusions

In conclusion it seems possible to make use of data coming from cows with different production patterns or characterised by considerable random errors (due to e.g. transient currents etc.) obtained from electronic milkmeters, only if a substantial number (>10) of daily data are gathered within the month. Moreover such number of data accounts for any occasional malfuctioning of milkmeters which can occur in their everyday use. In order to achieve this aim, it is necessary to determine what characteristics electronic milkmeters must have and to agree on a

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standardisation of data collecting (e.g. equipment for data trasmission). Due to the variability shown by different cows it is also important that the software should consider the milking pattern of each cow and consequently considers, if not always available, the minimum number of data for each condition.

Daily recording with electronic milkmeters gives a far better estimate of the lactation curve than any other means.
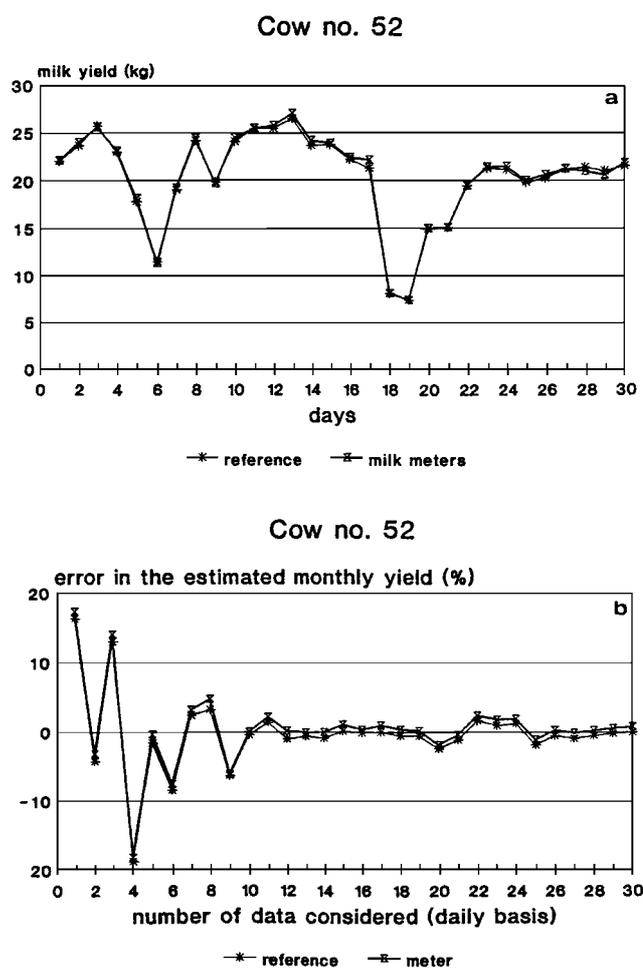
Cow no. 52

Cow no. 52

Figure 9. Cow no. 52
a) Daily milk yield data recorded from scales and milkmeters
b) Error in the estimated montly yield (in %) both for scale and milkmeters by
* using increasing number of data (daily basis), taken at regular interval.*

References

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