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Influence of basic feed ration on animal and milking behaviour with automatic milking

Automatic milking is expected to become very important especially in family dairy farms.

The question of how strongly feeding influences cow and milking performance with automatic milking has up until now been hardly touched upon. This investigation shows that with an increase in feed nutrition value the cow moves less often into the milking area compared with when a low-nutrition ration is fed.

Automatic milking requires that cows voluntarily seek out the milking box several times per day. Here, cows should neither be limited in their natural rhythm nor should the farmer have to round up too many cows and drive them to the milking point. So far, little work has been done on whether, alongside the cow movement system, the feeding regime could have an effect on cow and milking behaviour. Thus the aim of this investigation was to analyse the frequency of cow visits to the preselection point and milking boxes in association with the energy and nutritive content of tested feed rations.

Materials and method

The investigations were conducted in a four-row cubicle house (160 lying and 80 exterior feeding places) with a „Leonardo“ (Westfalia-Landtechnik GmbH) four-box automatic milking plant, preparation box and preselection point. Through the cow traffic system followed, the cows could only enter the feeding area via the preselection point (entitled to milking yes or no) or through the milking boxes. By passing through one of three one-way gates cows could return to the lying area. During the complete trial period

the herd comprised 125 HF cows with average lactation of ~ 8000 kg.

The different components of the analysed feed were identical in both trial periods: silage from maize, grass, and beet pulp plus homegrown concentrate feed. To assess the effects of different energy and protein content in the feed on the cow and milking behaviour the trial was divided into two periods:

- Period A: 104 MJ NEL, 2,300 g CP (21 kg milk), 107 cows, 17 days
- Period B: 117 MJ NEL, 2,650 g CP (25 kg milk), 113 cows, 17 days

Between both trial periods lay a 4-week acclimatisation phase. The additional yield-related concentrate feed was only fed in the milking boxes. Maximum concentrate ration per cow and milking in period A was 3 kg, in period B 2.5 kg. Maximum amounts per cow and day were limited to 7 kg (average consumed 4.8 kg) in period A and 5.5 kg (average consumption 3.5 kg) in period B. Average milk production was 26 kg per cow and day in the first, and 25.1 kg per cow and day in the second period. At the time of the trial the automatic milking system had already been working for more than a year.

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Keywords

Automatic milking system, feed ration, intermilking period

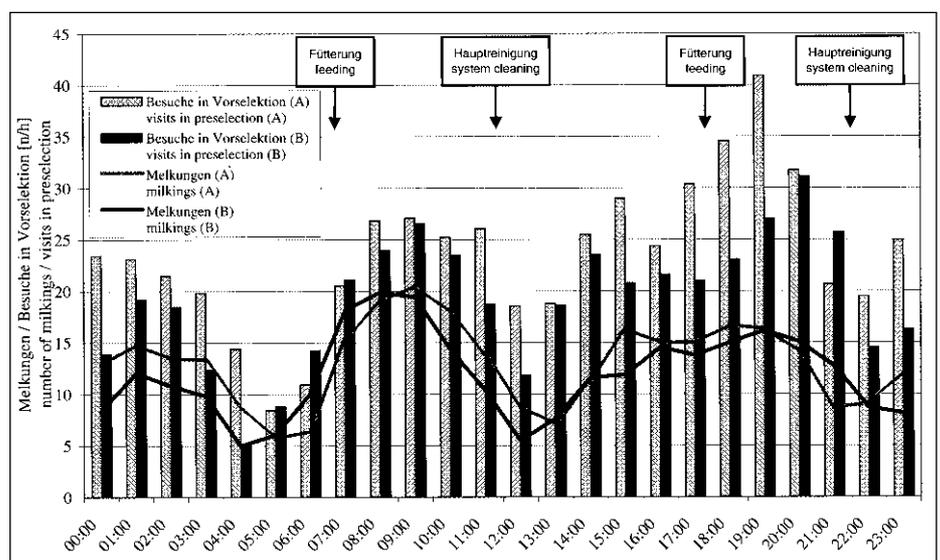


Fig. 1: Distribution of milking times and visits in the preselection point during the day

For describing animal and milking behaviour the number of visits to the preselection point, the number of milkings and the length of the intermilking periods were analysed. To investigate the influence of milking performance the herd was split into three performance groups: group I (<20 kg milk/day), group II (20 to 30 kg milk/day) and group III (>30 kg milk/day).

Results

Figure 1 shows the number of visits to the preselection point and the number of milkings over the day. In both trial periods a greater frequency of visits to the preselection point and milking boxes was determined in the evening as well as in the morning hours with less visit frequency in the early morning (4.00 to 6.00 am). These observations were also confirmed by [1, 3].

An increase in nutritional material in the feed ration (period B) caused a large change in cow visit frequency to the preselection point (figures 1 and 2). While the animals in the first trial period visited the preselection point an average 5.1 times (standard deviation = 2.5), the number of visits in period B dropped to 4.2 (standard deviation = 1.8). Highly significant average differences were determined in all three performance groups (T-test, $p = 0.01$).

In period A an average 2.8 milkings per cow and day were observed. Following the increase in feed energy and nutritional content the daily number of milkings per cow dropped to 2.6 (fig. 2).

The reduced number of milkings had a large influence on the intermilking period lengths and their distribution. In order to achieve a significant rise in milking performance it is important to keep intermilking periods below nine hours; additionally, intermilking periods of over 13 hours have a negative effect on milking performance [2].

In both periods it was clear that the higher milking frequency in performance groups II and III meant an increase in the percentage

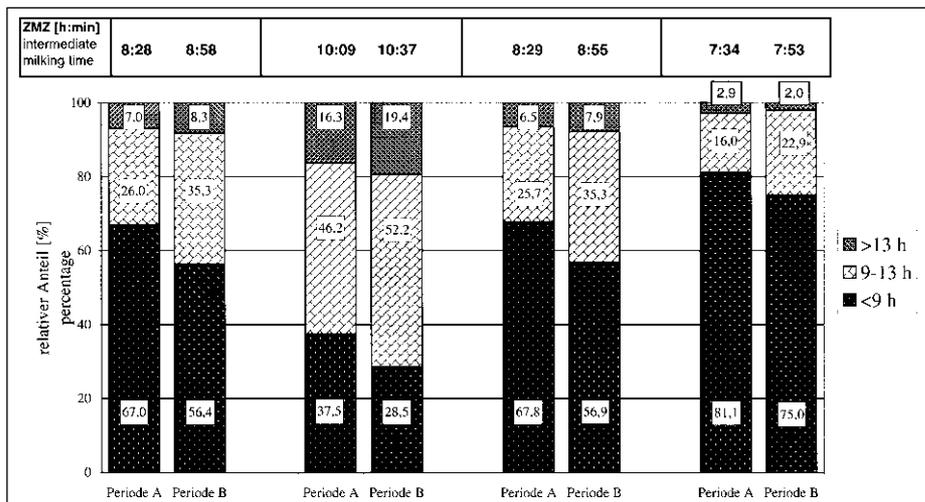


Fig. 3: Average intermilking period and its distribution depending on milk yield

proportion of intermilking periods less than nine hours. In line with increased performance the number of intermilking periods with more than 13 hours decreased (fig. 3).

The average intermilking period of all cows rose on transferring to the ration richer in energy and nutritional content from 8.28 h (period A) to 8.58 h (period B) (fig. 3). In all three performance groups a percentage decrease in milkings with less than nine hours intermilking period was recorded in period B. Meanwhile in period A only 67% of all the milkings lay under the required nine hours intermilking period, this proportion went to 56.4% in period B. Additionally an increase from 7% (period A) to 8.3% was determined in milkings with more than 13 h intermilking period.

The negative influence of the higher-nutrition feed (period B) on the intermilking periods of the cows in performance groups I and II (<30 kg milk/cow/day) was greater than with the cows with more than 30 kg daily production. Average intermilking period in the performance groups I and II increased after changing to the higher-nutrition ration by 30, in performance group III only by 19 min.

Summary

The investigation showed that the energy and nutritional content of feed rations has an influence on cow and milking behaviour. In the case of feed rations with higher nutritional content, and thus less feed being offered in the milking boxes, the cows visited the preselection point and milking boxes less frequently. In order to fully exploit the advantages of the more frequent milkings offered by automatic milking it appears important to give more attention to the components of the feed regarding energy and nutritional material content. Further investigations must clarify how optimum rations for the individual performance groups may be put together.

Literature

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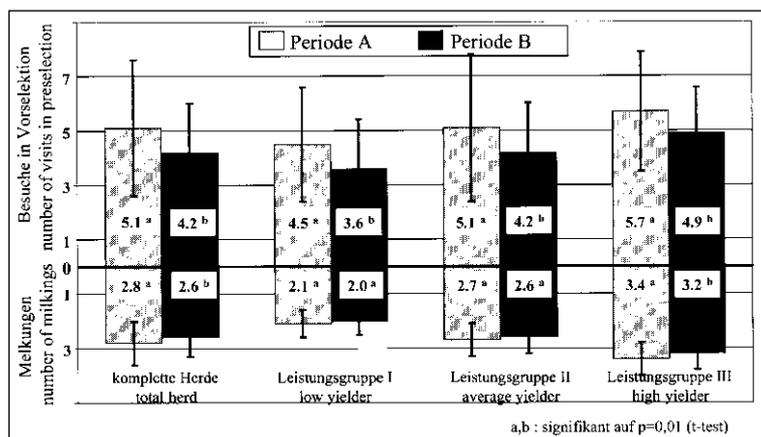


Fig. 2: Number of visits in the preselection point and milkings in association with milk yield