

Cattle traffic management with automatic milking systems

The influence of milking frequency and number of fetched cows

Automatic milking systems are expected to reduce dairy farm labour-input. Fetching cows that don't come voluntarily for milking represents an important proportion of total work. Investigated is whether different forms of cow traffic management affect the number of cows which have to be fetched for milking.

The introduction of automatic milking systems has allowed cows for the first time to follow individual requirements as to when milk takes place throughout the day. This has wide-reaching consequences for animal behaviour and for farm labour organisation. Different forms of cow traffic management are applied towards achieving optimum milking frequency and allowing for higher feed intake. [1, 2, 3, 5]. Cows that don't voluntarily turn-up at milking have to be fetched. The number of fetches is thus an important criterion for evaluation of labour input. Oberdellmann et al. [4] found in their investigation on labour requirements with automatic milking systems that 27% of the total working time was occupied by fetching cows. The aim of the presented report is to investigate the animal and milking behaviour under different cow traffic management forms and to analyse more closely the number of cows that have to be fetched for milking within the variants.

each case through conversion of the passageway between feeding and lying areas:

- Free traffic: unrestricted access to milking box and feeding area
- Simply managed traffic: feeding area only accessible through the milking box
- Selectively managed traffic: access to feeding area through the milking box and two decentral selection gates between lying and feeding areas.

In each case the trials lasted for 12 days and between the individual variants there were normalisation phases of at least six weeks. The decentral selection gates in the variant „selectively managed traffic“ were controlled by the automatic milking system so that a cow was not allowed to move through these gates after being awarded the status „ready for milking“ by the system. A detailed description of the trial can be found in [1].

Milking behaviour

With free traffic, an average 2.3 milkings per cow and day took place. In addition, the milking box was visited by each cow 0.6 times per day without the animals being milked. With simply managed traffic, more milkings (2.6) were achieved per day compared with free traffic, although the cows also visited the milking box without milking taking place more often (1.4 additional visits per day). The milking frequency with selectively managed traffic was the same as that of the simply managed traffic at 2.6 per day.

Investigated traffic systems

The investigations were carried out in a three-row naturally-ventilated house at the State Research Farm Administration Grub featuring a single box automatic system (type „Merlin“ from Lemmer-Fullwood). Average milk production in the 48 – 50 cow Fleckvieh herd used was around 7000 kg/lactation. The cow traffic management systems illustrated in *figure 1* were investigated, whereby all variants were realised in

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Keywords

Automatic milking systems, cow traffic, labour input, milking intervals

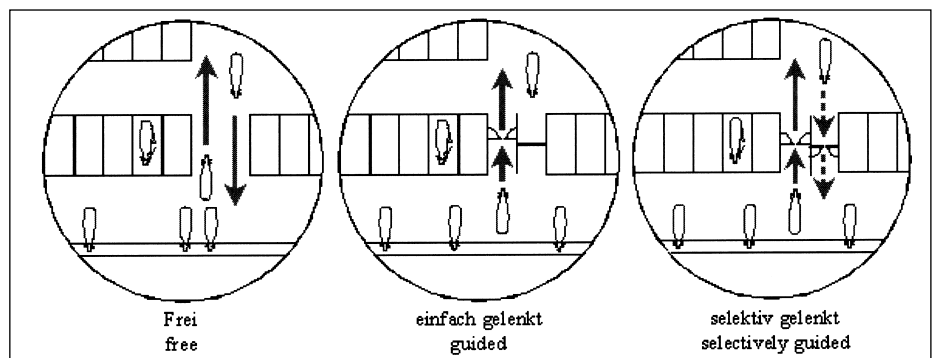


Fig. 1: Investigated forms of cow traffic

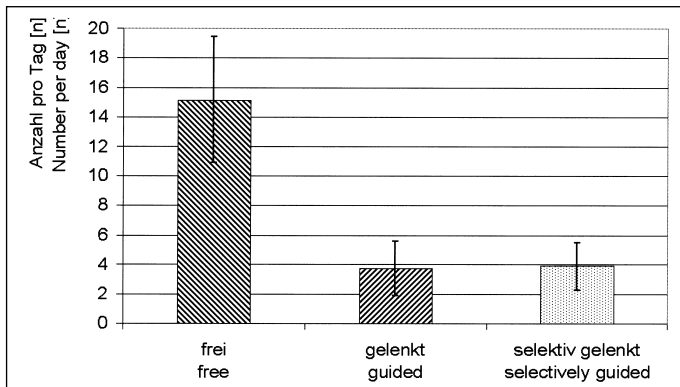


Fig. 2: Fetching-acts per day at different forms of cow traffic

On the other hand the number of non-milking visits was down to almost the same level as the free traffic system.

Analysis of fetched cows

To achieve the frequency of milk here presented, cows had to be fetched at differing frequencies within the trial variants: with free traffic an average of 15.2 times per day ($s = 4.2$), with simply managed only 3.8 ($s = 1.9$) and with selectively managed traffic 3.9 ($s = 1.6$) times per day. The values for both managed forms of traffic were around 75% below that for the free traffic cows (fig. 2).

A more precise investigation of the different fetched animals showed that during the observation period with the free traffic system 37 different animals (around 75% of the herd) had to be fetched. The representative numbers for the simply managed and selectively managed traffic systems were much less, respectively 20 and 16 (around 30 to 40% of the herd (fig. 3, left)). It was shown in all three traffic management forms that a larger proportion of the fetching was caused by a smaller proportion of the herd (fig. 3, right) With the free traffic cows the proportion of fetches not caused by five „problem animals“ (cows needing the most fetching) was, however, substantially over that recor-

ded in both managed traffic forms. Along with the higher number of fetched animals, this indicated that, with free traffic, more cows often had a problem in visiting the milking box voluntarily, and at the right times, compared with both managed traffic systems.

The analysis regarding distribution of between-milking times in the three different traffic management forms showed that, with free traffic, just under 60% of all the cows that had to be fetched had between-milking times of over 16 hours (fig. 4). This had the result that an average 12.7% of the milkers had between-milking times of over 16 hours (fig. 5). With both managed traffic forms, despite much less fetching, substantially lower values could be determined. Thus, with simply managed traffic, 2.9% of the cows had between-milking times of over 16 hours and the figure for selectively managed cows was 2.6%. Looking at the between-milking times of six to 11 hours, it was clear that both managed traffic forms realised higher values here compared with the free traffic cows. This is the area in which the largest proportion of milkings should lie to ensure achievement of an optimum milking frequency for the animals.

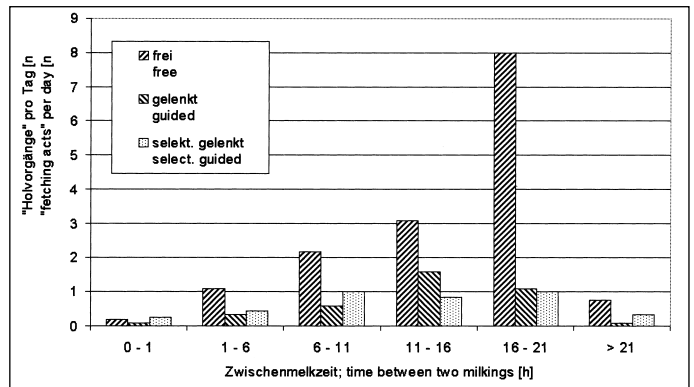


Fig. 4: Distribution of the time between two milkings of the fetched cows

Summary

Three different cow traffic management forms were used to investigate affects on milking frequency, number of milkings, milking performance and cows that had to be fetched.

The proportion of fetched animals in the herd was almost twice as high in free traffic as in the managed traffic systems. The free traffic system returned the lowest milking frequency of the three trials. Analysis of the between-milking times showed that with free traffic 12.7% of all cows first came to milking over 16 hours after the last milking. Here, simple management and selective management returned substantially better performances with 2.9 and 2.6% respectively. In already investigated criteria for evaluation of individual cow traffic management systems (feeding, visiting frequency, system exploitation) [1], the selectively managed traffic system showed itself as advantageous – also from the aspect of milking frequency and number of fetched cows.

Literature

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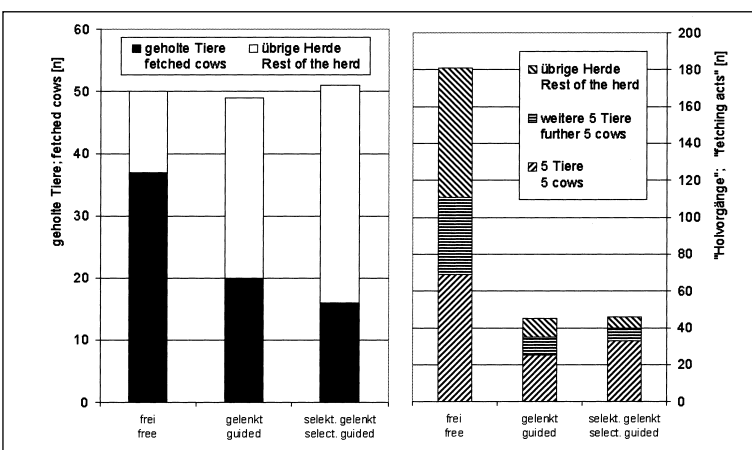


Fig. 3: Fetched cows and distribution of the fetching-acts

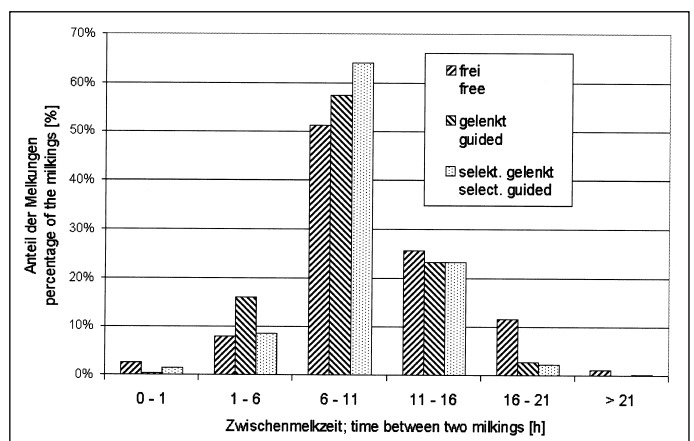


Fig. 5: Distribution of the time between two milkings

CATTLE PRODUCTION

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