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Effects of a forage-pusher fence on feeding behaviour of dairy cattle

Among the problems with forage-pushing fences added during renovation, or the building of, new cattle housing, are the resulting reduced animal:feedplace ratio (TFV), reduced free feed intake, and the level relationship of the feed passage floor and the cattle stance. Investigations were carried out at the FAL whereby animal behaviour and performance of milking cattle in a system with forage-pusher fence (FPF) was recorded and evaluated.

The aim was to discover whether, under the given conditions, the FPF enabled correct feeding of cattle from an animal welfare aspect, and also the identification of conditions allowing this. Only then can the potential work-economical and management advantages be

Alongside livestock performance, characteristics of animal behaviour also play a role in the evaluation of the most different housing designs for cattle. Especially in the evaluation of a reduced animal: feedplace ratio of 2.5:1, such as with FPF, performance parameters such as forage intake and milk production are not enough. Observation of animal behavioural parameters such as wrangling, altered feeding behaviour, length of resting periods, or other characteristics, allow the direct identification of effects. In the following report the assessment focal point lies, therefore, with criteria that reflect animal behaviour.

Animal:feedplace ratio in literature

In [5], a feedplace reduction up to a TFV of 3:1 in the feeding of silage and hay is classified as sufficient because feeding speed and feed intake were not greatly affected. [4] reports that feedplace reduction negatively affected synchronic feed intake.

[1] comes to the conclusion that a TFV of up to 3:1 can be accepted without performance reduction and behavioural effects when buffer feeding is offered and animal ob-

servations carefully carried out. 15 cm crib space per cow is, according to [2], the minimum for a suitable feedplace plan where there's continuous feed access. According to [3], feed intake is reduced when, on a daily average, more than 50% of the feed places are occupied.

Brief trial description

Investigations over two consecutive years compared systems and animal-feedplace variations in cattle housing. In the first comparative investigation, three groups were formed, each with different forage feeding systems including FPF, silage blocks fed manually, and feed mix wagon. The groups, each of 19 cows, changed after 40 days to the respective next system. The FPF group

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Cattle keeping, cow house installations, animal behaviour, animal welfare

Literature details are available from the publishers under LT 00411 or via Internet at <http://www.landwirtschaftsverlag.com/landtech/local/fliteratur.htm>.

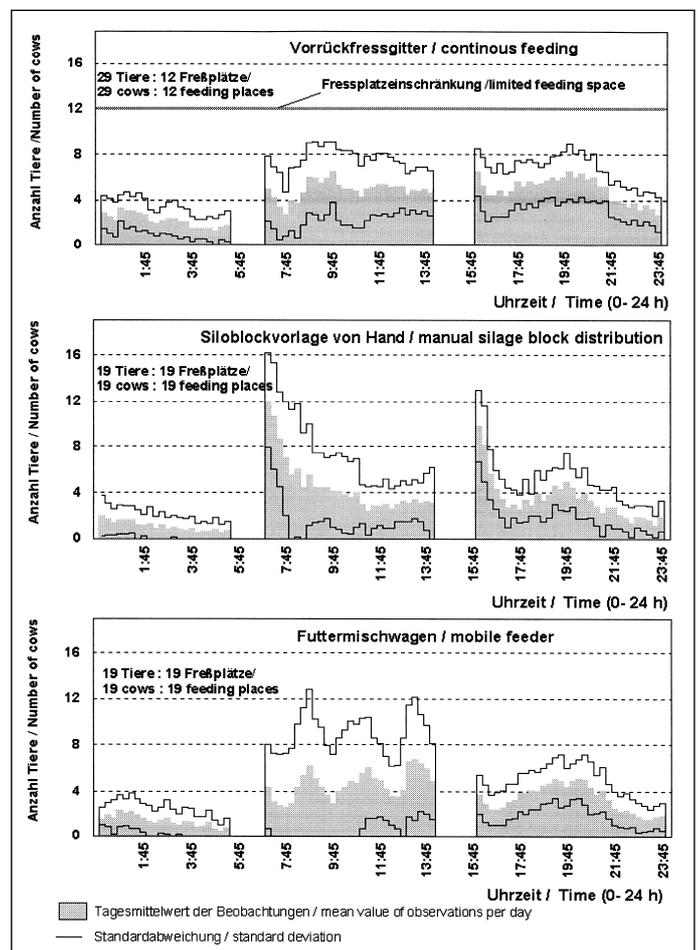


Fig. 1: Presentation of eating behaviour in the average over 24 hours for various feeding technologies

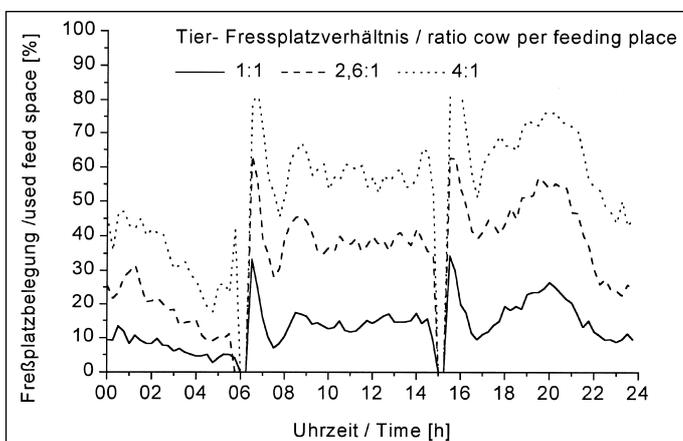


Fig. 2: Utilisation of feeding places for animal-feeding place ratios of 1:1, 2.6:1 and 4:1

was enlarged by 10 cows to realise an animal: feedplace ratio of 2.5:1. In the second trial year, a variation of the animal: feedplace trial comprised the introduction of three ratios (1:1, 1.6:1 and 4:1). These were experienced one after the other by three groups of cows each of 16 animals. The feeding of the groups was the same, and took place under 'FPF conditions'. For recording animal behaviour, a 24-hour direct observation was carried out over six trial days (first trial year) and videos were taken over a longer period and the films evaluated. Direct animal observation took place in the second trial year, in each case for every group after milking and through the evaluation of video films.

Feeding behaviour

For describing the influence of different feeding systems on animal feed intake behaviour, video films made at the feeding area were evaluated for all three groups. The graph (fig. 1) shows the respective occupation rates of the feeding fence as daily average value every 15 minutes for all three feeding systems (FPF, manual silage block and feed wagon) during the first trial year. The average value (grey area) shows characteristic differences for the individual feeding systems. The average value for the FPF ran without larger peaks, values were fairly consistently distributed over the day. The silage block feeding offered an entirely different picture: at time of feed placement after milking the feedplace occupation reached a peak of around 75%. The feed mix wagon system showed three smaller peak values over the day caused by the shoving of remaining feed up to the feeding fence. In the presentation of the FPF, the animal:feedplace ratio of 2.5:1 was also taken account of.

Affects of reduced animal:feedplace relationships

The comparison of the animal groups under variation of the feedplace reductions during the second year indicated that, with an increasing animal:feedplace ratio, the development of the proportion of feeding animals flattened-out a little. Peak value at main fee-

ding times with a TFV of 1:1 were not achieved with the TFVs 2.6:1 and 4:1. In these cases the proportion of feeding cows was around 10% less than TFV 1:1. On average, the proportion of feeding cattle with TFV 1:1 was not higher than 34%; with TFV 2.6:1 this was a maximum 24% and with TFV 4:1, 22%. After the peaks, the number of feeding animals with TFV 2.6:1 and 4:1 did not reduce so strongly as with TFV 1:1. From midnight to morning milking, the feedplace reductions indicated no clear influence. The proportion of feeding animals in the TFV 4:1 lay, during this period, always over the proportion of feeding animals at TFV 1:1. Where the feedplace ratio was reduced to 2.6:1 the proportion of feeding animals between midnight and morning milking was, however, less than with TFV 1:1. On daily average 13.14% in the group TFV 1:1, 12.65% in group TFV 2.6:1 and 13.5% in the group TFV 4:1 were feeding.

If one takes the number of feeding animals in relationship to the available feedplaces, there emerges the following picture: with the exception of the period from 10 pm to 6 am, more than 50% of the feed places were continually occupied in group TFV 4:1. With the group TFV 2.6:1 the 50% limit was exceeded during the three main feeding phases. Based on daily averages, 13.1% of feedplaces were occupied with the group TFV 1:1, 33.7% in group TFV 2.6:1 and 52.6% in group TFV 4:1 (fig. 2).

Aggressive attitudes

In the evaluation of the direct observations it was shown that even with the group TFV 1:1 the major proportion of wrangling took place within the feeding area and at the feeding passage. On the other hand, wrangling was seldom observed in the lying area. The number of wrangling cases in the feeding area doubled on average where the TFV was reduced to the ratio 2.6:1. The wrangling at the feed passage and at the concentrate feeding station was also increased by a small number of cases. Wrangling cases in the other areas hardly changed at all. The average number of wrangling cases per hour at the feeding fence rose from 2.6 with group TFV 1:1 to 12.4

with TFV 4:1. The wrangling at the feed passage was slightly smaller with TFV 4:1 compared with the number with TFV 2.6:1. A statistical review showed, however, that there were no significant differences between the individual TFV groups.

Conclusions

The results of the behaviour observations within the comparison trial (first year) showed that different techniques of feeding influenced the feeding behaviour of dairy cattle without there being a direct effect on animal performance. If one looks at the feeding behaviour in association with the feeding technique in each case, one realises that the evaluation of a system must not only take into account the available number of feed places, but also the way in which the feed is made available. This was made clear in the differences in feeding behaviour between FPF (buffer feeding) and manual silage block feeding, the latter being characterised by occupation peaks at the feed fence. If one looked at the feedplace occupation by reduced animal:feedplace relationship, the high occupation with ratio 4:1 is particularly noticeable. This featured an average daily occupation of 52.6%. Such a reduction should not, therefore, be considered [3]. Aggressive behaviour increased in line with reduced animal:feedplace relationship – also with no effect on the animal performance (second trial year). Even with a feedplace ratio of 1:1, wrangling takes place in the feeding area – although this should never be to such a massive extent as with the ratio 4:1. Based on these results, and assuming that forage feed is continually available and reachable, even a FPF with an animal:feedplace of 2.5:1 can be regarded as acceptable.

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