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Investigation of an automatic brush for dairy cows

Modern loose housing nowadays should offer scratching or rubbing possibilities for dairy cattle. Various types of automatic cattle brushes are commercially available and are increasingly in demand. In this investigation, the welfare aspect of an automatic cow brush is evaluated along with structural suitability and frequency of use in order to estimate possible risks in utilisation with cow housing.

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Keywords

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In the context of the increasing year-round housing of dairy cows, offering the animals a welfare-based natural environment is increasingly important. Alongside critical functional aspects in housing such as cubicles, the feeding area or movement surfaces more attention is being paid to cattle grooming equipment in loose housing design. In the mid-80s automatic cow brushes activated by the animals themselves were developed from the first equipment featuring simple sprung brushes on supports as replacements for the scratching tree out on the pasture. Cow brushes were offered as single or double brush systems, adjustable for use with different-sized animals. A variant newly launched on the market works without revolving brushes and instead offers vibrating brushes fitted at right angles. Compared with fixed-position brushes or brooms, the two vibration variants require no scratching motion by the cow.

An investigation by [1] concluded that with a 100-cow Fleckvieh herd the brushes were used once per day on average by individual cows, and that the animals preferred to be brushed on the back with the trial's double-brush equipment. The competitive behaviour at the machine increased strongly in-line with the growing experience of the cows during the trial. No influence on milking performance could be determined. [2] compared an automatic double-brush machine with a fixed-position grooming system and established a preference for the automatic brush machine by 50% of the animals. Main utilisation period for the brush machine was after each milking and the main feeding times, whereby low-ranking cows, according to [2], were forced to use the evening hours for utilisation, because of a cow feeding place ratio of 2.5:1. [2] determined that a cow-brushing machine for every 20 cows was sufficient.

Own investigations

With the increasing application of automatic cow brushes in the 90s there has been an increase in reports of possible injury risks from the equipment. Not least this aspect, along with a series of other questions such as cow-acceptance or utilisation structure formed the basis of an investigation at the Institute for Farm Technology and Building Research, FAL. Within the framework of diploma research together with the Zoological Institute, Technical University Brunswick, four identical cow-brushing machines were evaluated from the main aspect animal behaviour. The trial took place in four loose housing compartments of the same design (quadrants I to IV) each with a group of 12 animals. The number and size of groups were predetermined because parallel to the investigation of the cow brushes, a trial of different floor surface designs and their effects on hoof health was carried out with the same animals. The cow group members were matched according to age and performance. So that both trials did not influence each other's results, each group had the same type of brushing machine attached at the same point in the movement area to give free access. The movement area for quadrant I + II were solid-floored and that for quadrants III and IV slatted. This trail design prevented an uncontrolled influence on the trial results from movement area and cow group factors.

The cow-brushing machine featured a suspended brush which adjusted for optimum treatment for different sizes of cows. Lifting the brush starts it rotating for a set period. The brushing machine is situated in the movement area of the housing and is accessible from three directions. Continuous video films over two months were evaluated and use of the machine by the individual animals determined. Social ranking within the cow groups was determined by direct observation for evaluation of brushing machine utilisation preferences in context of individual ranking.

Table 1: Intensity of grooming at a cow brush from Feb. 1st to March 31st 2000

Quadrant	I	II	III	IV
Absolute brushing capability	4157	2369	2560	2478
Average brushing frequency day	70	40	44	42
Average brushing frequency day/cow	5,8	3,3	3,6	3,5

Results

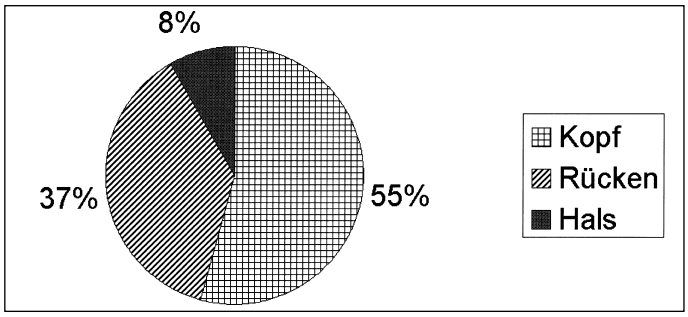
The four automatic brushing machines were quickly accepted by all the milking cows. Even after a single day 79% of the 48 trial animals had used them. After a week at the most, every cow had actively visited a brushing machine for a cleaning procedure at least once. The largest influence on the utilisation frequency of the brushing machines was the individual animal differences within the groups/quadrants. Significant differences in average utilisation of the cow brushes could be determined between quadrants I and II despite the same design and identical flooring of movement areas *(table 1)*. No significant differences were able to be determined between quadrants II, II and IV.

The cows cleaned themselves most intensively especially after milkings, but also in the late hours of the evening. No differences were able to be proved in use of the machines according to social ranking of the cows. The only differences according to rank were the times of utilisation. During the main brushing phase the average number of cleaning actions by dominant cows was double that carried out by low rankers. Once the dominant animals had finished their cleaning procedures, increasing numbers of low rankers then came to the brushing machines. This led to dominant and low ranking cows brushing themselves at lightly staggered times. Preferred body parts for brushing by the machine were the head, followed by neck and back *(fig. 1)*. It was also observed that the brushing machines could be used by two animals simultaneously. From 11564 cleaning procedures 420 featured two cows brushing themselves at the same time. Whilst one cow brushed herself on the head or back, another could also brush her head. Frequently, the brush was repeatedly lifted by one of the animals to re-activate the rotating action.

As there was an awareness of injury risk through tails tangling in the brushing mechanism, this was increasingly watched out for. With 11564 cleaning periods at the machine, there were 43 incidents where a cow tail lay over the brushes during a cleaning operation. But in such cases the brushes continued to revolve freely with no tangling. In each of the 43 cases, the cow tail lay only loosely on the brushes and the safety switch was not activated.

Cow milking performance was continually recorded throughout the trial to estimate any brushing effect. Such an influence could not be determined.

Fig. 1: Relative grooming frequency at the neck, head or back



Summary

Offering cow brushing machines can enrich the environment for cattle, even in modern loose housing. The animals use the equipment intensively

Four cattle groups each of 12 milking cows had its own brushing machine. Direct observations over several weeks at the starting phase of the trial determined the daily routine for the milk cows in the trial accommodation and additionally enabled the investigation of social ranking of trial animals. From two months of video observation, different factors could be investigated for their influence on brushing machine utilisation frequency. The automatic brushing machines were already being used by the majority of the cows within one day. After the first week of the trial, all the cows were actively using the brushing machines with a frequency averaging 3.3 to 5.8 times per day. In total, the 48 milk cows groomed themselves at the new brushing machines 11564 times over the two months. The individual frequency, and the way in which the machines were used, differed from animal to animal. In the course of the day the utilisation frequency was most intense after the two milkings.

Social-ranking of the trial animals had no observable influence on the intensity of use of the brushing machines. The machines were thoroughly utilised by both dominant and low-ranking animals. However, there were rank-linked differences in the times when grooming procedures were carried out.

The automatic brushing machines make it easier for the cows to satisfactorily follow the inborn urge for grooming and thus avoid possible frustrations or behavioural abnormalities caused by boredom in housing which otherwise offers no other stimuli.

Literature

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