Applied Animal Behaviour Science 147 (2013) 28–33

Contents lists available at SciVerse ScienceDirect

Applied Animal Behaviour Science

journal homepage: www.elsevier.com/locate/applanim

The effect of a view to the surroundings and microclimate variables on use of a loafing area in housed dairy cattle

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ARTICLE INFO

Article history:
Accepted 7 April 2013
Available online 29 May 2013

Keywords:
Cattle
Continuous housing
Zero-grazing
Loafing area
Welfare

ABSTRACT

There is concern that cows that are continuously housed year-round may lack the opportunity to express a full range of natural behaviour. Providing these cows with a loafing or exercise area may allow them the space to express a greater behavioural repertoire. Little is known about the factors that affect the use of loafing areas. The aim of this study was to determine whether access to a view across the surroundings, dominance rank of the cow or weather conditions influence the use of a loafing area. Four groups of cows were housed in a cubicle house with an adjoining roofed, concrete floored loafing area, with a view out across adjacent fields. Each group was tested over a period of 16 days with 2 four-day periods in which the cows could see the area beyond the loafing area and two periods when they could not. The dominance rank of each cow was assessed prior to the testing period and weather and climatic conditions were recorded regularly throughout the observation period. Overall, cows spent 14% of the observation period in the loafing area. Low-ranking cows were more often in the loafing area during feeding times than high-ranking cows, with all cows using the area most once feeding was completed ($P < 0.01$). Access to the view did not affect the use of the loafing area. Cows tended to use the loafing area more in sunny weather than in rainy or overcast weather ($P = 0.08$). More cows moved outdoors as the temperature-humidity index rose indoors ($P < 0.001$). On sunny days, high-ranking cows were found occupying places at the edges of the loafing area, rather than central positions ($P < 0.001$). This suggests that a view of the surroundings has little motivational value for cows, but the loafing area might be used to avoid high-ranking animals and for thermoregulation.

1. Introduction

In countries and areas with a cool temperate climate, such as the United Kingdom and Western Europe, dairy cows are traditionally housed during the winter and grazed at pasture during the summer. In recent years, however, continuous housing systems (where animals are kept indoors throughout the year or for their lactating period) have become more prevalent. These systems are more common in parts of North America. This system is much more compatible with automatic milking systems than grazing systems.

There is concern that continuous housing may affect the health and welfare of the cows. Research has largely focussed on effect on foot and leg health (Haskell et al., 2006; Somers et al., 2003; Burow et al., 2012). In addition to health, it is important to consider how continuous housing

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http://dx.doi.org/10.1016/j.applanim.2013.04.016

might other aspects of behaviour and welfare. Housing can reduce the level of social, play and comfort behaviours shown by cattle (Boyle et al., 2008). Providing open areas may allow cows to express these behaviours more easily than in the confined spaces of the internal passageways or allow them to avoid dominant animals. It has also been shown that the opportunity to exercise is beneficial to cow health. In a study by Gustafson (1993), fewer veterinary interventions and treatments were needed in the lactation period when the cows were exercised, in comparison to non-exercised animals. Therefore, if welfare is to be improved in continuous housing systems, provision of open loafing or exercise areas to allow for movement and performance of behaviour may be beneficial.

However, it is not clear under what circumstances and conditions cows are motivated to use loafing areas, or even to move from the housing to the outside. There have been some studies addressing the preference of housing vs. pasture. The choice appears to depend on the previous experience of the animals and the climatic conditions indoors and outdoors. When given a free choice over a long period, cows that have been reared with summer access to pasture preferred to spend most of the day outside in the summer, and most of the day inside during winter (Krohn et al., 1992). Over the course of a 24 h day, cows prefer pasture, mostly at night for lying (Legrand et al., 2009; Charlton et al., 2011b). However, when cows that have been continuously housed throughout their lives are offered a choice between going out into a pasture or staying in the house, they choose to spend much of their time indoors (Charlton et al., 2011a). The use of pasture as a loafing area is not practical for many farmers, and a concrete-based loafing area, adjacent to the housing, may be preferred as they are easier to clean and manage. A study showed that cows are willing to use these areas, but not in the main feeding and lying periods, and when it is not raining. Cows used the area more when grooming brushes were in the area (Haskell et al., 2010).

Further study needs to be done to determine what factors affect the use of a loafing area in dairy cattle. The aim of this experiment was to determine if allowing the animals a view across the surrounding area is an important motivational factor in the use of a loafing area. Wild cattle are a prey species, and so their domesticated descendants may prefer open areas with a clear view (Laundre et al., 2001). Ruminants often prefer open landscape where they can see other individuals from their group (Shrader et al., 2008). The possibility that use of a loafing area is determined by other factors such as social rank and weather conditions was also investigated by relating the dominance status of individual cows to their use of the loafing area at different times of day and relating usage to prevailing weather conditions.

2. Materials and methods

2.1. Animals and housing

The observations took place from April to July (late spring to early summer) at SRUC's Dairy Research Centre in south-west Scotland. Fifty-six healthy, lactating Holstein cows were used. The cows were allocated to four groups of fourteen balanced for age and days in milk. In each group, 12 cows were pregnant and 2 were not, and so the latter were expected to show oestrus behaviour during the test period. For the observations, cows could be identified by their unique freezebrand numbers. As many of the cows were at grass prior to the start of the experiment, the test cows were brought into the house one week before the start of their training and testing periods. Each group had 3 days of training and habituation prior to the start of a 16-day testing period. The four groups were run consecutively. The cows were housed in a section of cubicle house where the number of cubicles exceeded the number of cows (Fig. 1). The cubicles were a standard stall size of 1.10 m wide and 2.10 m long, and were fitted with a rubber mattress with sawdust covering it. The sawdust was cleaned daily and refreshed on a weekly basis. The cows were fed from a post-and strap feed-face. They were fed a total mixed ration delivered in the morning normally between 9:00 and 9:30. The cows were milked three times daily at 07:00, 15:00 and 22:00 h. The passageways were cleaned by automatic scraper.

A concrete-floored loafing area was next to the house. The loafing area was 18 m × 10 m and was entirely covered by a gabled roof, but the sides consisted of supporting pillars and open steel-tube gates, allowing free airflow and an unobstructed view beyond the house. The loafing area was scraped cleaned every 4th day by tractor or by hand. An access road ran around the edge of the loafing area and the house, and beyond this was a post and wire fence that was 9 m from the loafing area. Beyond this were grazing fields which were visible from the housing. The view was unobstructed for about one kilometre. To obscure the view of the cows of these fields in the periods designated by the experimental protocol, screens were erected on the perimeter fence by attaching opaque, finely knitted polyethylene cloth (Secure Covers, Thomas & Fontaine Ltd., Edgton, Craven Arms, Shropshire, UK) to poles secured to the fence-posts. The screens were 210 cm in height and effectively blocked the view of the surrounding areas.

2.2. Experimental design

2.2.1. Training and dominance assessment period

Each group began training three days before the start of testing. During that time, the cows were trained to use the loafing area by moving them out of the house and into the loafing area 5 times each day. On the first day of training, the screen was down. The screen was up for one, and down for the other of the two remaining days of training. The scheduling depended on which treatment (view or no view) the group was starting with, such that the last day of training matched the first day of the trial. Dominance hierarchy assessments were also carried out during the training period. The space available for access to feed was normally 18 m, but during the assessment period it was reduced to 3 m for 1 h after feed was put down. This length of feeder/cow is not representative of what is found on commercial farms, but reducing the space availability for this short period was necessary to induce animals