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Behaviour and Welfare Aspects of Cattle Lameness in Relation to Building Design

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Abstract

Lameness as a welfare problem is discussed in terms of pain, longer term effects on physiology and behaviour. Referring to a previous detailed study by the authors of the behaviour of Friesian cows housed in a commercial farm's cubicle system and other available literature, the importance of careful attention to both building design and to social factors within the herd are stressed. By considering lameness within the context of the five freedoms regarded as essential for the well being of an animal, it is concluded that lameness can have widespread adverse effects on the welfare of that animal.

Introduction

The major part of this symposium concentrates on causation, clinical aspects and economic considerations of lameness. Although this paper is mainly devoted to the importance of building design and behavioural factors, it also considers the question of the magnitude of the effects of lameness on the welfare of the individual animal. It is widely accepted that lameness is a major problem in housed dairy cows. How serious is it for the individual animal? In what ways will it affect the well being of that animal? If welfare is defined as the state of the animal as regards it's attempts to cope with it's environment, how is it best assessed? (Broom 1988).

An animal that is lame might be experiencing severe pain; longer term physiological responses, walking and other movements might be seriously affected; and less obvious but equally important, other behaviours might be disrupted.

Pain

That pain is an integral factor associated with lameness would appear to be self evident truth. However, the assessment of pain is far from simple since as Fraser and Broom (1990) point out, in certain situations it might be wholly disadvantageous for an animal to display signs of pain. For lame cattle, indications of pain are obvious in the changed gait of the animal, and it seems reasonable to assume that the greater this disruption to normal movement is, the more intense the pain is likely to be. The degree of pain, however, remains largely unknown. Various techniques such as measuring the effects of administering analgesics, or even direct recording such as from the sensory

nerves from pain receptors, might provide some information about pain level. Morton and Griffiths (1985) propose that various bodily and behavioural signs can usefully be given scores so that an accumulated score of pain level can be obtained.

Whether such information would help resolve the practical problems of preventing lameness is doubtful, but in the absence of such information, we should err on the side of caution and assume that pain might be severe even when behavioural and clinical signs are limited.

Long Term Indicators of Poor Welfare.

When adverse conditions last for an extended period, other responses occur which necessitate the use of different measures. Poor growth, inadequate reproductive function, poor lactation or maternal behaviour, and high incidence of disease can all indicate poor welfare. Elevated glucocorticoid production, although difficult to interpret, has been shown to be linked with stress in cattle (Ladewig 1984; Dantzer et al, 1983)

.Increased adrenal activity can also have a secondary effect on animals in suppressing the functioning of certain aspects of the immune system (Fraser and Broom 1990). Lameness, therefore, might directly result in an individual being less good at combating disease.

Effects on Behaviour

The most obvious indicator of lameness is clearly its effect on walking. Manson and Leaver (1988) used a system for scoring locomotion as a sensitive method of assessing the prevalence, severity and duration of lameness. However, it is the secondary effects of a reduced ability to walk that are important in welfare terms. These will depend on the environment in which the individual lives. Both the social structure within the group and building design will be important factors to consider.

Importance of Building Design

a) Number of feeding places

In a study of the behaviour of Friesian cows housed in a commercial farm's cubicle system, Potter and Broom (1987) found that many high ranking animals demonstrated a strong preference to fed at a particular section of the feed barrier. Since these preferred sections were often at the far ends of the barrier, it was suggested that this might indicate a mutual repulsion of the most dominant animals. It is possible that all cows might have a preferred feeding area, but higher ranks are better able to maintain their position. Data on individual feeding times in this study showed that low ranking cows spent a slight, but not significantly lower proportion of time feeding. It was concluded that a long feed barrier which allows all cows to fed simultaneously is a feature of good building design.

Metz (1983) reported a dramatic increase in chasing when the number of feed places was reduced. Therefore, if there are insufficient feeding places, due to the highly synchronised behaviour of dairy cows (Benham, 1982; Wierenga, 1983; Potter and Broom, 1987) there are considerable effects on the cows. It is likely,

therefore, that the welfare of cows is poor when they are unable to get to a feeding place because their herd-mates are feeding.

b) Design of passageways

The dimensions of various parts of cubicle systems have been shown to dramatically influence the freedom of movement of cows. For example, Konggaard (1983) saw more contact yielding, turning and waiting if passageways were 1.2m wide than if they were 2m wide. Potter and Broom (1987) demonstrated that when housing system design allows animals to synchronise their activities, the total amount of cattle movement can be very low and also results in a tendency for a one-way flow of cows through passageways. For lame individuals, this means that the total amount of walking is low and the risk of head to head confrontations is reduced.

c) Number of cubicles

An inadequate number of cubicles, such that not all cows can lie down at once, leads to more aggressive interactions and low-ranking animals having to lie in passageways where conditions are dirty and likelihood of disease and injury is high (Kaiser and Lippitz, 1974; Friend et al., 1977; Wierenga, 1987). Potter and Broom (1987) also found that low ranking individuals spent a greater proportion of their total cubicle time standing, and suggested that this demonstrated a dual function for cubicles, (i) as a lying place, (ii) as a zone where effective personal distance is increased by the bars of the cubicle. This was supported by the finding that low ranking cows spent almost three times as much standing in the cubicle passage with head and front legs in a cubicle than did other cows. If space in a housing system is limited, it might be beneficial to increase the number of cubicles at the expense of floor space to provide these safety zones for low ranking animals.

d) Social factors

The effects of house design will not only have profound effects on social behaviour but will interact with factors such as the age structure of the group. and the frequency of movements of animals into the group. Eddy (1989) suggests that the incidence of sole ulcers is particularly high among bought-in heifers because such animals spend more time standing and do not feel confident enough to lie with the rest of the herd. Social mixing has considerable effects on behaviour and milk production (Arave et al, 1974). It can also influence the incidence of lameness. Many injuries to the feet are the result of falls, slips and abrasion on concrete or slatted floors. Such mechanical damage might frequently result from competitive social interactions in which animals engage in pushing contests or when one animal moves rapidly to avoid an aggressor. Considerate herd management and careful housing design therefore, can reduce levels of social stress and competitive interaction. Stress itself can also influence lameness directly, for example, by increasing the susceptibility of cattle to metabolic disorders of the foot (Peterse, 1987)

Conclusion

Welfare must be considered in terms of the state of the individual, and a useful framework when considering it is provided by the five freedoms defined by the Farm Animal Welfare Council (1983). These are, freedom from: hunger and malnutrition, thermal and physical discomfort, injury and disease, suppression of 'normal behaviour', and fear and stress.

Lameness cannot be thought of only in terms of injury and disease. It can influence each of these five freedoms and therefore can have very serious welfare implications for the individual. Attention to both building design and social factors within the herd is vital in both the control of lameness and in reducing its impact on the individual.

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