

BEHAVIOR

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A cow's susceptibility to lameness-producing disease depends to some extent on its environment. The environment of animals kept together in a building is not the same in all ways. For example, the way in which each cow interacts with its social and physical environment influences the duration and location of lying and standing. These individual behavioral responses determine the amount of time a cow's claws are exposed to damaging mechanical forces or to prolonged submersion in slurry. In this section, the effects of housing on the social behavior of dairy cows, its relationship with individual non-interactive behavior, and the relationship between individual time budgets and susceptibility to lameness are considered.

EFFECTS OF HOUSING ON SOCIAL BEHAVIOR OF DAIRY COWS

Modern housing systems for dairy cattle have been designed to make some management procedures

more mechanized and easier to carry out. This is achieved by intensifying the use of space by the animals. These systems have important consequences for the social behavior of the animals. Several studies have compared the behavior of cattle, both when housed and at pasture.^{15, 20, 21, 28, 32, 45} These have shown that the two aspects of behavior that are most disrupted when cows are housed at high density are

- Agonistic behavior
- Social facilitation (behavioral synchrony of the herd)

AGONISTIC BEHAVIOR

Reduced space usually results in resources being more clustered. Aggression thus increases, partly because cows have to compete more for eating and lying places and because a cow's individual space is more

easily invaded.^{37, 44} In a study of 40 cows observed during the winter and summer, the level of aggression in the herd, measured by the mean number of agonistic interactions during the day, was more than four times higher when the cows were housed than when they were at pasture.¹⁶ This finding supports previous results in the literature.^{28, 32, 45} In addition, some management procedures, such as constant altering of the group composition or not providing enough eating and lying places for all the cows, cause increased aggression.⁴⁶

Although groups of cows can be classified as high, medium, and low ranking, according to success in agonistic interactions, the exact social status of each individual is not easy to calculate. Because dairy herds have a large number of individual animals and a low age distribution, they have a high frequency of non-linear dominance relationships—that is, where A dominates B, B dominates C, but C dominates A. The complexity of social relationships is one reason why some characteristics such as age or weight are not always reliable predictors of social status in dairy herds.¹⁵ Individual differences in coping strategies of cattle in a social environment are important in relation to the incidence of lameness and other disease conditions.

SOCIAL FACILITATION

Social facilitation exists when behavior is initiated or increased in rate or frequency when an animal carries out that behavior.¹⁴ It can be measured by the degree of synchronized behavior in a herd (number of cows performing the same behavior at the same time). Social facilitation is an important activity for cattle, which are a very social species. It can affect the rate of individual behaviors such as feeding and resting.¹⁴ Several researchers report less synchrony of behavior when cows are housed than when they are at pasture.^{20, 21, 28, 32, 45} Galindo and Broom¹⁵ found that at pasture, between morning and afternoon milking, approximately 80% to 90% of the individuals showed behavioral synchrony. However, during the

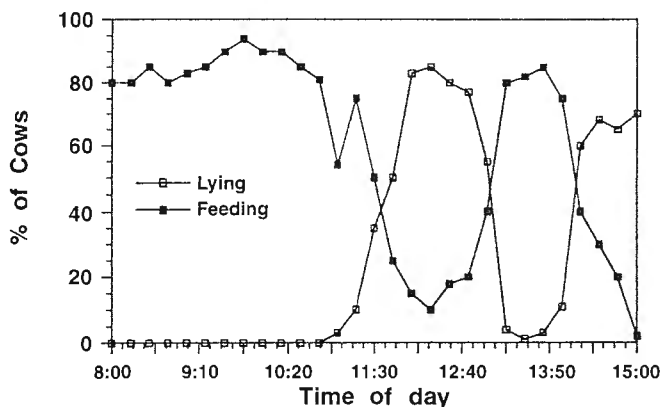


Figure 19-1. The percentage of dairy cows (n = 135) feeding and lying at the same time during the grazing period.

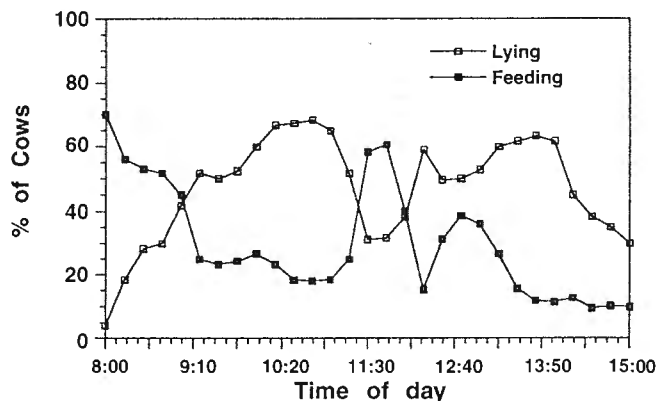


Figure 19-2. The percentage of dairy cows (n = 131) feeding and lying at the same time during the housing period.

same period when housed, only 50% to 60% of the cows showed synchronized behavior (Figs. 19-1 and 19-2).

A loss of synchrony is probably related to the increase in agonistic behavior.²⁸ It is important to know how relevant this is for the behavior of an individual cow.

SOCIAL BEHAVIOR AND INDIVIDUAL TIME BUDGETS

Social status affects individual behavior in cows. When sudden changes in the environment take place—for example, confining the cows, mixing of cows, or introduction of new members into the herd—stable dominance relationships are more difficult to maintain and agonistic interactions increase. Some animals try to adapt to these conditions by avoiding confrontations as much as possible, but not all cows do this. Some individuals are more successful than others and are able to choose feeding or lying places. Others have more difficulty in doing so and have to be active at less favored times, avoid activity when certain dominant animals are active, or tolerate less preferred places.

Galindo and Broom¹⁵ found not only that the mean lying time for cows housed indoors was less than at pasture but also that the individual variation was higher (Table 19-1). A similar observation has also

TABLE 19-1. MEAN TOTAL LYING TIME AND COEFFICIENT OF VARIATION IN LYING TIME INDOORS AND OUTDOORS

Measure	Indoors	Outdoors	P Value
Total lying time (hours/day)	8.5 a	11.1 b	< 0.05
Coefficient of variation in lying time	20.91 a	12.52 b	< 0.01

Values for a and b in the same row are significantly different. From Galindo F, Broom DM: The relationships between social behavior of dairy cows and the occurrence of lameness. Cattle Pract BCVA 1:360-365, 1993.

been reported by Singh and colleagues.³⁷ It is claimed that dairy cows should lie down for 9 to 14 hours, whether at pasture or in free stalls. Lying time is less at the beginning of lactation. Early in the housing period, first-lactation animals lie down for a significantly shorter period (6.25 hours) than adult cows (8.39 hours). This shorter lying time is significantly related to sole lesions. At pasture, on the other hand, first-lactation cows lie down for 9.35 hours and adult cows lie down for 10.20 hours.³⁸

Lame cows at pasture graze for shorter periods and lie down longer than normal cows. Lame cows were found to have lower bite rates than normal cows. They enter the milking parlor later and are significantly more restless while being milked.¹⁸

When relating social rank with some non-interactive behaviors, a positive correlation ($r_s = 0.437$, $P < 0.01$) was found between the index of being displaced from a cubicle and the time spent in walking areas. Low-ranking cows spent significantly longer during the day in walking areas than high-ranking cows (58.8% and 40%, respectively) (Fig. 19-3). Also, low-ranking cows spent significantly longer ($P < 0.01$) standing in occupied or unoccupied cubicles with their hind feet in the passageway. This behavior probably indicates that low-ranking cows use cubicles not just to lie in but also as physical barriers to help avoid confrontations.³⁴

INDIVIDUAL TIME BUDGETS AND LAMENESS

Several researchers have suggested that behavioral factors are of considerable importance in understanding the epidemiological pattern of lameness.^{1, 5, 10, 11, 17, 39, 41} One study found a possible relationship between standing times and the incidence of laminitis in heifers.¹⁰ In this study, the incidence of laminitis was

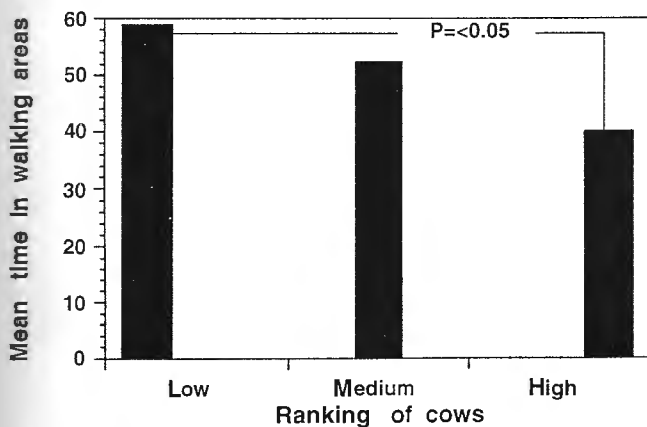


Figure 19-3. The mean time spent in walking areas for the low-, medium-, and high-ranking cows. These cows were ranked according to success in agonistic interactions.

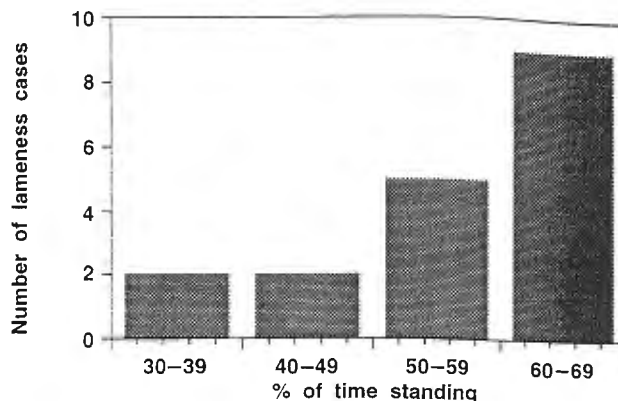


Figure 19-4. The number of cases of lameness according to the percentage of time walking and standing.

reduced considerably when the animals were encouraged to lie down by improving the bedding of cubicles. Singh and colleagues³⁷ found more hemorrhagic changes in the soles of the claws of individuals that spent longer standing, suggesting that these cows were potentially more likely to show lameness.

In one study,¹⁶ the incidence of clinical lameness during 1 year in the group of cows was 42%. A total of 18 cases of infectious and non-infectious lesions was recorded. The animals that stood for longer times during the housing period had a higher incidence of sole and interdigital lesions. Of the 18 cases of lameness recorded, 14 cases (77.8%) developed in cows that spent more than 50% of the time standing (22 cows). In the group of cows that spent less than 50% of the time standing (18 cows), 4 cases of lameness were recorded (Fig. 19-4). The mean index of how much cows were displaced was higher in the group of cows that became lame (54) than in the rest of the herd (45.6). Other factors affecting individual lying times for a short period, such as estrus and stage of lactation, may also affect the likelihood of lameness.

CONCLUSIONS

- When housed, dairy cattle show more aggressive and asynchronous behavior than when at pasture.
- Housed cattle show more individual variation in the time spent lying, and low-ranking cows spent longer in walking areas and with their feet in slurry.
- Cows that have to stand for longer periods are more susceptible to digital lameness.
- In the design of housing systems for dairy cattle, systems that consider social behavior can reduce problems associated with individual adaptive responses and susceptibility to lameness (see p. 300).

vaccinations and dehorning, weighing, artificial insemination, estrus synchronization, pregnancy checking, and other procedures as needed.

- Include provisions for observing animals for signs of heat, injury, and so on and a means of separating an animal from the rest of the group.
- As a general rule, one person should be able to separate and restrain an animal.
- Do not examine or treat dairy animals in the milking parlor.

Each management group must be provided with a method of restraint. The choice of method varies with age or size and the particular housing facility. Options include rope and halter (for smaller animals), individual stanchions, head gates, and gang-lock stanchions. Use these in combination with corrals, chutes, and pens. Provide the capability of lifting individual feet of animals to allow for inspection and treatment of the claws and associated areas (see pp. 127–129).

Provide a loading chute with solid sides for receiving and shipping animals. Provide a holding pen to contain animals before loading.

Give primary consideration to safety in all cases: the safety of the persons handling, examining, and treating the animals and the safety of the animals themselves.

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