## PHYSICAL ENVIRONMENT



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The Jeanne Marchig International Centre for Animal Welfare Education

#### What you will learn: How different production systems impact on welfare of dairy cattle

Welfare considerations related to the housing and husbandry of dairy animals Potential approaches to mitigate housing-related welfare issues Potential opportunities to promote positive animal welfare through improved housing



Freedom of movement is an important aspect of animal welfare as it provides opportunities to control the environment, reduce frustration, and to maintain physical health. For example, cattle with access to pasture have more opportunities to move around freely, lie in more extended positions, graze, and may have improved health, such as less lameness, and fewer reproductive and metabolic issues. The impact on animal welfare of each housing system is highly variable and affected by the quality of the physical environment and management on a specific farm.

## **Tie-stalls for**

# lactating cows



Severe restriction of movement by tethering of adult dairy cattle is still a common practice. Tiestalls offer a competition-free environment that facilitates observation of individual animals and earlier detection of changes (e.g., body condition).

However, tethering limits or prevents dairy cattle from carrying out many of their natural behaviours, such as grazing, self-, and social grooming, other types of social interactions, the ability to lie in all positions (e.g., lying on the side with extended legs, lying with the head supported) in a preferred or chosen location, comfort and social behaviour, and oestrus behaviour. In tie-stall systems, social behaviour within the dairy herd is particularly limited. Cows only have direct contact with their immediate neighbours except at times when they have access to outdoor areas or pasture. Cattle are highly social animals and form a social herd structure based on dominance and lasting preferential bonds. Giving cows regular access to open outdoor areas or bedded packs increases movement opportunity and may improve hoof health, reduce frequency and severity of injuries, and can reduce the occurrence of lameness. Tethered dairy cattle may also show oral stereotypies, likely caused by a combination of restricted movement and feeding behaviour, which may be reversed when the animals are transferred from tie-stalls to pasture or loose housing.



## Free stall housing for lactating cows

Comfortable, quality bedding and flooring are essential in these settings. Poor flooring and inadequate lying space can cause issues with lameness, disease, and mastitis, as well discomfort for cows. Social behaviours in free stall systems can be difficult to manage because of competition for space and resources. Ensuring that there are enough water points, feedbunk space and more cubicles than cows can help reduce competition and fighting. Larger numbers of cows near each other can also negatively affect the formation of social groups, prolonging agonistic behaviours.

## Housing dairy calves

Infancy is one of the most important periods of development for mammals, with the physical and social environment playing a crucial role. In the majority of dairying settings, calves are separated from their dam immediately or very shortly after birth. Once separated from the cow, calves can be housed individually or in groups until they are weaned.

The duration of the stay in individual housing varies 0 to 8 weeks for dairy calves. Some farmers may keep calves in individual pens for a period of 3-7 days, or much longer, after which they are housed in pairs or groups.

Dairy calves that have been separated from the dam will begin interacting with other calves, when given the opportunity, as early as 2 d after birth.



Young dairy calves housed in groups show a preference for a known peer in contrast to an unfamiliar calf, suggesting that they form social connections from a young age. These social relationships that were formed early in life can be long lasting. Individual housing for dairy calves can be either a hutch with a small outside space, an individual crate elevated from the ground with no access to an outdoor space, or a small indoor pen typically with some bedding, (e.g. straw). Systems with no provision of bedding may occur after a certain age. In the outdoor igloos, calves may be exposed to thermal discomfort, either during summer if the area provides no shade or protection from high temperatures, or during the winter when they may be exposed to very low temperatures.

In group pens with a low space allowance, the calves may be motivated,



but unable to perform locomotor play and thus deprived of potential positive emotion while performing play behaviour (see more in: Behavioural Interactions). Pair housing can be a good alternative to individual housing of calves. Rearing calves in same age pairs requires less space than individual housing, which can be used for spacing the pens further apart, and for increasing the living area for each pair to allow greater comfort and encourage play behaviour. Housing calves in pairs, however, requires adjustment to the feeding method to minimize food competition and decrease cross-sucking behaviour (see more in: Behavioural Interactions).

#### Access to shade

### in extensive systems

Dairy cattle are highly motivated to use shade in warm weather. Exposure to summer weather, with no access to shaded areas, affects both the behaviour and physiology of cattle and can impair animal welfare. Increased heat load, caused by a combination of air temperature, relative humidity, air movement, and solar radiation, can initiate many behavioural and physiological responses, including increased core body temperature and respiration rate, and consequently reduce activity, feed intake and milk production in dairy cows. In addition, heat stress can negatively affect breeding performance in dairy cattle by reducing fertility and can, in extreme cases, result in death. The situation can be worse when humidity adds to high temperature.

Cattle that have no access to shaded areas can adopt behavioural strategies, such as increasing the time around the water trough and more time standing in response to heat load, which can help to dissipate heat. However, this may also compromise hoof health and locomotion if these animals are standing around a wet area for long periods of the day, especially in grazing areas.



The effects of heat stress in dairy cows are particularly important in tropical or sub-tropical areas. Heat stress can reduce feed intake, milk production, and reproductive efficiency, leading to economic losses and health problems. Even though temperate areas have milder summers, single hot days or prolonged hot weather can still compromise their welfare.

Pre-weaned calves are particularly vulnerable to thermal extremes. Use of 'igloos' to provide shelter and shade for a group of outdoor managed calves can help to manage exposure, although these structures can get hot in hot weather. Use of 'calf jackets' can be a solution to keeping calves warm in the winter.

#### Access to pasture

Pasture is a natural environment for dairy cattle, but it is common for cows to be housed indoors, if not for the whole year, then at least for the winter months. In other parts of the world, dairy cattle may be housed because of inadequate fencing, risking animals being stolen or lost, or predated upon by wildlife. Indoor housing, such as freestall systems, can allow greater control of feeding, enabling cattle to meet their nutritional demands, which is not always possible at pasture (see more in: Nutrition). However, it prevents them from performing important natural behaviours (i.e. grazing) which can compromise their welfare (see more in: Behavioural Interactions).

Cattle are naturally motivated to access pasture and graze. Access to pasture also allow cows more space and an ability to lie and rest more comfortably, often in full recumbency positions which they cannot achieve in housed systems. Keeping cows on pasture for even a short period of time significantly reduces the occurrence of lameness (see more in: **Health**) and injuries. Pasture access can also result in an improvement in gait particularly if given during the day when cows are more active and motivated to graze.

Cows are more motivated (i.e. prepared to walk longer distances) to access pasture during the night compared with during the day, to have access to a soft surface and space in which to lie, although this also possibly allows them to avoid high temperatures during the day. Night-time access to pasture seems to be important for dairy cows, so one approach to improving cow comfort and welfare could be to allow cows access to pasture during the night, and house them indoors during the daytime with access to a quality feed. This is a particularly suitable option if good fencing infrastructure and climate allow, as cows can access pasture without negatively affecting productivity. Outdoor access can also be provided in the form of an exercise yard or a sheltered bedded pack, which offer many of the advantages of pasture. Overall hoof health is generally improved the more cows have access to comfortable footing such as pasture or bedded areas (see more in: **Health**). Giving cows more freedom of movement and opportunities for exercise also improves hoof health by increasing blood flow to the feet and legs.



Pasture access and pasture condition are important to enhance cow welfare. Muddy conditions might impose constraints on the ability of animals to move and find a comfortable place to lie down and thus can reduce lying times. Lying time is an important welfare indicator in cattle, with higher lying times indicative of a more comfortable lying surface. The effects of reduced lying time can accumulate over time and increase the chance for mastitis and lameness.

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