BEHAVIOURAL INTERACTIONS



THE UNIVERSITY of EDINBURGH The Royal (Dick) School of Veterinary Studies

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 behavioural needs of dairy animals Potential approaches to mitigate behaviour-related welfare issues in dairy animals Potential opportunities to promote positive animal welfare through behavioural interactions

Cow-calf separation

Dairy calves can be separated from their mother within 24 hours after birth. The reason is that by removing calves immediately, calf milk consumption can be controlled, leaving more milk for the producer to sell. Calves are still fed milk, but this is often 'waste' milk that cannot be sold, or milk replacers that are less expensive than fresh milk (see more in: **Nutrition**). Also, very early cowcalf separation is thought to prevent establishment of a strong maternal bond. These bonds become more difficult to break over time and early separation may reduce the acute stress in both cows and calves than if they are separated later.

However, research shows that maternal bonding can occur even within the first few hours (or even minutes) following parturition, so very early separation does not necessarily prevent bond formation. In situations where domesticated cattle are permitted to rear their calves, mothers express a variety of maternal behaviours toward their young such as licking, grooming, nursing, and protecting them from potential predators. Preventing cows from performing these maternal behaviours can lead to frustration. Also, the behavioural response to separation can last several days, during which cows and calves vocalize, show increased activity, reduced play behaviour, and spend more time close to the separation barrier. These behavioural responses increase if cow and calf are kept together for a longer period before separation. Separation from the dam can also induce a pessimistic response bias in a judgement task in calves, a similar response to that induced by disbudding (see more in **Health**). This cognitive bias suggests that calves can experience negative emotional responses to both pain and social loss.

In contrast, keeping cow-calf together can bring other advantages, such as longer-term benefits for calf growth, social interactions and behavioural development, with no consistent evidence for a reduction in milk yield from the cow. Similar benefits in behaviour and cognitive abilities were seen in buffalo calves kept with their dam and allowed to suckle. Some practices may help to reduce the stress response to separation. For instance, allowing the cow-calf pair some continued physical contact, separating cow and calf gradually, or feeding calves more milk after separation. Feeding calves with an alternative source of milk (i.e., bottle or feeder), while with the cow, can allow calves to have more nutritional independence and reduce the behavioural response to separation. These practices are not, however, commonly practiced when 100% separation of cow and calf is the norm.

Cow-calf contact systems which involve keeping cow and calf together after parturition can be challenging, but it is a more natural rearing method not common in intensified dairy farms, although this is gaining attention in many countries. Dam-reared calves are either kept with restricted or full contact with their dam or foster cow and often have access to other calves and adult cows. The length of the rearing period may vary from days to months depending on farm. Calves reared with their dam show less abnormal oral behaviour (e.g., cross suckling) compared with calves housed in groups away from the dams.

Rearing calves with their dam or a foster cow also appears to affect their behaviour later on in life. When mixed into a new group, dam-reared heifers express more submissive behaviours associated with longer duration of feeding and earlier lying activity, compared with heifers that were separated from their dam and fed through an automatic milk feeder. Despite the behavioural and developmental advantages of delaying cow-calf separation, concerns regarding cow health (e.g., transmission of Johne's disease through contact of calves with the faeces of its dam) and impaired milk ejection still exist. But, on dairy farms that are free of Johne's disease and can manage the logistics associated with keeping the dyad together (e.g., suitable enclosures, clean and dry environment), rearing calves with their dam could be an alternative enrichment method to pair housing. An alternative option that favours one side of the calfdam pair is to raise calves with a foster cow, which allow calves to satisfy their suckling motivation and engage in social contact with adult cows and may reduce weaning stress.



Key points to reduce stress during dam-calf separation:

- Separation of cow and calf may be easier in older calves that are less reliant on milk.
- Provide calves with an alternative source of milk when with cows (nutritional independence)
- Gradual weaning off milk or disconnecting separation from weaning of milk (e.g. fenced-line, nose flaps) may reduce the stress responses of calf and cow.
- Maintaining the social group of calves intact after the separation from cow(s) may provide a social buffer.

Sucking behaviour in calves

Sucking on a teat is a highly motivated behaviour for young mammals. Preventing this behaviour can increase the chances of abnormal behaviours (e.g., cross-sucking, tongue-rolling, sucking on or eating non-nutritional objects, etc), stress responses and lead to frustration. Calves have a high motivation to suck in connection with milk intake. The motivation to suck is elicited by the taste of milk, and is reduced by the performance of sucking, but also declines spontaneously around 30 min after milk ingestion, even if calves are not allowed to suck the milk.



In the longer term the motivation is also affected by hunger in that calves on a low milk allowance perform non-nutritive sucking for longer after ingestion of milk (see more in: **Nutrition**). In the absence of a suitable sucking object, individually housed calves may suck pen fixtures, or the head and neck of neighbouring calves. This behaviour is redirected and thus an abnormal behaviour. The inability to suck has also been related to tongue rolling behaviour, a stereotypic behaviour more common at a later age.



Non-nutritive sucking behaviour decreases when milk is provided by a teat compared with no teat (via open buckets or a trough). If calves ingest the milk via an artificial teat and have access to suck the teat after the milk is ingested, they can continue performing non-nutritive sucking, as an outlet for the sucking motivation, avoiding abnormal sucking behaviours.

Key points to prevent abnormal oral behaviour in calves:

- Offer milk via teat/nipple and avoid open buckets.
- Offer adequate milk allowance (20% BW).
- Let calves suck the artificial teat-feeder after the milk is ingested.
- Early separation from dam can increase risk of cross-sucking.
- Favour gradual weaning over abrupt weaning.
- Enriching the environment by adding nonnutritive rubber teats and/or a net filled with a hay bale can also reduce cross-sucking behaviour.

Individual housing

of dairy calves



Social isolation is an animal welfare concern for individually housed calves. Farm animals, including dairy cattle, are often exposed to novel events, such as changes in diet, changes in pen location, regrouping with new social partners, and new milking procedures. Individually reared calves show greater reactivity to environmental novelty compared with socially reared animals. Calves housed individually for the first 3 months of life can be more reactive to environmental and social novelty than group-housed animals. In contrast, early social contact reduces behavioural and physiological reactivity to environmental novelty. Calves provided with social contact show decreased responses to restraint, increased play during the milk feeding phase, and increased competitive success after weaning.



Calves raised in pairs or in small groups of calves are less fearful and more willing to approach unfamiliar calves when mixed after weaning. Socially reared calves were also less afraid of trying new food item than calves reared individually. In small-holder settings, herd sizes can be so small that there may be only one calf reared at a time. While this may a challenge for social interactions, calves in these setting are also more likely to be housed near/with their dam, other conspecifics and in close ongoing proximity to the household, helping them adapt to variation in their environment and novelty.

Play behaviour



Play is a self-rewarding behaviour that releases hormones (endorphins) associated with pleasure that help to alleviate pain, reduce stress and improve welfare. In addition, play behaviour in calves is associated with muscle and brain development, and enhances physical and cognitive skills. Play behaviour in calves is typically seen in a social context either as locomotor play or playfighting. Locomotor play includes jumping, kicking and galloping, often interrupted by sudden halts and continued locomotor play in a new direction, and it does not involve physical contact. Playfighting involves two or more calves pushing and butting while facing each other.

Play behaviour also includes butting and pushing objects, as well as ground play, where the calf rubs the neck and head against the ground while kneeling. Playful mounting is also a type of play behaviour. A lack of motivation to play is a sign of poor welfare because play behaviour is not essential for survival, so young animals will reduce or eliminate play behaviours in unfavourable conditions. Calves that are healthy, well-nourished and in their thermal comfort zone are more motivated to perform play behaviour than calves that are not. In individual housing, the calves may be motivated, but unable to perform locomotor and social play, which is likely to cause frustration. Keeping calves ingroup housing, in spacious group pens that allows the simultaneous performance of locomotor play behaviour by all calves in the group, will give calves the opportunity to perform social play. A daily provision of straw bedding, or novel environmental stimuli may also stimulate calves to play.

Key points to encourage play behaviour in calves:

- Ensure that calves are in good health and comfort, and motivated to play.
- Keep calves in a social and spacious environment, with enrichment if possible.
- Non-slip surfaces will also support play behaviour.
- Adequate feeding and thermal comfort will also motivate calves to play

Grazing behaviour

Dairy cattle allowed access to pasture are sometimes perceived as having higher welfare because the animals have freedom to express natural behaviours, such as grazing and exploration. Cattle are indeed highly motivated to look for food and will forage and consume large amounts of herbage for 6 to 13 hours a day. This feeding time is split into several smaller meals occurring throughout the day, with the largest meals occurring in the early morning and late afternoon.

Feeding diets high in concentrates and low in roughage decreases the amount of feed offered, which considerably reduces the duration of feeding and gut fill. Lactating dairy cows are motivated to orally manipulate (and consume) feed even when their rumens are filled with silage or concentrate feed, which suggests that cattle have a behavioural need to perform foraging behaviour even when metabolically satiated. This conflicts with the natural feeding pattern, where cows will consume greater amounts of less valuable feed. Stereotypic behaviour is not common in dairy cows with freedom to move and fed ad libitum. However, stereotypic behaviours are most often observed after the provision of a concentrated diet with little forage, which, it is suggested, compensates for low gut fill and reduced consummatory behaviour. In addition, cattle that are limit-fed may display oral stereotypies, such as head nodding, tongue rolling, or bar-biting/licking. These stereotypic behaviours are associated with frustration of feeding motivation and possibly hunger, and they are less frequent in cows fed ad libitum. Some nutritional deficiencies, such as for sodium chloride (salt), induce a reflex and subsequently a fixed stereotypic behaviour of licking the pen or random objects.

In mixed farming and subsistence settings, grazing behaviours can create other welfare risks to cows. This includes risks of tick and tsetse born disease, disease risks from intermingling herds, and longer distances to travel for water access, which can put a strain on young, lame, or other vulnerable animals. In these situations, the value of grazing behaviour is still important, and should be balanced with these other potential welfare risks and management of vulnerable individual animals.





Human–Animal

Relationships (HARs)

Dairy cattle rely on humans for almost every aspect of their lives. The interaction with humans is inevitable, and varies between farms depending on management policy, size of the herd, and level of automation on the farm. Dairy cows have daily interactions with stockpeople and these interactions have a significant effect on cows' behaviour and productivity. For instance, the use of negative interactions by stock people (e.g., slaps, pushing, or hitting cows with the hand or an object) will negatively impact milk production and composition (i.e., protein and fat) and increase flight distance from humans.

However, cow welfare can also be affected by other human interactions, not only the intentional negative handling. Several routine husbandry procedures practiced in dairy farms are unpleasant by nature and can be aversive to cows, causing pain and stress. For example, artificial insemination (AI) of cows, disbudding and tagging of calves involve a series of stressful procedures, such as restraint and pain. Following an aversive treatment, dairy cows and calves learn to avoid the specific handler and place associated with the aversive experience. In studies, calves engaged in fewer sucking finger events during blood sampling sessions compared with weighing sessions suggesting that they can distinguish between these two procedures and consider the blood sampling more aversive than weighing.

Negative attitudes towards dairy cows will affect their welfare and can also make animal handling more difficult. Reactive animals will be more dangerous to handle and may take longer to find their way through handling systems or may kick and be harder to milk. Lame cows are in pain and have greater difficulty to walk than animals that are sound (see more in: **Health**).In severe cases, they will need more time to walk to the milking parlour. If stock people think these cows are lazy or are too impatient to allow the cow time to move, they may use negative handling (such as slaps) to make them walk faster. This will increase fear of humans in the cows and can worsen their locomotion score. This cycle can be inverted if stock people recognize that lame cows are in pain and need treatment and more time to be able to walk.



By practicing positive interactions from an early age, dairy farmers can both improve the quality of their relationships with their cows and help their animals to reduce stress responses during aversive experiences. In the case of AI, positive interactions with stockpersons can increase conception rates and induce positive affective states promoting positive welfare on the farm. Positive humananimal relationship were also observed in advanced pregnant Sahiwal heifers, where avoidance distance, behaviour and milk production was improved with good handling.

Key points to encourage positive human-cattle interactions:

- Use a calm voice and avoid shouting or loud noises (clapping) when handling cows and calves, especially during more stressful events, for example during AI, blood sampling, and disbudding.
- Increase positive tactile interactions such as stroking and scratching, brushing cows on their backs and sides, and speak to them in a gentle voice when in the pen.
- Dairy cows are usually docile. Handling cows positively (talking quietly, petting, and touching) increases their opportunities to approach humans and the variety of their interactions with human handler, reducing their fear of humans.

Good dairy cattle

handling practices

Animal handling is necessary and inevitable. Positive handling methods are encouraged as they are more humane and improve welfare, reduce handling time and frustration. Lactating dairy cows are handled daily, sometimes multiple times a day, which gives stockpeople more opportunities to have a closer relationship with these animals. Positive handling requires that the handler moves slowly and calmly without shouting or running and understands cattle behaviour so that proximity and orientation to the animal results in efficient movement. Many factors can affect stress levels during handling including animal breed, temperament, previous handling experience, age, fitness, and quality of the handling facility. These factors need to be taken into consideration when training personnel and improving handling skills.

Key points for good handling cows and calves:

- Keep the paths between the milking parlour and where cows are kept clean and without obstacles and distractions.
- Use back patting or resting the hand on the cow/calf to gently encourage cow movements.
- Proper restraint is important not only for human and animal safety but also facilitates correct application of procedures. Depending on the size of the animal and nature of the procedure, cattle should be safely restrained manually or using a halter, chute, or sedative.
- Restraining cows or calves in halter or chutes should only last for as long as it is required, and this should be done in a safe way for the cow/calf and the handler. The animal should be set free immediately after the procedure is completed.
- Aversive handling is unacceptable. Avoid using loud noises, slapping, punching, tail-twisting, hitting the animals with the hand or a stick, or put pressure on any particularly sensitive part of the body.
- Electric or physical prods must not be used for routine handling. Electrical prods are banned in some countries.
- Good and gentle handling costs nothing but can be rewarding for the cow and handler and improve productivity.
- Person should be given proper animal handling training before engging on a dairy farm



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