

# Reducing Weaning Distress in Dairy Calves

By Kelli Griffin

## Introduction

Dairy calves are typically separated from their mothers at less than one week of age, before being abruptly weaned from milk some weeks later (Budzynska & Weary, in press). This contrasts to the gradual process of milk reduction and increased social interaction with their conspecifics in a natural setting and is a potential source of distress and compromised welfare (Weary *et al.*, 2008; Newberry & Swanson, 2008). Behavioural responses to maternal separation and weaning include high levels of distress vocalisations and activity, which under artificial weaning conditions are viewed as indicators of the compromised psychological state of the calf. Frequency, patterning and vocalisation intensity indicate the strength of drive to reunite (Newberry & Swanson, 2008).

## Discussion

During the past year, several studies have focused on weaning distress of calves in dairy production. In particular, the role of the parent-offspring bond and the development of attachments have been explored as causes of stress during the weaning period. This information has provided an opportunity to tailor management practices to reduce the distress associated with weaning. Newberry and Swanson (2008) suggest that development and maintenance of a maternal bond are critical determinants of the level of distress seen in calves as a result of separation and weaning. Bonding is an essential aspect of calf-rearing in the wild and in extensive production systems. It allows the cow to take responsibility for the protection and nourishment of the calf (Newberry & Swanson, 2007; Keyserlingk & Weary, 2007).

The breaking of strong maternal bonds results in “protest and despair” reinstatement behaviours such as activity (searching) and vocalisation – both of which would under natural conditions be thought to assist the reunion of calf and cow (Newberry & Swanson, 2008). Weary *et al.* (2008) believes these to be a result of “honest signalling”, whereby the need for maternal care determines the level of vocalisations and activity in the calf. This is supported by an observation by Keyserlingk and Weary (2007) that hungrier calves call more and show increased contact with the cow’s udder than better-fed calves. Similarly, a study by Stehulova *et al.* (2008) concluded that the peaks in activity of recently separated calves could be reduced by increasing the frequency of feeding a milk substitute.

Newberry and Swanson (2008) point out the involvement of various hormones in the development of this bond, referring to studies involving “knockout” mice, which implicate oxytocin and endogenous opioids as driving forces behind the calf seeking stimuli from and developing an attachment to its mother. Newberry and Swanson (2008) recommended reducing maternal bonding time (to less than 24 hours prior to separation) and using replacement stimuli at weaning (such as an artificial teat) to decrease calves’ behavioural indicators to stress.

Reinstatement behaviours are not only a result of the nutritional requirements of the calf (Budzynska & Weary, in press; Jasper *et al.*, 2008). Budzynska and Weary (in press) conducted a study into the behavioural responses to weaning from milk using 16 dairy calves (45 days old +/- 5 days). Calves were randomly assigned to either the abrupt removal of the milk-feeding system at day 1 or were given warm water instead of milk in the feeding system for 2 days post weaning. On the third day, no calves had access to the feeder system. The behavioural responses of abruptly weaned calves were significantly increased when compared with the gradually weaned calves. Budzynska and Weary (in press) concluded that maintaining access to the milk-feeding system for 2 days post weaning (filled with warm water instead of milk) was less distressing for the calves.

Budzynska and Weary (in press) proposed that this reduced response was a result of increased satiety due to water intake and due to the social rewards associated with sucking or having access to the milk-feeder system. The calves seemed to be responding to a loss of social rewards (mainly the loss of a surrogate mother in the milk feeder and the action of sucking), with Pavlovian conditioning forging positive associations with the milk-feeding routine (Budzynska & Weary, in press).

This is supported by previous studies such as those by Nelson and Panksepp (1998), who found that endogenous opioids were involved in maternal attachment, sucking and milk ingestion, and Panksepp *et al.* (1978), who demonstrated the role of opiates in reducing separation anxiety in puppies.

Stehulova *et al.* (2008) evaluated the behavioural responses to separation of 46 cow-calf pairs. They randomly allocated each pair to separation at one, four or seven days of age, with or without visual and auditory contact following separation. All calves were given milk twice a day (either via a bottle and teat for the first two to three feeds or via bucket for the duration) and free access to hay and grain. By recording the heart rates, activity and vocalisation levels at set intervals, the researchers found a reduced response to separation immediately following parturition (prior to development of a strong maternal bond at less than 24 hours old). They also showed prolonged and further intensified response in calves that had continuing visual and auditory contact following separation. Stehulova *et al.* (2008) recommended decreasing the time for a maternal bond to develop (to less than 24 hours) and decreasing visual and auditory contact with the cow following separation.

## Conclusion

A calf develops an attachment to the cow, the milk and the routine associated with acquiring milk (Stehulova *et al.*, 2008). Recent studies (described above) point to the process of detachment resulting from a drop in endogenous hormone/opioid concentrations leading to behaviours collectively known as “weaning distress”. As such, the need for management practices to focus on minimising compounding effects of detachment from a number of sources becomes apparent: first, by segregating nutritional and social independence (as is seen currently in milk-fed dairy calves) and second, by identifying sources of attachment (such as the milk as feed versus the milk-feeding routine) so that the detachment elicited produces a minimised drop in concentration of endogenous hormones.

## References

- Budzynska, M., Weary, D.M. (2008) Weaning distress in dairy calves: effects of alternative weaning procedures. *Applied Animal Behaviour Science*. In press.  
DOI:10.1016/j.applanim.2007.08.004.
- Jasper, J., Budzynska, M., Weary, D.M. (2008) Weaning Distress in dairy calves: Acute behavioural responses by limit-fed calves. *Applied Animal Behaviour Science* 110, 136-143.
- Keyserlingk, von M.A.G., Weary, D.M. (2007) Maternal behaviour in cattle. *Hormones and Behaviour* 52, 106-113.
- Nelson, E.E., Panksepp, J. (1998) Brain substrates of infant-mother attachment: contributions of opioids, oxytocin and nor-epinephrine. *Neuroscience and Biobehavioural Reviews* 22, 437-452.
- Newberry, R.C., Swanson, J.C. (2007) Implications of breaking mother-young social bonds. *Applied Animal Behaviour Science* 110, 3-23.
- Panksepp, J., Herman, B., Conner, R., Bishop, P., Scott, J.P. (1978) The biology of social attachments: opiates alleviate separation distress. *Biological Psychiatry* 13, 607-618.

Stehulova, I., Lidfors, L., Spinka, M. (2008) Response of dairy cows and calves to early separation: Effect of calf age and visual and auditory contact after separation. *Applied Animal Behaviour Science* 110, 144-165.

Weary, D.M., Jasper, J., Hotzel, M.J. (2008) Understanding Weaning Distress. *Applied Animal Behaviour Science* 110, 24-41.