

Dairy Cow-Calf Separation and Natural Weaning

Introduction

It is common practice in the dairy industry for cows and calves to be separated shortly after birth, either immediately or within a few days (Passillé *et al.* 2008). This is carried out for the perceived benefits of economic gain, by collecting a higher milk yield for human consumption; better control of calf feed intake with artificial feeding; faster return to oestrus of the dam by avoiding suckling; improved milk let-down in the parlour; reduced distress by removing the calf before the cow-calf bond forms (Flower and Weary 2003) and hygiene, by preventing contact between calves and other adults (Wagenaar and Langhout 2006).

A recent survey of people involved in the dairy industry and those with no involvement found that 9% of respondents were undecided and 48% were against separating dairy calves from the cow within the first few hours after birth (Ventura *et al.* 2013). The practice contrasts with the natural behaviour of free-living cows, which would give birth in an isolated location, keep the calf hidden in undergrowth for 2-10 days, and then rejoin the herd (Flower and Weary 2003). Modern dairy cows still maintain this instinct, and give birth in an enclosed area on commercial farms if given the option (Keyserlingk and Weary 2012). The behaviour protects the calf from predators and allows the cow-calf bond to form without interference from other herd members (Keyserlingk and Weary 2007). At 2 weeks of age the calf would be temporarily left with other calves and watched by one or two herd members (Marchant-Forde *et al.* 2002). The calf would also suckle for several months, becoming largely independent of milk by 6-8 months, spending time apart and socialising with other calves, but maintaining a close bond with the dam. After weaning, males would leave to join a bachelor group and females would stay in the dam's herd and occasionally suckle, even after the birth of another calf (Flower and Weary 2003).

There is a renewed interest in raising calves with cows, following reports of improved health and productivity and a growing interest in ecological milk (Passillé *et al.* 2008) and animal welfare issues (Wagenaar and Langhout 2006, Weary 2012). Mixed suckling-milking systems are also still common in some countries. Suckling until natural weaning maximises welfare and can provide multiple benefits to cows and calves, as well as the producer.

Benefits to Dairy Cows

Health

Cows suckled by their calf have a reduced risk of retaining the foetal membrane post-partum (Flower and Weary 2003). Suckling has other beneficial effects, including reducing the risk of post-calving disease, improving involution of the uterus post-partum; reducing the risk of clinical mastitis by up to 2.5 times, reducing the quantity of residual milk left in the udder (Flower and Weary 2003) and has no negative effects on somatic cell count (Wagenaar and Langhout 2006). Removing the calf has been shown to be stressful to cows (Flower and Weary 2003) and repeated exposure to stressors can damage health. Physiological indicators which show that removing the calf is stressful to cows include an immediate rapid increase in heart rate (Hopster *et al.* 1995, Stehulouá *et al.* 2008), reduction in rumination (Flower and Weary 2003), disturbed sleep (Ruckebusch 1975) and an increase in visible eye white, a sign of stress (Sandem *et al.* 2005). Cows also showed an increased heart rate to recordings of their own and another calf's call played back to them (Marchant-Forde *et al.* 2002).

Behaviour

Legislation in the UK (Animal Welfare Act 2006) states that an animal should be able to exhibit normal behaviour. As described, cows naturally show extensive maternal behaviour, including licking, nursing and protective behaviour and developing a bond which gets stronger over time (Keyserlingk and Weary 2007). Licking is essential post-partum to establish the maternal bond and to reduce the risk of rejection by the dam. Licking continues infrequently throughout lactation and is a common social behaviour, even amongst adults (Keyserlingk and Weary 2007). Early separation of the cow and calf prevents natural maternal and suckling behaviour and can be a cause of poor welfare for both (FAWC 1997).

Five minutes of post-partum contact is sufficient for the maternal bond to form which is strong enough to withstand 12 hours of separation (Keyserlingk and Weary 2007). Behavioural indicators of distress include increased vocalisation and activity, restlessness and sniffing; which naturally would function to reunite the cow and calf (Flower and Weary 2003, Keyserlingk and Weary 2007, Stehulouá *et al.* 2008). This immediate response is seen after separation at birth, but is more intense with later separation as the bond is stronger (Keyserlingk and Weary 2007). Cows separated at 4 days vocalised more, spent less time lying and ruminated less, compared to separation at birth (Lidfors 1996). Cows and calves showed immediate behavioural responses to separation at 6 hours, 1 day and 6 days post-partum; but the distress was strongest after the longer time periods spent together (Weary and Chua 2000). Stehulouá *et al.* (2008) also found that compared to separation at 1 day, later separation increased the responses of standing, putting their head outside the pen, vocalising, sniffing the air and sniffing other animals. The response was also more intense when dams could still see and hear their calf. In addition to time spent together, experience also has an effect, as multiparous cows show a stronger response to separation (Flower and Weary 2003).

It is reported anecdotally that some cows show only a mild response to separation, and therefore are not distressed. The immediate response is commonly low-amplitude calls with the mouth closed, which are not obvious and are designed to help the calf locate its' mother (Hopster *et al.* 1995). After separation, seeing and hearing the calf makes dams become nervous and vocalise more in response to the calf's calls. However, when there is no contact between them, sensory information from the calf is lost and the cow may return to feeding, which was taken to suggest separation is not stressful (Hopster *et al.* 1995). However, this focuses on the immediate response to distress. Cows are naturally a "hider" species, adapted to long periods of separation from their hidden calf while they feed. Therefore there should not be a large response to immediate separation, as it would attract predators (Flower and Weary 2003). Instead the distress occurs later on, when the dam expects to be reunited for suckling but cannot find the calf. Research has supported that the distress is delayed and peaks later, 12-24 hours after separation (Marchant-Forde *et al.* 2002). Flower and Weary (2003) also reported that cows vocalise more 24 hours after separation.

Overall Welfare

The negative effects of separation occur at any stage, as the heart rate of cows increased after separation irrelevant to the calf's age or amount of time spent together (Flower and Weary 2003, Stehulouá *et al.* 2008). Good welfare is comprised of health and physical wellbeing, but also psychological wellbeing and the ability to express natural behaviour (OIE 2011). Rearing the calf until natural weaning simultaneously improves cow health, by reducing the disease risk post-calving; psychological wellbeing, by preventing distress of separation and allowing positive bonding with the calf and natural behaviour, by expressing maternal behaviour.

Benefits to Dairy Calves

Health

Calves are typically licked by the dam for several hours post-partum. This stimulates calf activity and has physiological benefits of stimulating breathing, circulation, urination, defecation and drying (Keyserlingk and Weary 2007). The dam increases calf absorption of colostrum Immunoglobulins (Ig's), essential for passive

immunity in the first 14 days of life (Penn State 2012), because the dam persuades the calf to stand and suckle sooner (Flower and Weary 2003). In the first 24 hours ~30% of calves naturally do not suckle and so need guidance to the teat or supplementary colostrum to ensure adequate intake (Flower and Weary 2003). Separation is also stressful to calves, which could damage their health. A physiological sign which indicates distress caused by separation from the dam is an increase in heart rate (Marchant-Forde *et al.* 2002). Calves' heart rates increase rapidly at separation, a change which lasts longer than calves which are handled only (Stehulouá *et al.* 2008). Suckling the dam reduces bouts of diarrhoea for 3 weeks, improves digestive function, prevents the abnormal behaviour of cross-sucking other calves' navels, as the motivation is satisfied on the dam (Flower and Weary 2003), and improves immunity by exposure to existing pathogens in the herd (Wagenaar and Langhout 2006).

Behaviour

The natural behaviour of calves is to maintain a strong attachment bond with the dam until natural weaning or beyond. This attachment involves suckling, but also maintaining close proximity and social contact (Veissier *et al.* 1990). Calves can recognise their dam 48 hours post-partum, (Marchant-Forde *et al.* 2002), remain attracted to the dam for 3-5 weeks after separation (Veissier *et al.* 1990) and some can recognise the dam 2 years after separation (Wagner *et al.* 2012). Early separation prevents these experiences and reduces their welfare (FAWC 1997). Vocalisation is a behavioural indicator which indicates that separation is stressful (Flower and Weary 2003). When separated by abrupt weaning at several months of age when a strong bond has formed, Zebu-type calves showed increased locomotion, butting, urination and vocalisation and reduced grooming, lying and eating (Solano *et al.* 2007). Suckling, alternatively, induced calmness and reduced anxiety, heart rate, metabolic rate and increased the bonding hormone oxytocin. Rejoining the dam reduced stress and increased suckling and proximity to the dam (Solano *et al.* 2007). Finally, there is also evidence separation distress is also delayed in calves. Marchant-Forde *et al.* (2002) found that calves were silent at separation and showed a mild response, but vocalised most 18 hours later, when they expect the dam to return.

The dam improves future calf social behaviour, as calves become less fearful of other calves and adults, and more sociable (Flower and Weary 2003). Insufficient social contact causes abnormal behaviours and prevents the opportunity to learn social skills. Suckling improves social activity, learning and interaction, which results in more complex social behaviour (Flower and Weary 2003). Calves kept with their dam for 7 days also coped better at the challenge of meeting another calf at 3 weeks, compared to calves separated in 24 hours (Stehulouá *et al.* 2008). There are long-term benefits, as suckled calves show more maternal behaviour to their own calf (Flower and Weary 2003). Calves kept with the dam for 12 weeks were less stressed by integration into the main herd, which typically reduces feeding, grooming, lying and milk yield and increases the stress hormone cortisol (Wagner *et al.* 2012). Mother-reared heifers coped better, showed more self-grooming and were submissive to older cows (Wagner *et al.* 2012). Heifers reared with a foster dam compared to individual-housing were also more socially confident and showed better maternal behaviour (Wagner *et al.* 2012).

Overall Welfare

Welfare is comprised of physical wellbeing, psychological wellbeing and the ability to express natural behaviour (OIE 2011). Allowing calves to remain with the dam until natural weaning simultaneously improves health, by reducing the risk of disease and diarrhoea through improved colostrum intake and licking by the dam; psychological wellbeing, by avoiding the distress of separation and allowing positive bonding experiences with the dam; and natural behavioural expression, by allowing suckling and improving future social behaviour.

Benefits to Producers

Dairy Cow Productivity

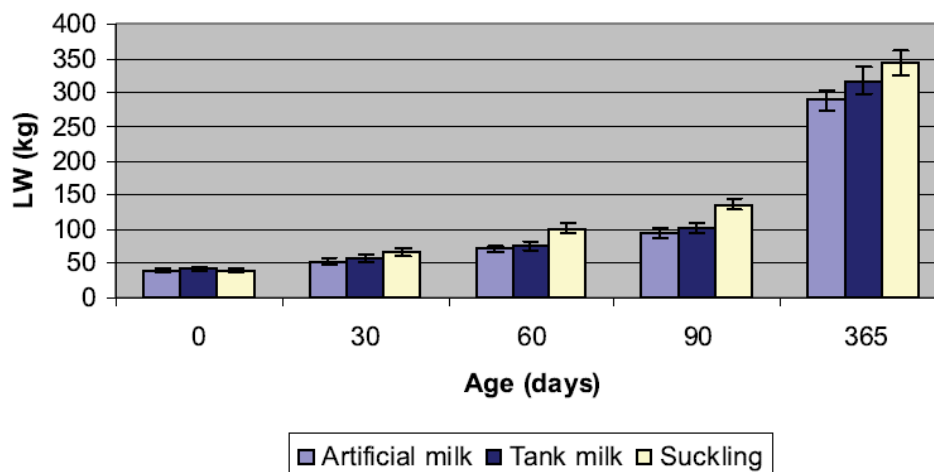
Repeated stress can damage milk production, and separation at 10 days reduced milk production for 5 days afterwards (Metz 1987). Suckled cows do not have a reduced overall milk yield, and produce at least as much milk as separated cows. Suckled cows may have an increased overall milk yield and a higher milk yield as adults if suckled as a calf, but the results are currently ambiguous (Flower and Weary 2003). Milk yield after suckling can rebound at weaning, which depending on the time of weaning could bring the total milk yield over lactation to equal that of separated cows (Passille *et al.* 2008). Cows with restricted suckling (2x/day) had a higher daily milk yield (at least 14% higher) compared to separated cows (Fröberg *et al.* 2007). This was for Holstein-Zebu cows, but has been found in Holsteins too (Bar-Peled *et al.* 1995). The higher milk yield was suggested as being due to frequent emptying of the udder and because the calves had restricted access. Suckled cows, and later their calves, also had reduced mastitis and improved udder health (Fröberg *et al.* 2007).

Suckling *ab-libitum* can reduce oxytocin and prolactin release at milking which can suppress milk ejection at milking, but limiting the frequency of suckling may limit these effects (Passille *et al.* 2008). The reduction in milk yield for human consumption from suckling equals the amount the calf drinks. If the calf drinks 20%, 80% of the normal yield is collected at milking (Passille *et al.* 2008). The calving-conception interval can be shorter in suckling cows, as cows suckled for 10 days had a 66 day interval, compared to 97 days for separated cows (Flower and Weary 2003). Oestrus inhibition was greater in cows continuously with their calves, than those suckled twice a day (Flower and Weary 2003). Finally, maternal care increases through generations of suckling, which provides future benefits to calf health and behaviour (Wagenaar and Langhout 2006).

Dairy Calf Productivity

The main benefit to producers of cow-calf rearing could be improved calf health. Calves with their dam for several weeks have higher daily weight gains and increased health and future productivity (Flower and Weary 2003). Other effects of suckling including a significantly higher daily weight gain despite similar birth weights, which is maintained for up to 16 months (3 times higher with 3x/day suckling vs. individually-housed calves fed 5-10% of bodyweight) (Figure 1, Metz 1987, Flower and Weary 2003, Passille *et al.* 2008); a reduced age of first calving and improved future milk production (Passille *et al.* 2008); a higher potential growth rate and avoiding a growth check at weaning (Wagenaar and Langhout 2006); improved adaptation to solid feed at weaning (Flower and Weary 2003); and a reduction in abnormal licking behaviour and mortality (Fröberg *et al.* 2007). Wagenaar (2009) found rearing method had a significant effect on preweaning growth rate and live weight at 90 day weaning; and suckled calves maintained a higher average live body weight for at least one year (Figure 1).

Figure 1. Live bodyweight (LW) development of calves in different rearing groups over time (Wagenaar 2009, adapted from Wagenaar and Langhout 2007).



Licking cleans the calf which removes birth membranes and helps prevent infection. The calf drinks more frequently, has improved digestion and better milk absorption. Daily weight gains can be >1kg/day. Calves also learn socially from the dam to drink water and eat grass, silage and hay roughage (Wagenaar and Langhout 2006). These benefits to calves through suckling from their mother have been described as an “investment in the future”, by improving the health of the future herd (Wagenaar and Langhout 2006).

Improved Management and Business Ethics

There are potential benefits to management and the business of cow-calf rearing. Management may be easier in some areas, such as avoiding cow-calf separation and reducing labour compared to individually rearing calves. The practice may also be more socially acceptable for consumers, and therefore a sustainable practice for the industry (Weary 2012). It can improve the welfare status of both dairy cows and calves. Finally, producers practicing cow-calf rearing report higher job satisfaction (Wagenaar and Langhout 2006).

Conclusion

Cow-calf rearing until natural weaning provides welfare benefits of health, psychological wellbeing and natural behavioural expression for both the calf and dam. The investment in the future herd of improved calf health may also outweigh the reduction in commercial milk yield. Where not possible, benefits of late separation may outweigh the distress caused, which can be partly mitigated by group housing calves which provides social benefits, and preventing visual and vocal contact with the dam (Flower and Weary 2003).

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