

## **Topic Summary: Cattle Weaning**

Weaning involves removing maternal care by decreasing milk yield and nursing frequency (von Keyserlingk & Weary, 2007). In the beef industry, calves are abruptly separated, forcing sudden and early weaning (Enríquez et al., 2011). Two-stage weaning prevents calves from suckling before they are separated from their mothers using either nose clips or fence lines (Enríquez et al., 2011). Nose clips are fitted in the nostrils to prevent suckling, and fence lines allow cows and calves to stay together without close contact (Enríquez et al., 2011). Weaning is observed by measuring the frequency of walking, laying, eating and vocalizing, using instantaneous sampling (Enríquez et al., 2011).

Milk yield influences weaning stress. Researchers from Ungerfeld et al. (2009) were interested in understanding how a cow's milk yield (high or low) affected their calf's weaning stress. During this study, researchers measured the frequency of grazing, walking, standing and vocalizing, before and after weaning (Ungerfeld et al., 2009). Calves with higher milk yield mothers spent less time grazing/laying and more time walking compared to calves receiving lower milk yield (Ungerfeld et al., 2009). These results suggest receiving a higher milk yield causes greater weaning stress (Ungerfeld et al., 2009).

Sex, age and weight influence stress. Researchers from Stěhulová et al. (2017) were interested in understanding if sex, age and weight influence a calf's weaning stress (Stěhulová et al., 2017). Calf sex, age and weight were recorded and then compared to their frequency of walking and vocalizing during weaning (Stěhulová et al., 2017). Calves that were younger, female, and had higher bodyweight showed more frequent walking and vocalizing (Stěhulová et al., 2017). These findings suggest younger, female calves of higher bodyweight experience higher weaning stress (Stěhulová et al., 2017).

Two-stage weaning using nose clips may influence weaning stress. Researchers from Haley et al. (2005), Enríquez et al. (2010) and Ungerfeld et al. (2016) were interested in understanding if nose clips could decrease weaning stress. In all three studies, researchers measured the frequency of grazing, walking, standing and vocalizing before and after weaning, then compared nose clips to abrupt separation (Haley et al., 2005, Enríquez et al., 2010 and Ungerfeld et al., 2016). In the Haley et al. (2005) and Ungerfeld et al. (2016) experiments, calves weaned with nose clips vocalized/walked less and rested/ate more frequently. Enríquez et al. (2010) found no significant difference between the two methods. These three experiments show conflicting results, suggesting it is unknown if nose clips reduce weaning stress compared to abrupt separation.

Two-stage weaning using fence lines may influence weaning stress. Researchers from Enríquez et al. (2010) and Price et al. (2003) were interested in understanding if using fence lines could decrease calf weaning stress. Both studies measured the frequency of grazing, walking, standing and vocalizing behaviour before and after weaning, then compared fence lines to abrupt separation (Enríquez et al. 2010 and Price et al. 2003). In Price et al. (2003) experiment, calves weaned with fence lines spent less time, vocalization/walking and more time laying/eating. Enríquez et al. (2010) experiment found no significant difference between the two methods. These two experiments contradict one another, suggesting that it is unknown if fence line separation reduces weaning stress compared to abrupt separation.

Analyzing hormones is a proximate way to measure stress. Researchers from Lefcourt & Elsasser (1995) were interested in quantifying calf weaning stress caused by abrupt separation. They analyzed the epinephrine and norepinephrine blood concentrations before and after weaning (Lefcourt & Elsasser, 1995). Norepinephrine and epinephrine increased when calves were separated, suggesting that calves experience more stress when they are abruptly separated (Lefcourt & Elsasser, 1995).

High cortisol may indicate stress. Researchers from Pérez et al. (2017) and Lefcourt & Elsasser (1995) were interested in comparing blood cortisol between calves that were temporarily and abruptly separated to quantify weaning stress. In the Pérez et al. (2017) study, temporary separation caused smaller cortisol increases. Lefcourt and Elsasser (1995) found no significant difference between treatments. The contradicting results of these two studies suggest that it is unknown if two-stage weaning decreases weaning stress.

An area that needs further research is the two-stage weaning methods using fence lines and nose clips. It is unknown if using nose clips and fence lines decreases weaning stress.

## **References**

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