
Inhibition of oxytocin release during repeated milking in unfamiliar surroundings: importance of opioids and adrenal cortex sensitivity

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In practical dairying, cows can be exposed to various emotionally stressful situations. Milking in unfamiliar surroundings can centrally suppress the milk ejection reflex accompanied by increased levels of cortisol and β -endorphin (Bruckmaier *et al.* 1993). Endogenous opioids inhibit OT secretion in response to various stimuli in rats (Bicknell and Leng, 1982). Administration of the opioid antagonist naloxone abolished inhibition of OT release in the rat (Pumford *et al.* 1991), but not in cows during milking in unfamiliar surroundings (Wellnitz *et al.* 1997). Thus the importance of the opioid system in the central inhibition of oxytocin release during milking under stress conditions in dairy cows is still unclear.

The response of the hypothalamic-pituitary-adrenal (HPA) axis to novel stimuli can characterise the individual sensitivity of animals to stress (von Borell and Ladewig, 1992). Possible relationships between reaction of individual cows to novel surroundings and sensitivity of the adrenal cortex to exogenous ACTH could help to explain the mechanisms of central inhibition of OT release.

The aim of this study was to test if the opioid antagonist naloxone has a beneficial effect on normalisation of oxytocin (OT) release during repeated milking of cows in unfamiliar surroundings. Experiments were performed during the usual evening milking time. One control milking without naloxone treatment in all cows was performed in the familiar parlour. For four successive evening milkings cows were transported to and milked in the operating theatre of the research station without (control group) or with naloxone administration (1mg/kg BW) (naloxone group) before milking. After cessation of spontaneous milk flow, but not before three min of milking, vaginal stimulation was applied for 2 min. After milk

flow ceased again 10 IU of OT was injected intravenously to remove the remaining milk including residual milk. Milk flow was recorded continuously and blood samples were collected via jugular vein cannula at 1-min intervals from 1 min before start of milking until i.v. injection of OT. The inhibition of milk ejection and its normalization during repeated milking in unfamiliar surroundings was not influenced by naloxone treatment. Therefore, any role of endogenous opioids in the inhibition of milk ejection in unfamiliar surroundings could not be demonstrated. There were not differences in cortisol release during control milking and all relocations between naloxone and control group.

In addition, the effect of exogenous ACTH₁₋₂₄ (8 IU) i.v. on the release of cortisol related to the response of cows milked in unfamiliar surroundings was studied. Cows with totally inhibited milk ejection in response to vaginal stimulation during milking after first relocation had numerically lower cortisol levels (8.8±3.4 ng/ml; AUC/min) in response to ACTH than cows with at least partial milk ejection (38.7±12.9 ng/ml). Thus animals with higher adrenal response to ACTH seemed to have less severe inhibition of milk ejection.

References

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