Environmental Enrichment and Housing Influence on Stress during Calf Disbudding

Application: Improving the housing conditions of calves and introducing activities to reduce their stress levels during the process of disbudding.

Introduction: Disbudding, an important practice in the dairy industry, often exposes calves to significant pain and stress both during and after the procedure, leading to a variety of behavioural and physiological responses like vocalisations and increased heart rate (Cozzi et al., 2015). Two strategies to potentially mitigate this distress are distraction which is engaging calves in alternative behaviours or interactions to divert their attention from stressors and social buffering. Social buffering is the presence or interaction with peers can reduce the stress responses of an individual, suggesting that the company of fellow calves may alleviate the adverse effects of stressful procedures like disbudding (Bučková et al., 2022). Enrichment is a method for reducing discomfort, unpleasant behaviour, and stress in captive animals. Mentally stimulating environments can powerfully combat stress in calves (Moncek et al., 2004).

Material and methods: This study explored the relationship between environmental enrichment, housing structures and stress indicators in calves. It focused on analysing behaviour and Heart Rate Variability (HRV) during disbudding procedures and health checks. Adopting a 2x2 factorial design, 36 Holstein calves (6-12 days old, 35-50 kg at birth) were categorized into four treatment groups. Each treatment group included either four (group housing) or two (pair housing) calves. GE (group housing with enrichment, 4 calves), GN (group housing, no enrichment, 4 calves), PE (pair housing with enrichment, 2 calves), and PN (pair housing, no enrichment, 2 calves). Calves were transferred to the study area 48-72 hours after birth. It took approximately two weeks to accumulate a group of eight calves for the group housing treatments or four calves for the pair housing treatments. Once these numbers were reached, the calves were then randomly allocated to either enriched or non-enriched conditions within their respective housing groups. Enrichment objects were brush, yoyo, chain and rope toy. Housing dimensions were 190x240 cm2 for pair housing and 380x240 cm2 for group housing. The disbudding procedure used in this study strictly complied to the standard farm management protocols and was conducted by established practices that are routinely implemented on the farm, without any modifications made specifically for this research. At seven week-age, disbudding was conducted using heated iron with anaesthetic. HRV monitoring was conducted on one sample from each treatment group. Out of the total, 12 calves had their HRV monitored with heart rate monitor chest strap during health checks and disbudding. They were systematically observed during three phases: 1 day before the procedure, during the procedure and 1 day afterwards. Behavioural observations from 2-hour CCTV footages were made using a detailed ethogram. A comprehensive examination of calf heart rates and behaviours during the disbudding process revealed variations.

Results: We observed differences across different phases and housing conditions emphasising the significant influence of environmental factors on animal welfare. During the disbudding phases, there were significant behavioural changes in calves. These changes, which were statistically significant (p<0.001) included positive aspects like calves lying together and engaging in social interactions, as well as negative aspects such as calves lying alone or standing in response to the procedure. Furthermore, the heart rate of the calves also exhibited a change. There was a significant increase in heart rate from before the procedure to during the procedure (p<0.05) but this situation changed from during the procedure to after its completion (p<0.001). Analysing the enrichment conditions revealed that calves in non-enriched environments stood more frequently than those in enriched conditions. Additionally, when it came to housing conditions, calves that were pair-housed tended to lie alone for longer durations in comparison to those housed in groups.

Conclusion: To summarize our findings, this study underscores the importance of enrichment for reducing stress associated with disbudding procedures, which is further supported by our observations. The specific changes in behaviour such as significant shifts in how the animals stand and lie down position provide further evidence of the diverse effects of the treatments used.

Acknowledgments: GU was funded by Republic of Turkiye Ministry of National Education.

References:

Bučková, K., Moravcsíková, Á., Šárová, R. et al. (2022) Scientific Reports, 12, 13348 (2022).

Cozzi, G., Gottardo, F., Brscic, M., Contiero, B., Irrgang, N., et al. (2015). Livestock Science, 179, 4-11.

Moncek, F., Duncko, R., Johansson, B. B., & Jezoya, D. (2004). Journal Neuroendocrinology, 16(5), 423-431.