

Pain Management for Dairy Calves:

How Canadian Dairy Research Supports the Code of Practice

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THE UNIVERSITY OF BRITISH COLUMBIA



Over the last 25 years, the University of British Columbia (UBC) Animal Welfare Program has conducted research that has led to the improvement of animal care and welfare in Canada and around the world. Dairy cattle welfare researchers, Dan Weary and Marina (Nina) von Keyserlingk, are key leaders in this program. Through their NSERC Industrial Research Chair (IRC) in Dairy Cattle Welfare, funded in part by the Dairy Farmers of Canada, they have been investigating novel approaches to addressing industry-wide topics, including pain management for disbudding, dehorning, and castration.

What Does the Code Say?

The *Code of Practice for the Care and Handling of Dairy Cattle* (Code)¹ was updated in March of 2023. With this update came revisions to Canada-wide requirements for pain management for painful procedures in dairy cattle. Specifically:

- ➡ Horn buds must be removed by 2 months of age. Note that disbudding of individual cattle may only be delayed past 2 months of age in exceptional circumstances.
- ➡ The use of bands is not an acceptable method of dehorning.
- ➡ Both systemic analgesia (a drug that relieves pain) and local anesthesia (localized freezing) is required for castration and when removing horn buds or horns.
- ➡ If removing extra teats, they must be removed as early as possible using pain control.



Key Takeaways

Regardless of the method used, disbudding, dehorning, and castration are painful practices.

The combined use of a local anesthetic with a non-steroidal anti-inflammatory drug has proven effective at reducing the short- and longer-term pain associated with these procedures.

If not already in place, producers should work with their veterinarian to establish protocols for pain mitigation when disbudding, dehorning, and/or castrating cattle.

In Canada, the proAction[®] program is implemented on all Canadian dairy farms and ensures that program requirements are aligned with the Code.



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While the specific expectation of systemic analgesia and local anesthesia for horn removal is an elevated requirement within the 2023 Code, proAction has had this expectation in place since 2019.



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What Does the Science Say?

Disbudding, dehorning, and castration are common but painful practices that are regularly performed on dairy farms across Canada. These procedures result in both long- and short-term pain in cattle, regardless of the methods used; however, some methods appear to produce greater signs of pain than others.

SO, WHAT ARE THE SIGNS OF PAIN?



Indicators of pain include physiological responses (e.g., increased cortisol levels in blood, heart rate, respiratory rate), changes in food and water intake or weight gain, and behavioural responses (e.g., vocalizations, head shaking, ear flicking, escape behaviours, licking lesions/wounds)².

DOES METHOD MATTER?



Building on previous research, the Weary and von Keyserlingk research team used indicators of pain, such as weight gain, time spent lying down, and licking of lesions to evaluate methods of castration in calves and found that rubber ring castration appeared to be more painful than surgical castration in the weeks following the procedures³.

CAN PAIN BE MANAGED EFFECTIVELY?



Research has demonstrated that with appropriate pain mitigation, the pain associated with disbudding, dehorning, and castration can be significantly reduced.

Using a local anesthetic (LA; e.g., Lidocaine) in combination with a non-steroidal anti-inflammatory drug (NSAID; e.g., Meloxicam) has been shown to be effective at relieving pain during disbudding, dehorning, and castration.

Specifically, scientific evidence shows that compared to just using one drug, or no pain mitigation at all, the use of an LA and NSAID together is best at reducing pain associated with these procedures⁴⁻⁸.

Using an LA and NSAID together:

- ➔ Reduces physiological and behavioral indicators of pain in calves during cauterizing and caustic paste disbudding
- ➔ Reduces both the short-term and longer-term pain associated with disbudding, dehorning, and castration



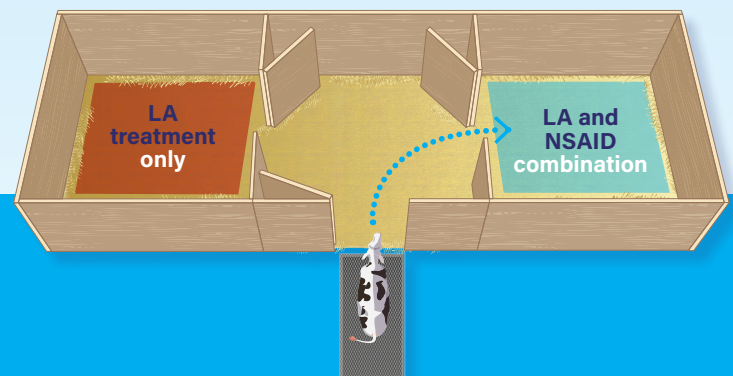
WHAT IS THE IMPACT OF PAIN ON AFFECTIVE STATE IN CALVES?



Past research has demonstrated that pain, and the experience of painful practices, can impact a number of outcomes in dairy cattle. Recent research from Drs. Weary and von Keyserlingk has investigated the impact of painful experiences on affective state (feelings/moods) in dairy calves. In one study⁹, calves had one horn bud removed using only lidocaine (an LA) to mitigate pain, and the other horn bud removed using lidocaine and meloxicam (an NSAID) together. Each procedure was done in a different pen to evaluate if painful procedures might impact calf preferences.

This study showed that calves appeared to prefer the pen in which they received the LA and NSAID combination rather than the pen in which they received the LA treatment alone⁹.

Additional research is needed in this area; however, this study suggests that painful practices in dairy calves may have an impact on affective state.



WHY STUDY AFFECTIVE STATES?



Exploring the impact of painful practices on affective, or emotional, states in calves is important because it contributes to the bigger picture of calf welfare – not just the absence of things like disease, pain, hunger, thirst, and discomfort, but also includes the mental state of the animal.

Research investigating affective states helps to understand how to maximize the positive welfare of dairy animals throughout their lifetime.

How Can Producers Use This Information?

Producers should work closely with their veterinarian to identify pain mitigation strategies that work for your farm and align with the Code.

Where possible, producers should try to identify opportunities to eliminate the need for these procedures.

Where is the Research Headed?

Future research will continue to explore how calves and cows perceive pain, how they react to different methods of disbudding, dehorning, and castration, and differences in various options for pain relief. The Weary and von Keyserlingk research team will specifically investigate concepts, such as the impact of pain on reward loss in calves¹⁰, the impact of post-operative disbudding pain on pessimism in calves¹¹, how memory is affected by pain after disbudding¹², and the effects of a social partner during painful procedures in calves¹³, and pain associated with practices and conditions, such as hoof trimming, lameness, dystocia, diarrhea, and mastitis.

The Bottom Line

- ➔ Disbudding, dehorning, and castration are common practices performed across the globe to improve management of cattle on dairy farms.
- ➔ The pain associated with these procedures must be appropriately managed to support animal welfare.
- ➔ The combined use of an LA and NSAID is proven to be the most effective strategy to minimize pain associated with these procedures
- ➔ Producers should work with their veterinarian to establish a pain mitigation protocol that works for you and your farm.



References:

- National Farm Animal Care Council (NFACC). 2023. Code of Practice for the Care and Handling of Dairy Cattle. Available at: https://www.nfacc.ca/pdfs/codes/dairy/DairyCattle_23_FINAL.pdf.
- Weary, D. M., Niel, L., Flower, F. C., and Fraser, D. 2006. Identifying and preventing pain in animals. *Appl. Anim. Behav. Sci.* 100: 64-76. <https://doi.org/10.1016/j.applanim.2006.04.013>
- Nogues, E., M.A.G. von Keyserlingk, and D.M. Weary. 2021. Pain in the weeks following surgical and rubber ring castration in dairy calves. *J. Dairy Sci.* 104: 12881-12886. <https://doi.org/10.3168/jds.2021-20127>
- Canadian Veterinary Medical Association. 2019. Position statement: Castration of cattle, sheep, and goats. Available at: <https://www.canadianveterinarians.net/policy-and-outreach/position-statements/statements/castration-of-cattle-sheep-and-goats/>
- Stafford K.J., and D. Mellor. 2005. The welfare significance of the castration of cattle: A review. *NZ Vet. J.* 53:271-278. <https://doi.org/10.1080/00480169.2005.36560>
- Stafford K.J., D.J. Mellor, S.E. Todd, R.A. Bruce, and R.N. Ward. 2002. Effects of local anaesthesia or local anaesthesia plus a non-steroidal anti-inflammatory drug on the acute cortisol response of calves to five different methods of castration. *Res. Vet. Sci.* 73:61-70. [https://doi.org/10.1016/S0034-5288\(02\)00045-0](https://doi.org/10.1016/S0034-5288(02)00045-0)
- Coetzee, J.F. 2011. A review of pain assessment techniques and pharmacological approaches to pain relief after bovine castration: Practical implications for cattle production within the United States. *Appl. Anim. Behav. Sci.* 135:192-213. <https://doi.org/10.1016/j.applanim.2011.10.016>
- Faulkner, P.M., and D.M. Weary. 2000. Reducing pain after dehorning in dairy calves. *J. Dairy Sci.* 83:2037-2041. [https://doi.org/10.3168/jds.S0022-0302\(00\)75084-3](https://doi.org/10.3168/jds.S0022-0302(00)75084-3)
- Ede, T., M.A.G. von Keyserlingk, and D.M. Weary. 2019. Assessing the affective component of pain, and the efficacy of pain control, using conditioned place aversion in calves. *Biol. Lett.* 15: 20190642. <https://doi.org/10.1098/rsbl.2019.0642>
- Ede, T., M.A.G. von Keyserlingk, and D.M. Weary. 2023. Exploring the effect of pain on response to reward loss in calves. *Sci. Rep.* 13. <https://doi.org/10.1038/s41598-023-42740-8>
- Neave, H. W., R.R. Daros, J.H.C. Costa, M.A.G. von Keyserlingk, and D.M. Weary. 2013. Pain and pessimism: Dairy calves exhibit negative judgement bias following hot-iron disbudding. *Plos One.* 8 (12). <https://doi.org/10.1371/journal.pone.0080556>
- Yoo, S., M.A.G. von Keyserlingk, and D.M. Weary. 2023. The effects of pain following disbudding on calf memory. *J. Dairy Sci.* 106: 9507-9513. <https://doi.org/10.3168/jds.2023-23604>
- Ede, T., M.A.G. von Keyserlingk, and D.M. Weary. 2020. Social approach and place aversion in relation to conspecific pain in dairy calves. *Plos One.* 15 (5). <https://doi.org/10.1371/journal.pone.0232897>

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