

# Determination for the need for analgesics in day old calves following caustic paste disbudding

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## Introduction

Caustic paste disbudding is practiced on 16.3% of U.S. operations and 32.5% of calves, with a greater percentage usage associated with larger farms. Only 5.6% of operations provide analgesics/anesthetics for caustic paste disbudding heifers (USDA NAHMS, 2018). One standard operating procedure for caustic paste disbudding advises applying paste before calves are 2 days of age, and immediately after feeding to avoid scratching/rubbing behavior. The author of one such protocol is adamant that no anesthetics or analgesics are needed with this protocol (Villarroel, 2011). There is increasing scientific evidence of pain experienced when caustic paste is used and supporting multimodal analgesic protocols in association with this procedure. However, this data was not accumulated on calves < 24 h of age at disbudding. The objective of this study is to examine effects of a multimodal analgesia protocol on nociceptive thresholds, behavior, and physiologic responses when caustic paste is applied to calves < 24 h of age. The following specific objectives were investigated.

**Specific objective 1:** To quantify pain responses associated with caustic paste in the newborn calf, by comparing calf responses when paste is present or absent.

**Specific objective 2:** To quantify pain responses associated with analgesia when calves are disbudded with caustic paste.

## Materials and methods

Seventy-five newborn (< 24 h) Jersey calves from a commercial dairy farm were enrolled in this study, and randomly assigned to one of three disbudding treatment groups:

- Sham Paste (NP): sham paste (petroleum jelly), placebo cornual block and placebo oral bolus
- Paste (PW): caustic paste, placebo cornual block and placebo oral bolus
- Paste with Analgesia (PA): caustic paste, lidocaine cornual block and meloxicam oral bolus at 1 mg/kg

Study animals were raised and housed to meet or exceed the requirements the Animal Care and Use Guidelines and according to the farm's management protocols. The study was approved by ISU's Institutional Animal Care and Use Committee prior to the commencement of the study.

Each morning (T-1 h, 0800), baseline data was collected before placing calves in a pen with videorecording equipment mounted above it to monitor calf behavior. Disbudding treatments were applied at (T0 h, 0900). Ten minutes before disbudding treatment, cornual nerve blocks (or placebo blocks) and meloxicam or placebo treatments were administered.

Post-disbudding data was collected at +4 h, +28 h, +52 h. Data collected included "Play Pen" video, mean nociceptive threshold (MNT), and collection of blood for cortisol concentration determination. Home pen video was collected for the entire period.

The experimental unit in this study is the individual animal. Statistical analysis on MNT and cortisol was completed using repeated measures approaches using commercially available software (JMP Pro v16). MNT measurements were averaged to calculate 1 score for each calf at the different points in time. Cortisol concentration values were log converted prior to data analysis.

## Results

MNT analysis did not find any differences between treatments ( $P > 0.05$ ). Analysis of cortisol data determined an effect of treatment ( $P = 0.003$ ) and time ( $P < 0.001$ ), but no treatment by time interaction. The PA group had lower least square mean (LSM) value (0.91 ng/mL vs 1.07 [NP] and 1.05 [PW]). Over time, cortisol values were lower at T52 h (LSM = 0.84 ng/mL vs 1.05 and 1.14 ng/mL at 4 and 28 h, respectively). Video recordings of calf behavior (head shaking and ear-flicking) and "Playpen" video is being evaluated by a blinded reviewer.

## Significance

In conclusion, we have found supporting evidence that providing analgesia to newborn calves mitigates pain response based on cortisol analysis, although this is not supported with MNT. Video data will be included prior to presentation. Results of this study will help inform best practices for provision of analgesic following paste disbudding in calves < 24 h of age.

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