

# Clinical trial of local anesthetic protocols for acute pain associated with caustic paste disbudding in dairy calves

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## Introduction

Caustic paste disbudding is becoming more commonplace in North America. A large body of work has examined pain control for cautery disbudding and surgical dehorning, but fewer studies have evaluated pain control for caustic paste disbudding, and results conflict regarding benefits of local anesthesia. In humans, the pain associated with a caustic, chemical burn can differ in nature, duration, and intensity compared to a thermal burn. The objective of this clinical trial was to evaluate the effects of either a lidocaine cornual nerve block or a topical anesthetic incorporated into caustic paste on the acute pain of caustic paste disbudding.

## Materials and Methods

Seventy-two Holstein-Friesian calves housed in groups with an automated milk feeder were enrolled into 18 replicates balanced on age and assigned to one of four treatments: sham (S), placebo paste and a saline cornual block; topical (T), a novel caustic paste containing lidocaine and prilocaine, and a saline cornual block; cornual block (B), commercial caustic paste and a lidocaine cornual nerve block; and positive (P), commercial caustic paste and a saline cornual block. All calves received 0.5 mg/kg meloxicam SC at the time of the block. Researchers were blinded to treatment group. Primary outcomes were validated pain behavior responses (head rub, head shake, ear flick, foot stamp, and tail swish) and pain sensitivity measured by algometry. Secondary outcomes consisted of respiratory and heart rate, latency to approach the evaluator, play behavior, feeding behavior, and standing and lying bout characteristics. Data were analyzed using linear, Poisson, and negative binomial regression models.

## Results

Cornual-blocked calves had less pain sensitivity at 60, 120, and 180 minutes after disbudding compared with all other groups ( $P < 0.001$ ); T and P calves had more pain sensitivity than S calves for the same time period ( $P < 0.05$ ). Compared to T and P calves, B and S calves had fewer pain behaviors at 15, 30, 45 ( $P < 0.001$ ), and 60 ( $P < 0.05$ ) minutes post-disbudding. S and B calves also had decreased respiratory rates at 15, 30, and 45 minutes ( $P < 0.05$ ) and decreased heart rates at 60 and 120 minutes ( $P < 0.05$ ). S calves mean latency to drink from the automated feeder on re-entry to the group pen was not statistically different from B calves (S,  $16 \pm 4$  minutes; B,  $40 \pm 16$  minutes), but did tend to be longer than T ( $58 \pm 22$  minutes) or P ( $60 \pm 17$  minutes) calves ( $P < 0.10$ ). S calves exhibited more play behavior than all other groups on re-entry to the group pen ( $P < 0.001$ ).

## Significance

Caustic paste appears to be acutely painful for at least 180 minutes, and this is reduced by a cornual nerve block but not by our novel paste. Because caustic paste may result in a different pain experience than cautery, use of a variety of metrics assessing affective state, physiologic responses, and normal behaviors such as feeding and lying, should be included into future trials in order to help assess the welfare of calves disbudded by this method. We recommend that calves disbudded with caustic paste receive local anesthetic with a cornual nerve block as well as an NSAID to mitigate acute pain.