

Characterization of efficacy and animal safety across four caprine disbudding methodologies: heat cautery, clove oil injection, short-term application of caustic paste, and freezing

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Introduction

Caprine disbudding is commonly performed for safety considerations or as a requirement by show organizations. Heat-cautery disbudding is typically performed by producers without adjunct anesthesia or analgesia and is both painful to the animal and aversive to the producer. Although it currently provides the most common compromise between welfare, efficacy, and production constraints, there is demand for a stand-alone disbudding option that improves welfare in the absence of adjunct anesthesia and is both technically straightforward and reliable. The objective of this study was to evaluate efficacy and animal safety for 3 alternative caprine disbudding methods (clove oil injection, 1-hour application of caustic paste, or freezing) against sham-disbudded and heat-cautery controls.

Materials and Methods

In this study 65 Alpine and Saanen commercial dairy buck kids (approximately 1 week of age or less) were randomly assigned to 1 of 6 treatment groups: SHAM disbudding with a room temperature disbudding iron; HEAT-cautery with a narrow-edge commercial butane disbudding iron; 0.2 mL injection of CLOVE oil into the center of the horn bud; 1-hour application of commercial caustic PASTE; 40s FREEZE with a liquid-nitrogen immersed disbudding iron; and 10s flooding with a commercial CRYOGEN. Horn bud volume was estimated with an impression mold at the time of disbudding. Disbudding efficacy was characterized by complete absence of horn growth from the horn bud 45 days after disbudding. Horn bud tissue scores and key health events were monitored for 45 days and the width and height of the horn or scur was measured with calipers at the final assessment. All CLOVE subjects and fatalities were euthanized at the end of the experiment and necropsied. A 1-tailed Fisher's Exact test was used to compare frequency of disbudding efficacy and complications, and a 1-tailed Student's T distribution was used to evaluate the total resulting horn or scur volume.

Results

HEAT was more effective than PASTE (91% and 54.5% success, respectively, $P < 0.05$) and both were superior to

SHAM and all other experimental methods ($P < 0.0001$). Disbudding failure with HEAT or PASTE was associated with larger horn and efficacy of PASTE was reduced when cornified tissue was present at the time of disbudding. CLOVE resulted in 91% scurs and 9% normal horns, although it was not more effective than SHAM in preventing any growth of horned tissue it did result in 47% less horn volume at 45 days post-treatment ($P < 0.005$). HEAT resulted in fewer scurs (9%) than PASTE (27%) and CLOVE ($P < 0.05$). HEAT resulted in more superficial infections at the disbudding site (64%, $P < 0.005$) than SHAM, but did not cause any serious complications. Fatal complications occurred in 4 out of the 11 CLOVE animals, significantly more than other treatment groups ($P = 0.045$), and evidence of suppurative meningitis, dural abscess, or complete defect in the calvarium was observed post-mortem in 3 additional CLOVE kids. One additional CLOVE kid demonstrated severe orbital swelling 1 day after injection which progressed to necrosis of the upper eyelid margin and 3 kids demonstrated transient flaccid paresis and paralysis immediately after injection. There was no difference in efficacy or disbudding-related complications between CRYO, FREEZE, and SHAM.

Significance

Based on the high frequency of scur formation and unacceptable complications observed in this study, serious concerns are raised about the use of clove oil injection for caprine disbudding. Further research is needed to identify potential associations with technique and/or study population before CLOVE can be recommended. Heat cautery was the best performing method and least sensitive to horn bud volume at the time of disbudding. The relatively high number of superficial infections observed in this study supports research to identify and mitigate risk factors. Short-term application of caustic paste was effective, but more prone to failure than heat cautery in the presence of cornified tissue. Both methods of freezing were ineffective.