Disbudding practices: Present and future

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Outline

Current practices  Considerations for best practice  Future practices
Disbudding vs dehorning

<8 weeks of age

>8 weeks of age

Adapted from Meat and Livestock Australia 2007
Poll question 1

Which method do you use for disbudding?
More than 9 in 10 dairies disbud or dehorn

2007
70%
9%
45%

2014
70%
16%
30%

2007 and 2014 NAHMS surveys
Poll question 2

What age do you disbud at?
Week 0

4

8

12

PASTE
Hot-iron and caustic paste disbudding occur between 3 to 4 days sooner than a decade ago.

2007 and 2014 NAHMS surveys
Poll question 3

What pain management do you use?
% operations using pain relief

<table>
<thead>
<tr>
<th>Year</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>2007</td>
<td>14%</td>
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<td>2007</td>
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<td>2014</td>
<td>6%</td>
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2007 and 2014 NAHMS Surveys
Stakeholder attitudes

- 83% of producers think pain relief should be provided for disbudding.
- 92% of vets think pain relief should be provided for disbudding.
- 92% of the public think pain relief should be provided for disbudding.

Robbins et al. 2015
2019:
Bovine vets endorse pain relief as “standard of care”
Version 4 standards effective January 2020

<table>
<thead>
<tr>
<th>Mandatory corrective action</th>
<th>Continuous Improvement Plan</th>
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<tbody>
<tr>
<td>• Calves disbudded before 8 weeks of age</td>
<td>• Pain mitigation is expected to be used when disbudding calves for any method</td>
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<td>• It is expected that the producer work with their veterinarian to determine appropriate pain mitigation for disbudding</td>
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Considerations for best practice

• Which method should we use?
• What age should we do it at?
• What pain relief should we give?
Considerations for best practice

• Which method should we use?
• What age should we do it at?
• What pain relief should we give?
Hot-iron and caustic paste methods cause third-degree burns.
Which method should we use?

44 studies

9 studies
Which method should we use?

44 studies

9 studies
In the hours after disbudding

• Stress hormones
• Heart rate
• Wound-directed behaviors
  • Head shakes
  • Head rubs
  • Ear flicks

This response is reduced with painkillers

• Play
Wounds take 9 weeks to heal

Week 1

Week 2

Week 3

Week 4-8

Week 4-8

Week 9

Adcock and Tucker 2018
Is pain present during healing?

Evoked
Are wounds painful when touched?

Ongoing
Are wounds painful even when they are not being touched?
How long does the pain last?

Evoked
Are wounds painful when touched?
How do we measure evoked pain?
Calves with wounds are more responsive to touch than when tissue is healed.
Evoked
Are wounds painful when touched?

Ongoing
Are wounds painful even when they are not being touched?
Ruminating
Ruminating

For 2 weeks after disbudding
Suckling
Suckling

For at least 3 weeks after disbudding
Do disbudded calves seek pain relief?

Lidocaine + Saline

Adcock and Tucker 2020
Disbudded calves choose pain relief more than non-disbudded calves

Lidocaine-associated nipple/board

Saline-associated nipple/board

Adcock and Tucker 2020
Summary: Hot-iron

Wounds take 9 weeks to heal and are painful throughout this time
Which method should we use?

44 studies

9 studies
Caustic paste
Improper use
Concerns about paste in social housing
To avoid paste transfer to other body parts or animals:

• Nickel-sized amount
• Under 1 week of age
• Keep calf dry for 24 h
• Isolate calf for 24 h
• Optional: duct tape over bud
In the hours after disbudding

- Stress hormones
- Heart rate
- Wound-directed behaviors
  - Head shakes
  - Head rubs
  - Ear flicks

This response is reduced with painkillers

- Play
Healing and long-term pain

- Lack of research
- Anecdotally, wounds take 6 to 10 weeks to heal

In goat kids, burns are present for at least 6 weeks after paste application

Day 1  Day 2  Day 7  Week 6

Hempstead et al 2018
Summary: Caustic paste

Caustic paste is painful for at least 3 h, but longer-term effects are unknown
Caustic paste is perceived as less painful by producers and veterinarians.
% operations using pain relief

2014 NAHMS surveys

- 30% in 2014
- 6% in 2014
Hot-iron vs caustic paste

Morisse et al 1995
Lower stress response after hot-iron, but procedures were done at different ages

Vickers et al 2005
Calves disbudded with a hot iron shook their head more in first 4 h compared to paste

More research needed
Considerations for best practice

• Which method should we use?
  • Hot-iron or caustic paste is appropriate

• What age should we do it at?

• What pain relief should we give?
Considerations for best practice

• Which method should we use?
  • Hot-iron or caustic paste is appropriate

• What age should we do it at?

• What pain relief should we give?
Is younger better?

It is widely believed that newborns feel less pain, but no research supports this claim.

In 2009, 60% of babies did not receive pain relief for painful procedures.
Is younger better?

Babies feel pain 'like adults'

The brains of babies 'light up' in a very similar way to adults when exposed to the same painful stimulus, a pioneering Oxford University brain scanning study has discovered. It suggests that babies experience pain much like adults.
Calves experience pain no matter how young they are, and pain control is needed at all ages.

Caray et al 2015; Adcock and Tucker 2018; Casoni et al 2019
Painful experiences near birth can increase pain sensitivity into adulthood

McCracken et al., 2010  Beggs et al., 2012  Taddio et al., 1997
Is younger better?

• Disbudding newborns could result in disbudding hornless animals

• Risk of horn regrowth/scurs if bud isn’t properly identified
Considerations for best practice

• Which method should we use?
  • Hot-iron or caustic paste is appropriate

• What age should we do it at?
  • < 8 weeks to avoid more invasive procedure, but no evidence that disbudding near birth is better for welfare

• What pain relief should we give?
Considerations for best practice

• Which method should we use?
  • Hot-iron or caustic paste is appropriate

• What age should we do it at?
  • < 8 weeks to avoid more invasive procedure, but no evidence that disbudding near birth is better for welfare

• What pain relief should we give?
Cornual nerve block
Numbs the horn bud for 2-3 h

NSAID
Reduces inflammation in the hours after the procedure

Numbing cream/gel is not an effective substitute

Greatest reduction in signs of pain
2% lidocaine hydrochloride

20-gauge 1-inch needle

12 ml syringe
How to give a cornual nerve block

Step 1: Draw 10 ml lidocaine
How to give a cornual nerve block

Step 2: Locate injection site
How to give a cornual nerve block

Step 3: Insert needle
How to give a cornual nerve block

Step 4: Inject 5 ml on each side
How to give a cornual nerve block

Step 5: Clip hair to locate bud
How to give a cornual nerve block

Step 6: Check for numbness with pinprick test
Cornual nerve block

Numb the horn bud for 2-3 h

NSAID

Reduces inflammation in the hours after the procedure

Topical anesthesia is not an effective substitute

Greatest reduction in signs of pain
Time course of NSAIDs varies from <1 h to 50 h

- Flunixin IV
- Ketoprofen IV, IM
- Meloxicam IV, SC, oral
- Carprofen IV, SC
Flunixin (Banamine®) is only FDA-approved NSAID for cattle

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<tr>
<th>Intravenous</th>
<th>Transdermal</th>
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<td>Approved for fever from BRD</td>
<td>Approved for pain from foot rot</td>
</tr>
<tr>
<td>Extra-label use as an analgesic</td>
<td>Does not control disbudding pain when given alone</td>
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Meloxicam is the NSAID of choice

• Long-acting

• Easy to administer as oral tablets

• Most researched

• Extra-label use
Giving oral meloxicam

Step 1: Add tablets to capsule (1 mg/kg)
Giving oral meloxicam

Step 2: Place capsule in balling gun
Giving oral meloxicam

Step 3: Insert capsule in throat
Sedatives

• Reduces handling stress
• Does not provide pain relief
Disbudding with a hot iron
Optional: flick out bud
Considerations for best practice

• Which method should we use?
  • Hot-iron or caustic paste is appropriate

• What age should we do it at?
  • < 8 weeks to avoid more invasive procedure, but no evidence that disbudding near birth is better for welfare

• What pain relief should we give?
  • Cornual nerve block and meloxicam
  • Optional: sedative
What about pain during healing?

• Available drugs only control pain for the first day after disbudding

• Alternatives
Alternative methods are ineffective

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<th>Scur/horn growth</th>
<th>Clove oil</th>
<th>Cryosurgery</th>
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<td></td>
<td>67%</td>
<td>100%</td>
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Sutherland et al. 2019
Breeding polled (hornless) animals

- Naturally occurring
- Niche market... but growing
- Sire quality/lack of availability main reason for non-use

88% beef cattle are polled
Processors and retailers are asking suppliers to incorporate polled genetics.
Gene editing for polled
Gene editing for polled

Rapid increase of POLLED allele
Maintain genetic gain
Constrain inbreeding

66% of Americans support gene editing for hornless cattle

Regulatory fate unclear

Mueller et al 2019; McConnachie et al 2019
Take-home points

• Disbudding is painful, regardless of the method and age of the calf

• Disbud before 8 weeks of age to avoid the need for more invasive methods

• Combining a cornual nerve block and NSAID is best practice for both methods and at all ages

• Stay ahead of changing markets by using polled genetics
Questions?

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