

## Stakeholder views on treating pain due to dehorning dairy calves

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### Abstract

A common and painful management practice undertaken on most dairy farms is dehorning young calves (also called 'disbudding' when done on calves less than about two months of age). Despite much evidence the practice is painful, and effective means available to mitigate this pain, it is frequently performed without pain relief. The overall aim of this study was to describe different stakeholder views on the use of pain mitigation for disbudding and dehorning. Using an interactive, online platform, we asked participants whether or not they believed that calves should be disbudded and dehorned with pain relief and to provide reasons to support their choice. Participant composition was as follows: dairy producer or other farm worker (10%); veterinarian or other professional working with the dairy industry (7%); student, teacher or researcher (16%); animal advocate (9%); and no involvement with the dairy industry (57%). Of 354 participants, 90% thought pain relief should be provided when disbudding and dehorning. This support was consistent across all demographic categories suggesting the industry practice of disbudding and dehorning without pain control is not consistent with normative beliefs. The most common themes in participants' comments were: pain intensity and duration, concerns about drug use, cost, ease and practicality and availability of alternatives. Some of the participants' reasoning corresponded well with existing scientific evidence, but other reasons illustrated important misconceptions, indicating an urgent need for educational efforts targeted at dairy producers and dairy industry professionals advising these producers.

**Keywords:** animal welfare, attitudes, calves, dehorning, disbudding, pain

### Introduction

Disbudding and dehorning are common management practices on dairy farms performed to reduce the likelihood of injury to cattle and farm workers (AVMA 2012). The term 'disbudding' refers to the destruction or excision of horn-producing cells before skull attachment; 'dehorning' entails the excision of the horn after this tissue has attached to the skull. The time of attachment varies by breed and individual animal, but is thought to occur around eight weeks of age when the horn bud is approximately 5–10 mm long (Stafford & Mellor 2005).

Disbudding is usually achieved by destroying the innervated tissue immediately surrounding the bud either using a hot iron (~600°C) or caustic paste, while dehorning is typically done surgically, using a mechanical gouger, wire or saw. Since disbudding is performed at an earlier age and entails less tissue damage, it is generally considered less invasive and therefore preferable to dehorning (AVMA 2012). Several US studies have found a substantial proportion of calves are dehorned rather than disbudded (Fulwider *et al* 2008; USDA 2009).

Regardless of timing or method, there is considerable behavioural, physiological and cognitive research indicating that all forms of disbudding and dehorning are painful (Stafford & Mellor 2011). To address the pain

caused by these procedures, a variety of pain management strategies have been investigated. The administration of local anaesthesia (eg lidocaine) in combination with non-steroidal anti-inflammatory drugs (eg meloxicam) has been shown to provide effective pain control throughout the intra- and post-operative periods (McMeekan *et al* 1999; Milligan *et al* 2004; Stewart *et al* 2009; Heinrich *et al* 2010; Stilwell *et al* 2012; Huber *et al* 2013). Distress associated with the handling and restraint required for administration of anaesthetics and analgesics can be mitigated with the use of a sedative (eg xylazine) administered before the procedure (Grøndahl-Nielsen *et al* 1999).

These findings have informed a number of policies. The Council of Europe, that represents 47 member countries including all of the European Union member states, recommends the use of pain relief when disbudding calves more than four weeks of age (ALCASDE 2009). In Sweden, Denmark and The Netherlands pain relief is legally required when disbudding/dehorning regardless of age (ALCASDE 2009). There are no such legal requirements in the US or Canada. However, the recently revised US National Milk Producer's Federation Farmers Assuring Responsible Management animal welfare programme (NMPF-FARM) recommends calves be disbudded before eight weeks of age

using pain mitigation (NMPF 2013). The Canadian Code of Practice for Care and Handling of Dairy Cattle states, “Pain control must be used when dehorning or disbudding” (NFACC 2009). Regulations regarding pain control for disbudding and dehorning are also in place in New Zealand (NAWAC 2005) and Australia (PIMC 2004).

Despite evidence these procedures are painful, use of pain mitigation remains low in many parts of the world. For example, multiple US surveys indicate that less than 18% of dairy farms reported using pain relief when disbudding or dehorning (Hoe & Ruegg 2006; Fulwider *et al* 2008; USDA 2009). In a survey of more than 600 Italian dairy farmers, less than 20% reported using some form of pain relief (Gottardo *et al* 2011), and a survey of over 400 French dairy farms found that only eight farms used local anaesthesia for these procedures (Le Cozler *et al* 2012). In Canada, the reported use of local anaesthesia was 22% in Ontario (Misch *et al* 2007) and 45% in Quebec (Vasseur *et al* 2010). Smaller farms appear somewhat more likely to provide pain relief (Gottardo *et al* 2011), perhaps because veterinarians are more likely to perform these procedures on smaller farms (USDA 2009). That said, involvement of a veterinarian is no guarantee pain relief will be provided; 37% of veterinarians in the United States (Fajt *et al* 2011) and between 8–15% of veterinarians in Canada (Hewson *et al* 2007; Misch *et al* 2007) reported not using analgesia when dehorning dairy calves (< 6 months of age).

Analysing the views of stakeholders may aid in identifying barriers to adoption of pain mitigation when disbudding/dehorning dairy calves. The goals of this study were to: i) assess the normative beliefs of various stakeholders with respect to disbudding and dehorning; and ii) identify and reconcile discrepancies between these beliefs and available evidence.

## Materials and methods

This study received ethics approval from the Behavioural Research Ethics Board at the University of British Columbia.

The University of British Columbia’s (UBC) ‘Your Views’ website ([www.yourviews.ubc.ca](http://www.yourviews.ubc.ca)) was created to engage people on ethical issues regarding science and technology. The ‘Cow Views’ section focused on animal welfare topics related to dairy production. We used the N-Reasons platform designed to improve public participation in ethically significant social decisions (Danielson 2010), including contentious issues facing the dairy industry (see Weary *et al* 2011; Ventura *et al* 2013; Schuppli *et al* 2014).

The N-Reasons platform allowed for the collection of responses to close-ended questions (Yes, No and Neutral) and open-ended comments (the participants’ reasons for their choice). Participants were able to see votes and reasons put forward by previous participants, creating a virtual ‘town-hall’ environment. Self-administered, internet surveys such as this have been shown to minimise social desirability bias relative to more traditional, direct methods (Tourangeau & Yan 2007; Chang & Krosnick 2009; Heerwegh 2009).

The survey was made available on the worldwide web from November 30, 2010 until July 12, 2012, during this time anyone with access to the internet could participate. Internet surveys result in diverse samples comparable to more traditional survey methods (Gosling *et al* 2004). We preferentially targeted individuals working in the United States and Canadian dairy industry via advertising at producer meetings, contacts at the United States Department of Agriculture, livestock feed companies, and a livestock pharmaceutical company. Additionally, we targeted animal advocates via a posting in the newsletter of the British Columbia Society for the Prevention of Cruelty to Animals. Broader public input was gathered from participants recruited via Amazon’s *Mechanical Turk* crowd-sourcing service ([www.mturk.com](http://www.mturk.com)). This combined sample should not be considered representative of any particular population. Rather, our intent was to describe the range of themes that participants provide to support their views on this issue.

Participants taking the survey were provided with the following information on the practice of disbudding and dehorning dairy cattle:

The developing horns of dairy calves are typically removed to reduce the risk of injuries to farm workers or other cattle that can be caused by horned cattle. Horns of calves three months of age or older are normally removed surgically (‘dehorning’) by scooping, shearing or sawing. Horn buds of younger calves are typically removed (‘disbudding’) using a caustic paste or a hot iron.

There is considerable scientific evidence that all of these procedures cause pain. The immediate pain can be reduced using a local anaesthetic to provide a nerve block — this procedure has been used safely for decades and costs just pennies a shot. Pain can persist 24 h or more; this longer lasting pain can be reduced using non-steroidal anti-inflammatory drugs (like the ibuprofen you take for a headache). Providing calves a sedative before the procedure can reduce handling stress and make the procedure easier to carry out.

In many countries some pain relief is required. For example, Canada’s new Code of Practice for the Care and Handling of Dairy Cattle requires that pain control be used. Approximately 18% of dairy farms in the United States report using pain relieving drugs for disbudding or dehorning dairy calves.

Participants were then asked: “Should we provide pain relief for disbudding and dehorning dairy calves?”

As people joined the discussion they were randomly assigned into one of eight groups (virtual ‘town halls’) with a mean size of 44 participants. Within each group, subsequent participants could see all previous participant’s responses (yes/no/neutral vote, reasons and number of votes earned for each reason), but not responses from other groups. This way, each group provided an independent assessment and ensured that an especially articulate or persuasive reason could only influence votes within a single group.

Participants were asked to provide basic demographic information including gender (male or female), age (19–29, 29–39, 39–49, 49–59, 60+), educational attainment (secondary,

college/university, masters/doctorate, other) and country of origin (US, Canada, other). Participants were also asked, "Which best describes your involvement with dairy production?" Choices included: no involvement, dairy producer/worker, student, veterinarian, dairy industry professional (eg nutritionist), or animal advocate. Differences among groups, and the effect of each demographic variable, on quantitative responses were tested separately using a Chi-squared test, with significance declared at  $P < 0.05$  (two-tailed).

Similar to previous studies using the N-Reasons platform (Weary *et al* 2011; Ventura *et al* 2013), participants were not required to write their own reason for their vote. They could select reasons submitted by other participants within their group. There was no limit as to how many unique reasons participants could select; however, each selection was discounted by the total number of selections made by that individual; in this way, each participant could contribute just one 'vote' in total. Reasons were coded, following the methods described by Knight and Barnett (2008). Two evaluators (JA Robbins and CA Schuppli), blind to demographic information, independently examined each reason line-by-line, breaking them down into smaller 'chunks'. They then met to compare results and reconcile any discrepancies. Finally, these 'chunks' were compared and organised into common themes.

## Results

### Quantitative

A total of 354 individuals participated in this study (Table 1). Of these, 65% were female, 53% were > 30 years old, 91% were from either the US or Canada, and 22% had graduate degrees. Participants self-identified their involvement in the dairy industry as: dairy producer/worker (10%); veterinarian/industry professional (7%); student (16%); animal advocate (9%); or no involvement (57%).

The majority (90%) of individuals believed that pain relief should be provided when disbudding and dehorning dairy calves, with 5% voting 'No' and 5% voting 'Neutral'. The level of support tended to vary among groups, from a low of 81% to a high of 96% ( $\chi^2 = 23.0$ ,  $df = 14$ ;  $P = 0.06$ ). Support also varied in relation to involvement in the dairy industry, from a low of 83% for dairy producers and farm workers to a high of 93% for animal advocates ( $\chi^2 = 17.9$ ,  $df = 8$ ;  $P = 0.02$ ). Females were more supportive of providing pain relief than males (93 vs 85%;  $\chi^2 = 9.3$ ,  $df = 2$ ;  $P = 0.01$ ). There was no effect of education, country of origin or participant age on support for pain relief.

### Qualitative

Participants provided 101 unique reasons in support of their positions. These written reasons averaged ( $\pm$  SD) 23 ( $\pm$  18) words and 130 ( $\pm$  106) characters in length. The dominant themes, and the % of unique reasons corresponding to these themes, were as follows: pain and suffering (67%); concerns about drug use (20%); ease and practicality (12%); alternatives (12%); and cost (11%). Participants from every demographic selected reasons that cited each of these themes. For example, reasons containing the theme pain and suffering were selected by the majority of participants in

**Table 1** The number (and %) of participants (n = 354) who supported ('Yes'), opposed ('No') or were 'Neutral' regarding the provision of pain relief for disbudding and dehorning dairy calves<sup>†‡</sup>.

Factor	Yes	No	Neutral
All participants (n = 354)	320 (90.4%)	16 (4.5%)	18 (5.1%)
Gender (n = 339)			
Female	207 (93.2%)	5 (2.3%)	10 (4.5%)
Male	99 (84.6%)	11 (9.4%)	7 (6.0%)
Age (n = 339)			
19–29	143 (89.9%)	9 (5.7%)	7 (4.4%)
30–39	71 (89.9%)	1 (1.3%)	7 (8.9%)
40–49	51 (92.7%)	3 (5.4%)	1 (1.8%)
50–59	25 (89.3%)	2 (7.1%)	1 (3.6%)
60+	16 (88.9%)	1 (5.6%)	1 (5.6%)
Country of origin (n = 339)			
Canada	110 (89.4%)	8 (6.5%)	5 (4.1%)
USA	168 (90.8%)	6 (3.2%)	11 (5.6%)
Other	28 (90.3%)	2 (6.5%)	1 (3.2%)
Dairy background (n = 336)			
Producer/Worker	29 (82.9%)	6 (17.1%)	0 (0.0%)
Veterinarian/Industry professional	22 (91.7%)	1 (4.2%)	1 (4.2%)
Student	48 (87.3%)	4 (7.3%)	3 (5.5%)
No involvement	176 (91.7%)	4 (2.1%)	12 (6.3%)
Animal advocate	28 (93.3%)	1 (3.3%)	1 (3.3%)
Education (n = 339)			
Secondary	34 (91.9%)	2 (5.4%)	1 (2.7%)
College	197 (91.6%)	7 (3.3%)	11 (5.1%)
Masters/Doctorate	64 (85.3%)	6 (8.0%)	5 (6.7%)
Other	11 (91.7%)	1 (8.3%)	0 (0.0%)
Group (n = 354)			
1 (n = 51)	46 (90.2%)	3 (5.9%)	2 (3.9%)
2 (n = 43)	38 (88.4%)	3 (7.0%)	2 (4.7%)
3 (n = 47)	38 (80.9%)	6 (12.8%)	3 (6.4%)
4 (n = 32)	30 (93.8%)	0 (0.0%)	2 (6.3%)
5 (n = 69)	66 (95.7%)	2 (2.9%)	1 (1.5%)
6 (n = 73)	65 (89.0%)	0 (0.0%)	8 (11.0%)
7 (n = 18)	17 (94.4%)	1 (5.6%)	0 (0.0%)
8 (n = 21)	20 (95.2%)	1 (4.8%)	0 (0.0%)
Responses <sup>§</sup> (n = 354)			
Single	245 (89.4%)	15 (5.5%)	14 (5.1%)
Multiple	75 (93.8%)	1 (1.3%)	4 (5.0%)

<sup>†</sup> Categories where n < 354 reflect participants not providing demographic information; <sup>‡</sup> Percentages have been rounded up so may not equal 100%; <sup>§</sup> Participants selecting one, or more than one, unique reason to justify their vote.

**Table 2** The most popular reason cited within each of the eight groups expressed as the total number of times the reason was voted for divided by the total number of participants within the group in response to the question “Should we provide pain relief when disbudding and dehorning dairy calves?”

Group	n	Percent	Reason
1	51	61	Yes, because ‘there is pain involved and the means are readily available to address the pain. We have the responsibility to treat production animals as co-existent beings. It is valuable to the farmer/persons individual soul to have compassion for living beings animal and human’
2	43	58	Yes, because ‘we should try to alleviate pain in animals whenever possible’
3	47	51	Yes, because ‘if we have a way to reduce pain without many side-effects then we should use it’
4	32	50	Yes, because ‘providing pain control should be standard practice on farms. Withholding pain control for such a painful procedure is unacceptable and inhumane’
5	69	55	Yes, because ‘it’s the most humane thing to do’
6	73	79	Yes, because ‘the procedure produces pain’
7	18	61	Yes, because ‘it is only fair. Nothing should needlessly suffer’
8	21	62	Yes, because ‘while animals are useful for food production, they should not suffer in the process’

each category of dairy industry involvement (ie by farmers, industry professionals, students, animal advocates, and those claiming no involvement with dairy).

Participants in favour of pain control suggested that dehorning was painful and that pain mitigation was effective and practical to implement. They also believed pain relief was beneficial to the physical health and productivity of calves in terms of reduced stress and recovery times and that the use of pain relief makes the task of dehorning easier for the workers to perform. Reasons given in support were often phrased as moral claims; eg “this is just the right thing to do”, “it’s the most humane thing to do” and “we have a moral obligation...” (see Table 2), and used terminology like ‘cruel’ and ‘inhumane’ to describe dehorning without pain relief.

Opponents of pain relief also referenced pain, but expressed doubts about the intensity and duration of the pain, arguing, “the pain is only temporary”, “the pain is short term” and “I don’t believe the pain is excessive or long-lasting”. Opponents also suggested that the young age of calves was a reason for not providing pain relief stating, “young calves are less sensitive to pain...” and “I hope to get it done as quickly as possible”. They also expressed doubts about the efficacy of pain control modalities, commenting “pain relief suggested is topical and has minimal impact on the calf”. Opponents also identified the additional cost as a reason why pain relief should not be provided.

Concerns about drug use were mentioned across all possible vote categories (‘Yes’, ‘No’ and ‘Neutral’). One participant stated, “non-steroidal anti-inflammatory drugs can have negative side-effects for the animals, including cardiovascular, gastrointestinal, liver, and kidney effects. The effect on humans who consume this meat should also be taken into account.” Another said, “I would wonder what, if any, long-term effects there are on the animal and the milk they produce. To give medicine that only causes greater problems later for a short-term pain would be unwise.” Similarly, another partici-

pant questioned, “will giving medication impact organic status?” and another asserted that recommendations “might have to be more flexible for organic farmers...”

Reference to possible alternatives also emerged across vote categories with one participant suggesting, “the debate could be shifted to dehorning or not dehorning. Polled genetics can be used to reduce the number of animals requiring dehorning. Horns could be left on, cut farther from the skull where they don’t cause pain. They continue to grow, but aren’t pointy.” Others questioned the assumption that horns are inherently dangerous and therefore must be removed. As one participant stated, “Yes, certainly we should not want to cause pain. However, the original problem is a mistaken premise. We should not be dehorning or disbudding dairy calves in the first place. We should not be putting the animals in such close contact with each other that they will damage each other with their horns. Animals with enough room to move around would not require such cruel interventions.”

## Discussion

Previous research on attitudes regarding painful procedures — including disbudding and dehorning — has focused on the views of those closely allied with the dairy industry, including: dairy producers (Hoe & Ruegg 2006; Gottardo *et al* 2011; Wikman *et al* 2013), veterinarians (Huxley & Whay 2006; Laven *et al* 2009; Fajt *et al* 2011) and university animal science faculties (Heleski *et al* 2004). This study is the first to include non-industry stakeholders in an interactive manner while also allowing for open-ended responses. Rarely do industry and non-industry perspectives directly interact to discuss animal welfare issues despite the fact that long-term sustainability depends heavily upon this type of engagement (Boogaard *et al* 2008; Miele *et al* 2011). The reasons provided by opponents of pain relief (4.5%) were especially interesting. These appeared to reflect a variety of misconceptions that may contribute to calves being left untreated. Opponents of pain relief tended to

downplay the intensity and duration of the pain and use this as justification for not providing pain relief. Previous work has shown a positive association between perceived painfulness and likelihood of analgesic use (Hewson *et al* 2007). There is ample behavioural and physiological evidence that both dehorning and disbudding cause pain and distress regardless of timing or method used (Stafford & Mellor 2005, 2011). Plasma cortisol concentrations remain elevated for approximately 7–9 h (Sutherland *et al* 2002) and differences in behaviour, such as grazing, have been detected 48 h after dehorning (Stafford & Mellor 2005). More recent work by Neave *et al* (2013) and Daros *et al* (2004) has shown calves dehorned without pain relief exhibit a pessimistic cognitive bias indicative of anxiety or depression. Unlike opponents of pain relief who mentioned specific features of pain such as duration and intensity, proponents never mentioned these specific features. For proponents of pain relief, the mere presence of pain and the ability to control it seemed sufficient to make an ethical judgment.

The structures and mechanisms necessary to perceive pain are present shortly after birth in farmed species (Mellor & Diesch 2006), yet opponents of pain relief suggested young animals experience pain less acutely. This view may arise from the common recommendation to perform painful procedures at the earliest age practicable (AVMA 2012). While younger animals may be easier to handle and recover more quickly there is, however, no evidence to indicate that they experience less pain (Anil *et al* 2002). Histological examinations of innervation surrounding the horn region have found few differences between newborn and 4 month old calves (Taschke & Folsch 1997). The view that neonates are less able to experience pain was once common in paediatric medicine, with human babies denied pain relief on the assumption that they lacked the anatomical and cognitive apparatus necessary to experience pain (McGrath 2011). There is even evidence that pain experienced earlier in life may be more, not less intense (Anand & Hickey 1987), resulting in long-term changes in central nervous system functioning and behaviour (Shimada *et al* 1990; Sternberg *et al* 2005).

Additional cost was also expressed as a reason why pain relief should not be provided. Previous work has found that willingness of the farmer to pay was a strong predictor of analgesic use (Hewson *et al* 2007). The use of the phrase ‘just pennies a shot’ used in our introductory statement, may have biased participants, but we believe this to be a fair description given that the price per calf for lidocaine treatment is estimated to be \$0.46 (Misch *et al* 2007). The estimated cost of providing comprehensive, multi-modal pain management for disbudding/dehorning (including an analgesic and sedative) is less than \$4.00, representing approximately 0.004% of the total estimated cost of raising a replacement dairy heifer (Gabler *et al* 2000). These costs will vary by region, method used and the involvement required by the herd veterinarian.

Some opponents argued correctly that gastrointestinal pathologies can result from non-steroidal anti-inflammatory drugs, however, this risk is associated with high dosages and prolonged use (Wallace 1997), both of which seem

unlikely to occur in food animals. Moreover, selective cyclooxygenase-2 inhibitors (eg meloxicam) reduce this risk even further (Donnelly & Hawkey 1997). Concerns about the risk of drug residues in meat consumed by humans also seems remote given that dairy calves are unlikely to enter the foodchain for months or years following treatment. ‘Bob’ calves may be sent for slaughter at less than four weeks of age, but for these animals there is no reason for disbudding. The uncertain risks of using NSAIDS for pain relief in dairy calves at the time of disbudding/dehorning must be weighed against the certainty of allowing preventable pain as a result of not using them.

Participants also indicated uncertainty about how the use of analgesics might affect organic dairy production. These concerns seem unfounded. Regulations governing US organic dairy production allow the use of most commonly recommended anaesthetics and analgesics (CFR 2012). Canadian organic standards explicitly mandate pain control be used when disbudding and dehorning (CGSB 2006) as does EU Commission Regulation (EC) No 889/2008 governing organic production.

Participants also indicated a desire for long-term solutions to disbudding and dehorning, including the introduction of polled (hornless) genetics. The potential of polled genetics to replace the need to dehorn cattle has been suggested elsewhere (Long & Gregory 1978; Hoeschele 1990). This approach has been adopted in the US beef industry where, in 2007, more than 85% of beef calves were born without horns — up 17% from 1992 (USDA 2008). The recently revised US National Milk Producers Federation (NMPF) animal care manual recognises the potential of polled dairy genetics to supplant dehorning (NMPF 2013). Given the obvious benefits of this approach for both dairy producers (ie reduced labour and improved public image) and dairy cattle (ie reduced pain), greater investment in this option seems prudent.

Some participants also suggested that the need for hornless cattle resulted from a mismatch between housing and management. Instead of modifying the animal to fit the environment, they thought it preferable to change the environment to fit the animal (eg more extensive rearing, reduced stocking densities, less mixing, more stable group structures). Responses of this type may stem from beliefs about respecting the integrity or ‘telos’ of the animals, of which dehorning may be seen as a violation (Bovenkerk *et al* 2002; Gavrell-Ortiz 2004). Among dairy farmers who did not dehorn, Gottardo *et al* (2011) found that the majority (74%) reported no difficulties in managing horned animals. Menke *et al* (1999) found that horned cattle engaged in fewer agonistic behaviours than those without horns. However, some of the problems associated with keeping horned cattle may not arise until cattle are transported and/or mixed with unfamiliar animals (Shaw *et al* 1976; Wythes *et al* 1979), events that occur with increasing frequency on many modern dairy farms and at the end of the production phase.

Participants in the current study did not voice concerns about regulatory restrictions limiting the availability of analgesic drugs, but these have been raised elsewhere

(Schwartzkopf-Genswein *et al* 2012). To date, the US Food and Drug Administration has not approved any drugs labeled for pain relief in food animals (Schwartzkopf-Genswein *et al* 2012), but veterinarians can prescribe drugs in a manner not specified on the label ('Extra Label Drug Use' or 'ELDU') provided certain conditions are met (Smith *et al* 2008; Smith 2013). Extensive ELDU for purposes other than pain relief has been documented elsewhere (Dewey *et al* 1997; Sawant *et al* 2005). In the US, ELDU legislation was enacted so that veterinary practitioners could exercise their professional judgment to protect animal health and reduce suffering (USDA 1994). Controlling the pain associated with dehorning and disbudding would appear to justify such use.

### Conclusion

A large majority of respondents in every group and across every category — including those closely affiliated with the dairy industry — believed pain relief should be provided when disbudding and dehorning dairy calves. The reasons put forth by those who disagreed or were neutral on the issue were largely unsupported by available evidence. Despite this consensus, provision of pain relief for dehorning remains low.

Collectively, our results point to the need for increased outreach efforts targeted at veterinarians and producers that promote awareness of the relevant science, regulations and pain management protocols. These efforts should address misconceptions surrounding the efficacy, availability, safety, and costs associated with pain mitigation. Although veterinarians are able to provide pain control under extra-label drug use, approval of additional analgesics for use in food animals is also needed. Collaborative efforts to increase the availability and adoption of polled dairy genetics should be pursued as this avoids the need for dehorning.

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