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Study investigating the attitudes and opinions of cattle farmers and veterinarians in the United Kingdom on the use of Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) for post-disbudding analgesia of calves

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Running title: Veterinarian and farmer opinions on post-disbudding analgesia

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Abstract

The study examined cattle farmers’ and veterinarians’ opinions of pain-induced distress associated with disbudding and attitudes towards Non-Steroidal Anti-Inflammatory Drugs (NSAIDs). An emphasis was placed on investigating pain perception, vet-client communication and factors influencing analgesic use. Data was collected from an online questionnaire, links to which were published in professional periodicals, promoted by industry organisations and distributed on private practice mailing lists. A total of 110 veterinarians and 116 farmers that regularly disbud calves completed the questionnaires. Of the respondents, 56% of veterinarians and 14% of farmers routinely use NSAIDs for disbudding. Respondents perceived disbudding to be severely painful without medication and 82% of veterinarians and 43% of farmers perceived post-procedural pain to persist beyond 24 hours. There was a significant difference between female and male veterinarians’ pain scores for disbudding without medication. Veterinarians underestimate the influences of welfare and analgesic duration and effectiveness on farmers’ decisions and overrated cost impact. The study highlights that improvements in veterinarian-farmer communication regarding calf disbudding analgesia are required; both in terms of refining veterinarians’ understanding of farmers’ priorities and guiding clients on methods to improve calf welfare.

Keywords: Analgesia; Animal Welfare; Calves; Disbudding; Non-Steroidal Anti-Inflammatory Drugs (NSAIDs)
Disbudding and dehorning are routine husbandry practices (Stafford & Mellor 2005) used to reduce the likelihood of injury to personnel and other cattle (Bos taurus) (Misch et al 2007). Horn injuries can cause significant pain and distress, as well as damaging the carcass and hide, resulting in financial penalties (Stewart et al 2009). Dehorning involves the amputation of the horn, while disbudding is the destruction of horn germinal tissue in young calves to prevent horn growth. The Department of Environment, Food and Rural Affairs (DEFRA 2003) recommends that calves are disbudded before two months old, ideally as soon as the horn bud is palpable, which varies between breeds (Stafford & Mellor 2005). Under the United Kingdom’s (UK) Protection of Animals (Anaesthetics) Act 1954/1964, all methods of disbudding and dehorning require a cornual nerve local anaesthetic (LA) blockade. The only exception being chemical cauterisation in calves less than one week old (DEFRA 2003). Thermal cauterisation with LA blockade is the recommended method for disbudding in the UK. A number of studies have investigated physiological and behavioural indicators of the pain-induced distress associated with disbudding of calves (Allen et al 2013; Coetzee et al 2012; Earley & Crowe 2002; Gibson et al 2007; Graf & Senn 1999; Grondahl-Nielsen et al 1999; Heinrich et al 2010; McMeekan et al 1998; Stewart et al 2008; Stilwell et al 2012; Sutherland et al 2002). These studies similarly concluded that disbudding is a painful procedure, which without pain-relief causes pain and suffering. It has been suggested that post-disbudding pain persists for up to 24 hours (Faulkner & Weary 2000) and potentially 44 hours (Heinrich et al 2010). It is generally considered that the LA used for disbudding and dehorning are effective at providing nerve blockage for up to two hours (Heinrich et al 2009; Stafford & Mellor 2011). However, that can result in a period post procedure where the LA blockage has worn off, with the
animal experiencing pain and distress, particularly from the inflammatory response in the wound.

Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) are routinely used in companion animal (Capner et al 1999; Dohoo & Dohoo 1996a, 1996b; Lascelles et al 1999) and equine practice (Waran et al 2010), however their usage is sometimes overlooked in farm animals (Barrett 2004; Whay & Huxley 2005) and they are not routinely used for disbudding or dehorning of cattle in the UK. Non-Steroidal Anti-Inflammatory Drugs are Prescription-only Medicines (POM-V), which farmers require the authorisation of a registered veterinarian for their use (NOAH 2015; RCVS 2015).

The use of NSAIDs in combination with LAs have been shown to reduce post-disbudding pain in calves (Faulkner & Weary 2000; Heinrich et al 2010; McMeekan et al 1998; Stewart et al 2009; Stilwell et al 2012), virtually eliminating the cortisol-stress response when compared to LA alone (Allen et al 2013; Heinrich et al 2009; Stafford & Mellor 2011; Stafford et al 2003). Furthermore, NSAIDs have been shown to increase feed intake (Duffield et al 2010; Heinrich et al 2010) and growth rates (Faulkner & Weary 2000) in calves post-procedurally. However, despite the large body of scientific evidence on the effectiveness of NSAIDs for reducing the pain and distress associated with disbudding, farmers and veterinarians in the UK do not routinely use them during disbudding. Furthermore, there are currently no legislative requirements for the usage of NSAIDs for disbudding in the UK, it is at the discretion of the farmer/veterinarian carrying out the procedure.

Questionnaire-based studies have investigated the opinions of British (Capner et al 1999; Lascelles et al 1999) and Canadian (Dohoo & Dohoo 1996a, 1996b) veterinarians towards pain and analgesia in companion animals. Similar studies have explored veterinarian and farmer perceptions of pain and analgesia in cattle in relation
to various conditions and procedures (Fitzpatrick 2002; Hudson et al 2008; Huxley & Whay 2006, 2007; Lorena et al 2013; Watts & Clarke 2000; Whay & Huxley 2005), with a number of studies conducted outside of the UK (Gottardo et al 2011; Hewson et al 2007; Hoe & Ruegg 2006; Hokkanen et al 2015; Lorena et al 2013; Misch et al 2007; Norring et al 2014; Vasseur et al 2010; Wikman et al 2013, 2016). However, there is currently a lack of detailed information on the opinions and awareness of UK veterinarians and farmers on the usage of NSAIDs for disbudding and the potential reasons for why they are not more commonly used.

The aim of the study was to examine the attitudes and opinions of UK cattle farmers and veterinarians on the pain associated with disbudding, analgesia and the use of NSAIDs for disbudding of calves. With an emphasis on pain perception, demographic factors, vet-client communication, economics and other factors influencing potential NSAID usage.
Materials and Methods

Two matched online questionnaires were developed with specific questions adapted towards the target populations. The questionnaires were designed to investigate cattle farmers’ and veterinarians’ opinions on the pain associated with disbudding and the usage of NSAIDs. The study and questionnaires were approved by the Royal Veterinary College Research Ethics Committee.

Questionnaire Design

Some questions were adapted from previous research (Gottardo et al 2011; Huxley & Whay 2006, 2007; Whay & Huxley 2005). Questions were primarily closed-ended with appropriate categories, including ‘don’t know’ to avoid selectional bias. Questionnaires examined: participant demographics; education; awareness of cattle pain and analgesia; detailed disbudding practices; and factors influencing NSAID usage. The perception of pain duration and severity experienced by calves during disbudding (with various analgesic protocols) was examined with a numerical scale adapted from previous studies (Fitzpatrick 2002; Hewson et al 2007; Huxley & Whay 2007; Watts & Clarke 2000; Whay & Huxley 2005). Influences of various factors on NSAID usage (potential side-effects; cost; availability; anti-inflammatory/toxic effects; support; veterinary advice; availability; duration of action; administration; dose; licensing; withdrawal period), were assessed on a Likert scale adapted from Whay and Huxley (2005). Previously in a survey by Huxley and Whay (2007) the majority of participants stated ‘less than five pounds’ was an acceptable price for NSAIDs. Therefore, in the current survey the cost question focused on the £0 to £5 range.

Survey Distribution and Analysis
The surveys were made available online via SmartSurvey (Smartline International Ltd., Gloucestershire, UK) with access via web links or Quick Response (QR) codes. The study was promoted via newsletters and adverts produced by various organisations (EBLEX, DairyCo, NFU, BCVA, NADIS, Farmers Weekly) and on private practice mailing lists. A prize was offered as an incentive.

After collation, data for participants who do not disbud was removed. Prior to analysis, data was categorised and certain responses combined. Pain-scales were treated as categorical variables. In the results, ‘pain perception’ refers to pain scale and post-procedural pain duration responses and ‘analgesia’ refers to NSAIDs and doesn’t consider other drugs such as opioids. Analysis of the standard drugs used for disbudding was made with exclusion of those respondents citing the use of caustic pastes (vets n = 2; farmers n = 13), as neural blockade and analgesia are not a requirement for this method.

**Statistics**

Data was analysed using SPSS (Version 22, IBM Corporation, Chicago, IL, USA). Data was rejected where questions were not completed. Categorical variables were analysed for associations with the Chi-squared tests or Fisher’s exact test when appropriate. The Kolmogorov-Smirnov test was used to determine the distribution of continuous data. Continuous data was non-parametrically distributed. Differences between veterinarian and farmer responses for post-procedural pain duration, duration of action and price were analysed with either Mann-Whitney U or Kruskal-Wallis tests. The level of significance for all tests was $P < 0.05$. 
**Results**

A total of 118 veterinarians and 140 farmers completed the questionnaires, of which 93% (n = 110) and 83% (n = 116) respectively, regularly disbudded calves. Data from those respondents who do not disbud calves were not included in subsequent analysis.

**Demographics**

All veterinary respondents practiced within the UK and 93% (n = 102) were UK graduates. With representatives from seven UK veterinary schools (excluding University of Surrey). Eight (7%) respondents were from overseas veterinary schools. The median year since graduation was 9.5 (year of graduation range 1973 – 2014). There was an even gender distribution of veterinary respondents (50% male; 50% female) (n = 110). The median proportion of time working with cattle was 80% (interquartile range (IQR): 50 – 95%). Seventy respondents (64%) had participated in cattle-related post-graduate training.

Farmer respondents were from across the UK. There was an uneven gender distribution of 71 males (61%) and 39 females (34%), six individuals did not answer this question. Ninety-two (79%) respondents had more than 20 years of farming experience (range: < 5 – > 50 years). Most respondents owned farms (64%; n = 74) and cattle were the main enterprise (74%; n = 86). Beef and dairy cattle farmers represented 59% (n = 68) and 31% (n = 36) of respondents respectively, with smallholders, breeders and conservation grazers making up the remaining 10%. Median herd size was 150 cattle (range: 0 – 1200). Beef farmers had significantly smaller cattle herds (median 153, IQR 62 – 200) than diary producers (median 323, IQR 140 – 478) (P<0.0001).
Disbudding Practices

There was no significant difference between beef and dairy farmers in the reasons or methods used for disbudding calves. Eighty percent (n = 93) of all farmers reported that they disbud to prevent injury, 13% (n = 15) disbud for financial reasons, and 4% (n = 5) for aesthetic purposes. Seven (47%) of those disbudding for financial reasons rated cost as very important, whilst the majority disbudding for safety concerns rated it as less important (n = 27, 29%) (P = 0.038).

On the farms that disbud the procedure was carried out by: farm personnel 86% (n = 100), veterinarians 11% (n = 13), contractors 2% (n = 2), and students 1% (n = 1). The disbudding methods used by veterinarians included: blow torch and hot iron (52%, n = 57), gas-powered cauteriser (45%, n = 49), mechanical (scoop) disbudding (7%, n = 8), electronic cauterization (5% n = 5) and caustic paste (2%, n = 2), with 6% (n = 7) of these using a combination of methods. Meanwhile, the methods used by farmers included: gas-powered cauterizer (59%, n = 69), blow torch and hot iron (19%, n = 22), electronic cauterization (11%, n = 13), caustic paste (11%, n = 13), mechanical (scoop) disbudding (3%, n = 4), or a combination of methods (4%, n = 5). Fifteen farmer respondents (13%) reported that they were also introducing polled genetics into the herd (10 beef and 5 dairy producers). Twenty four (21%) farmers stated they don’t disbud when asked, 71% (n = 17) of these where beef producers (8% dairy, 21% other). Of the farmers that don’t disbud, 50% (n = 12) said they breed polled cattle, 17% (n = 4) dehorned at a later stage, 8% (n = 2) did not disbud due to ethical/welfare reasons and six choose not to answer the question. Most veterinarians (94%, n = 102) and farmers (93%, n = 108) reported that they disbud calves under eight weeks old. Five veterinarians (5%) and eight farmers (7%) reported that they disbud after eight weeks.
There were no significant associations between disbudding age/method with perceptions of pain/analgesic use.

**Knowledge of Pain and Analgesia**

Veterinarians reported that they gained their knowledge from clinical experience (47%, n = 52) and undergraduate training (21%, n = 23). There was little difference in the sources of knowledge on cattle pain and analgesia between veterinarians that routinely use or don’t use NSAIDs for disbudding. The only association found was that veterinarians that routinely use NSAIDS accessed literature-based NSAID information (papers, articles, commercial literature, data sheets, etc) more often than those that don’t use NSAIDs (P = 0.009). Sixty-seven percent (n = 70) of veterinarians stated that their knowledge of cattle pain and analgesia was adequate, of this 66% routinely used NSAIDs for disbudding. There was a significant association between perceived level of knowledge and the routine use of NSAIDs for disbudding (P = 0.019). There were no associations between knowledge/training and veterinary pain perceptions.

Seventy-two percent of farmers (n = 84) reported that their knowledge of disbudding analgesia is adequate, there was no significant difference between beef and dairy producers. Farmers reported that they gained their knowledge through tradition (36%, n = 42), training courses (31%, n = 36), veterinarians (27%, n = 31) and media (5%, n = 6). There were no significant associations between information sources and NSAID usage amongst farmers. When asked where farmers would seek advice if they were considering introducing NSAIDs to their disbudding protocol, 94% (n = 109) stated they would approach their veterinarian. Other responses included professional farm management advisors, fellow farmers/meetings and information resources (i.e.
internet, articles, leaflets). Almost 20% of farmers stated a combination of these resources but none reported that they would seek advice from drug company representatives.

**Perception of the Pain Associated with Disbudding**

Veterinary and farmer responders rated the severity of disbudding-induced pain with different analgesic protocols (table 1). Veterinarians and farmers were similar in the ranking of the severity of pain associated with disbudding with the different analgesia protocols. Significantly more female (51%; n = 28) compared to male (26%; n = 14) veterinarians scored disbudding as severely painful (pain severity score 10) ($P = 0.029$). There was no association between gender, farm type and the scoring of pain severity of disbudding for farmers. There was a significant association between groups (veterinarians/farmers) and the perception of post-disbudding pain duration ($P < 0.001$) (table 2). Eighty-two percent of vets reported that the pain of disbudding lasted >24 hr, compared to 43% of farmers ($P < 0.05$). Twelve percent of farmers reported they didn’t know how long post-disbudding pain lasted, compared to 3% of veterinarians ($P < 0.05$). There was a significant association between veterinarian use of NSAIDs and perception of post-disbudding pain ($P = 0.02$), with 51% of veterinarians that routinely use NSAIDs reporting that the pain lasted >24 hr, compared to 31% who do not use NSAIDs.

**TABLE 1**

**TABLE 2**

**Disbudding Drugs**
Drugs used by respondents during disbudding are detailed in table 3. One hundred and six (98%) and 89 (86%) veterinarians and farmers respectively, reported that they routinely use LA when disbudding. In addition, 60 (56%) and 14 (14%) veterinarians and farmers (8 beef and 6 diary producers) respectively reported that they routinely use NSAIDs when disbudding \( (P < 0.001) \). Of respondents using NSAIDs, all farmers (100%) and 84% of veterinarians (51%, \( n = 48 \)) reported that the drug used was meloxicam. Veterinarians also reported using flunixin meglumine (7%, \( n = 4 \)) and ketoprofen (2%, \( n = 1 \)). Seventy-nine percent (\( n = 87 \)) of veterinarians identified meloxicam as the UK licensed NSAID for disbudding. Veterinarian’s reported having permission to use NSAIDs on a median of 13% of their client’s farms (range:0 – 100).

**TABLE 3**

There was a significant difference \( (P < 0.001) \) between responses of farmers and veterinarians in their preference for calves to receive disbudding analgesia. Sixty-one (56%) veterinarians compared to 26 (22%) farmers stated they would prefer if calves received NSAIDs for disbudding, there was no difference between farmer type. While 48% of farmers indicated that they may be interested in the use of NSAIDs. There was a significant association between veterinarian pain scores for disbudding without any pain relief and a preference for clients to use NSAIDs for disbudding \( (P = 0.033) \). Fifty-four veterinarians (49%) reported that NSAIDs should be made compulsory for disbudding. There was a significant association between veterinarian’s opinions on compulsory use of NSAIDs and number of years since graduation \( (P = 0.015) \), where newer graduates were more in favour of their use.
Veterinarians were asked to rate the importance of fourteen factors on their decision to use NSAIDs for calf disbudding (Figure 1). The following factors were rated as very important in influencing their decision to use NSAIDs: analgesia and welfare (77%), anti-inflammatory effect (57%), duration of action (63%) and licensing (57%) (modal value). Administration ease (45%), cost (34%) and time to onset (45%) were rated as quite important. Veterinarians routinely using NSAIDs significantly scored analgesia/welfare ($P = 0.015$) and duration of action ($P = 0.019$) as more important, while cost was scored as less important ($P = 0.001$) compared to those who don’t use NSAIDs. The majority of veterinarians scoring analgesia/welfare as very important, also perceived pain to persist $>24$ hr ($64\%, n=70$) ($P = 0.016$). Of the 31% of vets that said that pain persist $>24$ hr but did not use NSAIDs, the factors they reported as very important in influencing their decisions regarding NSAIDs where: analgesia and welfare (75%), duration of action (64%), anti-inflammatory effect (61%) and licensing (58%). Meanwhile, administration ease (50%), time of onset (47%) and cost (36%) where rated as quite important. Twenty three percent ($n=25$) of veterinarians thought that all their farming clients would prefer calves to receive NSAIDs for disbudding. While $71\%$ ($n=78$) reported that some of their clients would.

**FIGURE 1**

Similar to the veterinarian ratings, farmers were asked to rate the importance of eleven factors in relation to considering NSAID usage for disbudding calves. In addition, veterinarians were also asked to rate these same factors from the perspective of the farmer (their perceived perspective) (table 4). Fifty-three percent of farmers (58%
beef and 42% dairy farmers) rated analgesia and welfare as very important compared to just over a quarter of veterinarians (27%) \( (P = 0.001) \). Veterinarians significantly underestimated how important farmers rated onset \( (P < 0.001) \), duration of action \( (P < 0.001) \), side effects \( (P < 0.001) \), licensing \( (P < 0.001) \) and product support \( (P < 0.001) \).

Eighty-two farmers (71%) (70% beef and 74% dairy farmers) stated that veterinary recommendation was very or quite important, however this was not significantly different to the veterinarian’s perspective of the farmer’s concerns. Conversely, veterinarians significantly overestimated the importance of withdrawal periods \( (P < 0.001) \) and ease of administration \( (P = 0.001) \).

**TABLE 4**

Sixty-four percent of veterinarians thought that the most important concern of farmers was cost. However, only 18% of farmers (19% beef and 16% dairy farmers) reported cost as a very important factor when considering NSAID usage; veterinarians significantly overestimated the importance of cost and labour to farmers \( (P < 0.001) \) (figure 2). Farmers were asked what price per calf they would consider acceptable for NSAIDs for disbudding. Seventy-three percent of farmers (74% beef and 71% dairy farmers) responded that a dose less than £2 per calf would be acceptable (figure 3). When broken down 37%, 36%, 16% and 1% of farmers reported that they thought < £1, £1 – 2, £2 – 5 and > £10 respectively were acceptable costs per dose. Similarly, veterinarians were asked what cost per dose they thought would be acceptable to their clients (farmers). Sixty-six percent said the cost would have to be less than £2 to be acceptable (33% < £1; 34% £1 – 2; 24% £2 – 5). Only 2% of farmers responded that they would be unwilling to pay for NSAIDs, compared to 7% of veterinarians stating
that farmers would be unwilling to pay. For veterinarians there was a significant
association between the perception of disbudding pain duration lasting > 24 hr and
those that stated a higher acceptable price for NSAIDs ($P = 0.034$). Furthermore,
veterinarians that routinely used NSAIDs reported that farmers would find £2-5 an
acceptable cost per dose of NASIDs ($P < 0.001$).

**FIGURE 2**

**FIGURE 3**

**Vet-Client Communications**

When asked whether veterinarians discussed cattle analgesia enough, there was
a significant difference between the groups with 71% and 45% of veterinarians and
farmers respectively stating the subject was not discussed enough ($P < 0.001$). Seventy-
eight percent of veterinarians reported that they had discussed the use of NSAIDs with
their clients. Overall 29% of farmers said they have had discussions with their vets on
the use of NSAID for disbudding. Dairy farmers where more likely to have these
discussions with 41% reporting talking to their vets about NSAIDs compared to 25%
of beef farmers. Of the farmers that reported they have discussed NSAIDs for
disbudding with their veterinarian, 29% routinely used NSAIDs, while 71% did not ($P
< 0.001$). In total 101 farmers said they don’t use NSAIDs, of these 72% reported that
they have never discussed disbudding analgesia with their veterinarian.

Veterinarians that perceived post-disbudding pain to persist > 24 hours were
more likely to have discussed the use of NSAIDs with their farming clients ($P = 0.001$).
Generally, veterinarians who discussed NSAID usage with their clients spent
significantly more time working with cattle, than those who did not ($P = 0.025$). These
same veterinarians were more likely to be permitted to use NSAIDs on their clients’ farms (\(P < 0.001\)).
Discussion

This is the first detailed study comparing the attitudes and opinions of UK veterinarians and farmers on the use of NSAIDs for disbudding of calves. There were disparities in responses between veterinarians and farmers on the: influence of veterinarians on analgesia choices; importance of cost; and welfare. However, almost all veterinarians and most farmers favoured NSAID use, with most veterinarians stating that some (71%), if not all of their clients (23%), would prefer calves to receive NSAIDs. Likewise, approximately half of veterinarians think NSAIDs should be made compulsory for disbudding.

Current Practices

The disbudding of calves is a routine husbandry practice, which when practiced without adequate pain relief can result in significant pain and distress. In the study the majority of farmers (86%) and veterinarians (98%) reported that they routinely used LA when disbudding. In addition, 5% and 7% of veterinarians and farmers respectively reported that they were disbudding calves after eight weeks of age. The disbudding of calves without LA and over 8 weeks of age could be considered a breach of the Protection of Animals (Anaesthetics) Act 1954/1964; Veterinary Surgeon Act 1996; Animal Welfare Act 2006; and DEFRA Code of Recommendation for the Welfare of Livestock (Cattle). However, care must be taken with these results as the response was open-ended, so this doesn’t necessarily mean that participants are not using LA, even if they have not stated its use. Potentially veterinarians’ who did not state LA, instead used general anaesthesia instead for calves older than eight weeks old. Local anaesthesia for disbudding is not routinely used in some overseas countries, although it is widely agreed that the procedure is painful (Gottardo et al 2011; Hoe & Ruegg 2006).
It is worth noting that several respondents stated use of lidocaine preparations, which are not currently licensed for use in UK food-producing animals (Reg (EC) 37/2010 (Commission)).

The most commonly used disbudding methods for both groups involved cauterisation of the horn bud and surrounding tissue. This is consistent with the findings of Cozzi et al (2015), who reported that cauterization was the most common method in EU Member states. Cauterisation produces third-degree burns, damaging nociceptors and resulting in desensitization (Doherty et al 2007). Furthermore, it has been associated with reductions in plasma cortisol concentrations compared to other dehorning methods, suggesting a reduced pain response (Petrie et al 1996; Stafford & Mellor 2011). Interestingly 13% of the farmers reported that they were introducing polled genetics into their herds. This was a higher proportion than that reported by King-Eveillard et al (2015) (9%) in a survey of farmer attitudes in Italy, Germany and France. The breeding of polled animals would remove the need for disbudding and dehorning. The polled genotype is dominant over the horned, with the gene located on the proximal end of the Bovine chromosome 1 (Brenneman et al 1996; Georges et al 1993). There has been resistance to the induction of polled genetics, based on the concern that selection of the polled allele might result in: lower breeding values for preferred production traits and the potential for high relatedness and inbreeding due to the lower range of available sires and genetic diversity (King-Eveillard et al 2015; Windig et al 2015). However, as more farmers and breeding companies start to introduce polled genetics, the number of sires with higher genetic merit is increasing, making polled genetics a viable alternative to current practices.

Fifty six percent of veterinarians used NSAIDs for disbudding; this was significantly greater than that reported in similar studies by Huxley & Whay (2006)
Meanwhile, 14% of farmer responders reported that they use NSAIDs, this proportion was higher than previously reported by Gottardo et al (2011) (5%) and Vasseur et al (2010) (0%) in northeastern Italy and Canada respectively, but was significantly less than Finnish farmers (48%). In addition to regional differences in veterinary and farming practices a possible reason for this apparent increase in usage by both groups may be increased awareness of the benefits of NSAIDs and the recent registering of meloxicam (under brand name of Metacam™ in the UK) for disbudding and dehorning in calves in the EU. Indeed, Huxley & Whay (2006) reported a similar proportion of veterinarians reporting the use of NSAIDs in calves for other procedures and conditions (e.g. sole ulcers, claw amputations, dystocia, caesarean section, etc). Alternatively, the sample could have been biased, as individuals with a greater concern for welfare, analgesia or awareness of the registering of meloxicam may have been more likely to participate in a survey of this type.

Pain, Analgesia and Knowledge

Both veterinarian and farmer respondents agreed that disbudding without medication is severely painful and that this pain can be reduced with the use of LA. This finding is consistent with the existing literature, guidelines and minimum standards. Veterinarian pain-scores were higher and within a narrower range than reported by Huxley & Whay (2006) (median 9 (range: 6-10) versus median 7 (range: 2-10) respectively). This difference may be because the current study focuses solely on disbudding, without estimation of pain alongside that of other procedures, meanwhile Huxley & Whay (2006) examined the attitudes relating to a range of procedures and conditions. Meanwhile, the pain score results in the current study were similar to those
of Finnish veterinarians & clinical veterinary students as reported by Norring et al (2014), who also reported a positive association between disbudding pain scores (without pain relief) with higher human empathy scores.

Farmers generally perceived disbudding as less painful with a LA+NSAID compared to LA alone, however veterinarians scored them equally. This is an interesting finding and suggests that research on disbudding and NSAIDs may not be finding its way into cattle practice. To ensure adequate advice is being provided to clients it is important that veterinary surgeons are up to date with recent developments in the profession. An alternative explanation is that as farmers spend more time with their livestock post-procedure than veterinary surgeons, they are more likely to have observed the benefits of LA+NSAIDs for post-operative pain. Whereas due to the financial demands of farm animal veterinary practice, vets seldom have the time to observe calves post procedure prior to leaving to visit other clients.

In the study, female veterinarians scored disbudding without medication as significantly more painful than their male counterparts. Meanwhile, there was no such relationship with the farmers. Dohoo & Dohoo (1996a) found similar findings for veterinarians in a study of companion animal practitioner’s opinions on post-operative pain and analgesia. However, in studies which also included disbudding, no significant associations were found between gender and opinions on post-operative pain in vets (Hewson et al 2007; Huxley & Whay 2006). Years since graduation in the current study had no bearing on veterinarian perception of pain during disbudding, which was similar to findings of Hewson et al (2007). However, Huxley and Whay (2006) reported that older graduates assigned higher pain scores to disbudding without pain-relief. Conversely, Dohoo and Dohoo (1996a) found that recent graduates perceived companion animals to experience more post-operative pain compared to more
experienced peers. Despite the lack of association between years since graduation and perception of pain of disbudding in the current study, it was found that newer graduates were more likely to agree that NSAIDs should be made compulsory for disbudding.

It is important to note, that there has been significant debate about the subjectivity of pain scales. The issue is that pain scales by their nature are subjective, open to interpretation bias and do not take account of the multidimensionality of pain (Krebs et al. 2007). However, in many situations they are the only available method for the assessment of opinions on painful husbandry practices. Also despite these limitations numerical scoring systems with carefully designed questionnaires are now recognised as sensitive methods for quantifying attitudes in regards to pain, simplifying data for collection and analysis (Hjermstad et al. 2011, Jensen et al. 1994, Williamson & Hoggart 2005).

It has been previously reported that post-disbudding pain can persist beyond 24 hours (Faulkner & Weary 2000, Heinrich et al. 2010). In the study almost twice the number of veterinarians than farmers stated that post-disbudding pain persists beyond 24 hours. This difference in perception may be attributable to veterinarian’s training (undergraduate/post-graduation continuing professional development (CPD)), specifically awareness of pain-induced behaviours displayed in calves, or awareness of recent research. Indeed, veterinarians perceiving pain to persist beyond 24 hours stated that analgesia/welfare featured highly in their analgesic choices. In an Italian study, most farmers perceived pain to diminish within 6 hours (Gottardo et al. 2011), a view shared by a minority in the current study. This could be due to cultural differences or variations in farming systems in other countries compared to the UK. Fifty one percent of veterinarians that reported that post-disbudding pain persists beyond 24 hours were routine NSAID users. The duration of analgesia and its effectiveness was reported as
more important to veterinarians who routinely use NSAID than to non-users. This suggests that clinicians’ perceptions of animal suffering has an important influence on analgesic choices. However, it is disconcerting that 31% of veterinarians that reported that post-disbudding pain persisted beyond 24 hours did not use NSAIDs. It is unclear from the results the reasons for this seemingly contradictory response. When asked what where the most important factors in influencing their decision on NSAID usage, the results effectively mirrored those of the veterinarians that do use NSAIDs. Potential factors that could have contributed to their decision not to use NSAID may relate to internal and external pressures, such as client wishes, practice policy, perception of importance of cost to the farmer, lack of dissemination of current best practice and even an unwillingness to change practices. These factors were not covered in the survey.

Compared to the studies of Lorena et al (2013) (16%) and Whay & Huxley (2006) (46%), the current study found that sixty-seven percent of veterinarians considered their knowledge of cattle pain and analgesia to be adequate. This is consistent with the findings of Hewson et al (2007) (75%) on attitudes of Brazilian large animal clinicians. The differences between the studies may be due to changes in:

(1) awareness of post-operative pain in the past ten years; interestingly there was little change in the reported sources of the information on pain relief by veterinarians in the current study and those of Lorena et al (2013) and Whay & Huxley (2005); (2) veterinary school curriculums and teaching filtering through into practice; 62% of veterinary respondents had graduated within the last five years and veterinarians using NSAIDs were more likely to access information on them via literature (papers, articles, commercial literature, data sheets, etc); and (3) due to the recent registration and increased advertising of Metacam™ to cattle veterinarians.

Meanwhile, only 16% of farmer respondents felt their knowledge of cattle pain
and analgesia to be insufficient. This is in contrast to almost two-thirds of farmers eight years ago (Huxley & Whay 2007). In the current study however, knowledge of analgesia related specifically to disbudding, whilst the Huxley & Whay (2007) study explored more generalised opinions on cattle. Potentially, this indicates that farmers are more aware of analgesia for disbudding of cattle compared to other procedures and conditions (e.g. surgical castration, joint ill, fractures etc). Alternatively, it may suggest that awareness or education on the use of pain-relief for procedures has improved since the previous study. However, this could not be determined from the current study.

Veterinary-Farmer Communication

Most farmers reported that they seek advice about analgesia from their veterinarian and indicated that this advice can be highly influential on their decisions. Similarly, veterinary respondents highlighted the importance of vet-client communications. However, 45% of farming respondents reported that veterinarians don’t discuss cattle analgesia enough. This is a similar proportion as reported by Huxley & Whay (2007) (53%) in a larger survey of attitudes in relation to use of analgesics in cattle (all procedures). Seventy one percent of veterinarians also reported that disbudding analgesia wasn’t discussed enough. In the current study, 71% of farmers have never discussed NSAIDs for disbudding with their veterinarian. Yet 78% of veterinarians said they had discussed NSAIDs with their clients. This disparity suggests a disconnection in vet-client communication on the topic of NSAIDs, suggesting that more work is needed to improve the dialog between vet and client. However, these findings must be interpreted with caution as the surveys were not vet/client matched, regional effects were not tested and sample size of both populations were not large, which could have introduced regional based bias. Veterinarians that had discussed
NSAIDs with their clients were more likely to respond that post-disbudding pain persisted beyond 24 hours, these responders also generally spent more of their time working with cattle. This is similar to the findings of Hewson et al (2007) for Canadian veterinarians.

One discouraging finding in the study was that of the farmers that had discussed NSAIDs for disbudding, only 29% routinely used them, while 71% did not. This suggests that veterinary advice although rated important by farmers in the decision-making processes, does not always help to influence behavioural change. Ajzen (1991) proposed with the theory of planned behaviour that an individual’s intention to engage in a behaviour (such as adoption of NSAIDs for disbudding) is influenced by the interaction of attitude towards the behaviour, subjective norms and perceived behavioural control. In the context of analgesia and disbudding the lack of uptake of NSAIDs by farmers could be influenced by attitude to the changes in practice, how these changes will be perceived by others (peers, vets, suppliers, buyers, public etc) and how the farmer perceives the ease or difficulty of the new practice (practicality, skill, perceived barriers) (Godin and Kok 1996). Generally, the more positive the attitude and the subjective norms, combined with greater perceived control the more likely the intention is to perform the behaviour.

Both groups had similar concerns about analgesia onset, duration and effectiveness, however veterinarians underestimated the impact that these factors have on farmer decision-making. In addition, veterinarians underestimated the influence of NSAID side effects, licensing and product support on farmers and overestimated the importance of withdrawal periods and administration ease. Suggesting that veterinarians do not always correctly perceive or understand the motivation and concerns of their clients in relation to animal welfare. Veterinarians also overestimated
the impact of cost/labour to the farmers, which is similar to the findings of Huxley & Whay (2006) and Kristensen and Enevoldsen (2008). These distorted perceptions of farmer motivations and concerns could potentially affect the type of advice that veterinarian’s offered to their clients, which could have impacts on welfare and production. Despite this, the majority (66% veterinarians; 73% farmers) of both groups agreed on an acceptable NSAID price of less than two pounds per calf, which supports the findings of Huxley and Whay (2007). According to a specified list price for meloxicam of £1.97/100kg (Hudson et al 2008; Wern Veterinary Surgeons price 2015), NSAIDs would be a viable option for the majority of respondents in the current study. Veterinarians that indicated that the pain associated with disbudding persisted for a longer period were more likely to state that farmers would be willing to pay a higher price for NSAIDs. Similarly, a study by Hewson et al (2007) reported an association between the unwillingness to pay for analgesia with lower pain scoring. Veterinarians, who indicated they don’t use NSAID, generally rated cost importance higher and stated lower acceptable prices (less than one pound) compared to NSAID users. These findings highlight the importance of improving vet-client communication around the subject. As it suggests that some veterinarians may not be adequately discussing with their clients NSAIDs options due to preconceived notions of farmer perceptions and priorities. It is an essential part of veterinary medicine that all realistic analgesic options are communicated with clients to allow them to make informed decisions for the care of their livestock.

Implications for animal welfare and conclusions

In conclusion, this study highlights an inadequacy in vet-client communications
in conveying the practicalities and potential benefits of using NSAIDs. Importantly
veterinarians underestimate the influences of welfare, and analgesic duration and
effectiveness on farmers’ decisions and overrated cost impact. This perception could
have a negative effect on veterinary recommendation and should be addressed.

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