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Current attitudes of bovine practitioners, claw-trimmers and farmers in Switzerland to pain and painful interventions in the feet in dairy cattle [☆]

Johanna Becker ^a, Martin Reist ^b, Katharina Friedli ^c, Dirk Strabel ^d, Marianne Wüthrich ^a, Adrian Steiner ^{a,*}

^a Clinic for Ruminants, Vetsuisse Faculty, University of Berne, Berne 3012, Switzerland

^b Veterinary Public Health Institute, Vetsuisse Faculty, University of Berne, Berne 3012, Switzerland

^c Swiss Federal Veterinary Office, Centre for Proper Housing of Ruminants and Pigs, Tänikon, Ettenhausen 8356, Switzerland

^d Bovine Health Service, Lindau 8315, Switzerland

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ABSTRACT

The attitudes of bovine practitioners, claw-trimmers and farmers towards painful therapeutic claw-trimming of dairy cattle were surveyed and differences between the respondents were assessed. A total of 77 farmers and 32 claw-trimmers were interviewed, and 137 bovine practitioners completed an equivalent online survey. No veterinary consultation for common painful interventions in the feet of cattle was reported by 52% of farmers (i.e. procedures in these herds were performed without local anaesthesia). Only ~30% of practitioners always carried out such interventions under local anaesthesia and, in general, practitioners considered pain reduction to the lowest possible level less important than did farmers. Furthermore, 47% of practitioners and 33% of claw-trimmers, compared to only 11% of farmers, agreed with the statement that the cost of pain management was a major concern for farmers.

There was a particular lack of awareness by farmers regarding the obligation to carry out painful therapeutic claw-trimming under analgesia and the application of local anaesthesia during the trimming of sole ulcers was considered reasonable by significantly fewer farmers (41.6%) and claw-trimmers (46.9%), than practitioners (78.6%). Overall, the attitudes of those involved in painful therapeutic claw-trimming contrasted with Swiss national legislation and with farmer opinion on the importance of reducing pain to the lowest level possible.

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Introduction

Pain has been described by the International Association for the Assessment of Pain as ‘*an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage*’ (Merskey, 1979). Molony (1992) proposed that animal pain generally served the same purposes as human pain, and that although the experiences were similar, they were not identical. Procedures or clinical conditions that cause pain in humans can also be expected to be painful in animals (ACVA, 1998). The UK Farm Animal Welfare Council (FAWC, 1993) set out the ‘Five Freedoms’ as guidelines for the welfare of all species of livestock, including the ‘*freedom from pain, injury or disease – by prevention or rapid diagnosis and treatment*’. In Switzerland, freedom of pain in animals is regulated in the Swiss Animal Welfare Law (Anonymous, 2005a).

Poorly managed pain not only results in distress and compromised welfare but also impacts negatively on cattle productivity through impaired physiological and immunological function, negative energy balance and self-mutilation (Anil et al., 2005), and may lead to significant economic loss (Paul-Murphy et al., 2004). Pain can only be alleviated when it has been correctly identified and assessed (Anil et al., 2005). The recognition and evaluation of pain in cattle can be challenging as this species may not express clinical signs commensurate with the level of pain experienced, and will tend to hide and remain motionless, as injured animals are more prone to predation (Short, 1998; Phillips, 2002; Underwood, 2002; Fitzpatrick et al., 2006). Furthermore, adequate methods of assessing (particularly chronic) pain in this species remain elusive (Anil et al., 2005; Viñuela-Fernández et al., 2007).

Although pain management in farm animals requires collaboration between farmers, veterinary technicians and veterinarians, this collective effort may be influenced by the different estimations of, attitudes toward, and economic consequences of pain by the parties involved, (Anil et al., 2005; Viñuela-Fernández et al., 2007).

Improvements in pain management in farm animals have not progressed at the same rate as they have in companion animals (Anil et al., 2005), and a number of studies have highlighted

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* Corresponding author. Tel.: +41 31 631 23 44.

E-mail address: adrian.steiner@vetsuisse.unibe.ch (A. Steiner).

insufficient pain management of painful procedures in cattle (Rae-kallio et al., 2003; Barrett, 2004; Huxley and Whay, 2006; Hewson et al., 2007a,b; Hudson et al., 2008; Fajt et al., 2011). Swiss animal welfare legislation (Anonymous, 2005b) enshrines the obligation to provide analgesia when performing potentially painful surgical interventions in cattle. In a study of 1449 dairy cattle from 78 farms in Switzerland, prevalence of lameness at cow and herd-level was 15% and 81%, respectively (J. Becker, unpublished data), suggesting that painful therapeutic claw-trimming is frequently required and performed. During such interventions, analgesia such as that afforded by local anaesthesia, should be administered to mitigate any pain provoked (Rushen et al., 2007), and there is an expectation of strict compliance with such animal welfare legislation within Swiss society (Brandenberg, 2007).

Lameness in cattle is important because of its significant negative impact on animal welfare (Whay et al., 1997) and production (Kossaibati and Esslemont, 1997; Green et al., 2002; Booth et al., 2004; Garbarino et al., 2004; Sogstad et al., 2006; Bicalho et al., 2007; Amory et al., 2008). As lame animals are in a chronic state of hyperalgesia (Whay et al., 1997), adequate pain management during therapeutic claw-trimming is especially important to avoid severe peri- and post-operative pain and distress. Claw-trimming as a procedure is stressful (Pesenhofer et al., 2006), as cattle are typically restrained in a trimming chute which may limit their movement and expression of the signs of pain, an event which in turn may result in an under-estimation of the pain the animal experiences. The objective of this study was to assess the attitudes of bovine practitioners, farmers and claw-trimmers towards pain and painful interventions in the feet in dairy cattle and their compliance with the obligation to provide adequate analgesia.

Materials and methods

Questionnaire design and delivery

A questionnaire¹ was designed, based on those previously used to investigate the use of analgesia in companion animals (Capner et al., 1999; Lascelles et al., 1999), and cattle (Huxley and Whay, 2006, 2007; Laven et al., 2009; Thomsen et al., 2010, 2012). The 'Introduction' section of the questionnaire collected background data such as decade of birth, gender, year of graduation and the continuing education undertaken by bovine practitioners, the number of years they had been working in cattle practice, the approximate number of claw-trimming procedures they performed/year, and the frequency of therapeutic claw-trimming procedures performed by bovine practitioners, claw-trimmers, farmers, and other lay persons. The respondents' knowledge of the obligation to provide analgesia during interventions in the feet involving the 'pododerm' of the claw and their ability to recognise pain in cattle and the emphasis they placed on its appropriate reduction were assessed. Bovine practitioners were also asked to estimate their knowledge of pain management. Possible answers for the three latter questions could be chosen from a graduated non-numerical scale: 'absolutely (good/bad)', 'very (good/bad)', 'rather (good/bad)', etc.

In the 'Materials and methods' section of the questionnaire the respondents were asked to estimate the sensitivity to pain of different animals on a numerical scale from 1 (no sensitivity) to 10 (highest sensitivity), the pain caused by several interventions on the feet in dairy cattle on a scale from 1 (none) to 10 (most severe), and the usefulness of different pain indicators in dairy cattle suffering from claw lesions on a scale from 1 (not useful) to 10 (very useful). Additionally, respondent opinion towards the benefit of local anaesthesia and post-operative analgesia (for three consecutive days) during several interventions in dairy cattle were sought: 'yes, it is reasonable'/'no, it is not reasonable'. Farmers as well as veterinarians were asked to specify an acceptable level of cost to manage this pain (Table 10).

The 'Results' section of the questionnaire contained several statements about attitudes toward pain and pain management with which the respondents were asked to agree/disagree. Veterinarians were asked questions about the drugs available for pain management in dairy cattle in their practice and their actual usage of these drugs, as only veterinarians are allowed to administer analgesia as specified by Swiss Animal Welfare Law (Anonymous, 2005b).

The questionnaires targeting farmers, claw-trimmers and veterinary practitioners were adapted to each other to allow direct comparison among the three groups. Prior to the start of the study the questionnaire for veterinarians was

pre-tested on five veterinarians from the Herd Health Management Section of the Clinic for Ruminants at the University of Berne. Five undergraduate students of the School of Agricultural, Forest and Food Sciences, Berne University of Applied Science, pre-tested the questionnaires for claw-trimmers and farmers. All questionnaires were slightly adapted as a result of this pilot procedure. Pre-testing was followed by a period of practicing and standardising the use of the questionnaires by four investigators who collected the data from the farmers and claw-trimmers.

Between June 2010 and February 2011, 32 claw-trimmers of the Swiss Federation of Claw-trimmers SKV/ASPO (SKV), were accompanied during their routine claw-trimming visits to between one and six dairy farms/claw-trimmer. The claw-trimmers had been randomly chosen from a list of all the registered members and had been contacted by telephone. A new claw-trimming knife was offered as an incentive to participate in the study. The farmers of the herds involved ($n = 77$) were invited to participate and this was incentivized by a payment of 20 CHF.² Farmers as well as claw-trimmers were interviewed by one of the four trained investigators in the absence of other persons by using the respective questionnaire.

In order to include only bovine practitioners, each veterinarian had to state what percentage of their work involved cattle and 'bovine practitioners' were defined as veterinarians with >50% of their work comprising farm animals and with at least 80% of this involving cattle. Only entirely completed questionnaires from these practitioners were considered for data evaluation. In order to reach as many bovine practitioners as possible, the questionnaire for veterinarians was designed using an online survey platform.³

In collaboration with the Association of Swiss Bovine Practitioners SVW-ASMR (SVW), information relating to the then upcoming study was posted in a newsletter targeting bovine practitioners. The contact e-mail addresses of 457 members of the Association of Swiss Veterinarians (GST) listed as working with farm animals were provided by the GST for the purpose of the study. At a continuing education event for bovine practitioners in Berne, Switzerland, additional information on the study was provided and interested veterinarians were asked to provide contact e-mail addresses. An 'invitation to participate' e-mail was then sent to 507 practitioners explaining the goals of the study and the estimated time required to complete the questionnaire, and respondents were assured of their anonymity. A draw for three book vouchers, each worth 100 CHF, was offered to incentivise participation. A reminder e-mail was sent to all invited veterinarians, and a reminder was also included in a second newsletter from the SVW 1 month before the survey closed. The 137 practitioners who qualified as bovine practitioners by our definition completed the online questionnaire, and these were included in the data evaluation process.

Statistical analysis

Online questionnaire data were exported into Excel 2007 (Microsoft) and imported into an Access 2007 (Microsoft) database for further processing and validation, together with the data from the personal interviews with farmers and claw-trimmers. Data were then analysed using NCSS 2007 and 'R' (version 2.13.1). Data were first subjected to descriptive statistical analysis. Normality was assessed using normal $q-q$ plots and by applying the tests comprised in the descriptive statistics procedure of NCSS for formal normality testing. Kruskal–Wallis tests on Ranks with the Kruskal–Wallis multiple-comparison Z-value test (Dunn's Test) as correction for multiple testing (pairwise comparisons) were used for data not found to be normally distributed and for data on an ordinal scale in order to assess differences between groups of respondents such as the comparison of the estimated perception of sensitivity to pain of cows between bovine practitioners, farmers and claw-trimmers (independent scores).

Logistic regression was used to analyse the effect of the group of respondents on binomially distributed data such as the agreement with statements. Friedman tests were used for data found not to be normally distributed and for data on an ordinal scale to assess differences between dependent scores given within a group of respondents. This included scores of respondent groups (e.g. bovine practitioners) on pain sensitivity of different species with each practitioner scoring the sensitivity to pain of the different species (e.g. human, horse, cow, calf, small ruminants, and young mammals). Another example was the scoring of the perceived pain induced by various interventions within a respondent group (e.g. claw-trimmers) with each claw-trimmer scoring different interventions. Wilcoxon Signed Rank tests with Bonferroni corrected P -values were used for pairwise comparisons. The significance was set at $P < 0.05$.

Results

Background data and awareness of obligation to provide analgesia

Information about decade of birth, gender, year of graduation and the continuing education undertaken (bovine practitioners), years working with cattle, and approximate number of claw-

¹ Copies of the questionnaire are available from the corresponding author on request.

² 1 CHF = approx. UK£ 0.67, US\$ 1.08, € 0.83 at 13th December 2012.

³ See: <http://www.surveymonkey.com>.

trimming procedures performed/year (claw-trimmers and bovine practitioners) are detailed in Table 1. Most of the 32 claw-trimmers (96.9%) compared to 31.2% of the 77 farmers ($P < 0.001$) and 63.5% of 137 bovine practitioners ($P < 0.01$) were aware of the obligation to administer analgesia as soon as a particular intervention elicited pain, i.e. in the context of claw-trimming, as soon as the pododerm was involved in the procedure. The percentage of farmers (31.2%) and bovine practitioners (63.5%) also differed significantly ($P < 0.001$) toward this question.

Recognition and reduction of pain

Significantly more farmers (50.7% of 77 respondents; $P < 0.001$) than bovine practitioners (25.6% of 137 respondents) thought that reducing pain to the lowest possible level was of 'absolute' importance. No significant difference was found between claw-trimmers (34.4% of 32 respondents) and the other groups towards this question. Details of opinions regarding the usefulness of different pain indicators in lame dairy cattle of respondents are given in Table 2. Compared to 48.9% of 137 bovine practitioners, 63.6% of 77 farmers ($P < 0.039$) and 65.6% of 32 claw-trimmers considered themselves 'absolutely' or 'very' good at recognising pain in dairy cattle, and 47.5% of the 137 practitioners considered their knowledge of pain management 'absolutely' or 'very' good. Descriptions of the estimated sensitivity of different species to pain and differences between and within groups of respondents are detailed in Table 3.

Treatment of claw lesions

More than 50% of farmers stated that all painful interventions on the feet in dairy cattle were performed by persons other than veterinarians, i.e. without local anaesthesia. This was mainly by claw-trimmers, followed by the farmers themselves and in some cases by other laypersons (Table 4). The percentages of claw-trimmers who stated that they treated solar ulcers, white-line disease, and inter-digital hyperplasia involving the pododerm without consulting a veterinarian (i.e. without analgesia) in at least 95% of cases were 84.4%, 90.6%, and 15.6%, respectively. The

frequency of painful interventions performed by bovine practitioners (with or without analgesia) is given in Table 5.

Perception of levels of pain involved

Information on the perceived level of pain caused by different interventions performed without analgesia, between and within respondent groups is given in Table 6. Significantly more bovine practitioners (88.3%; median level 8) compared to 76.6% of farmers ($P = 0.027$; median level 7), and 62.5% of claw-trimmers ($P < 0.001$; median level 7) stated that excision of a solar ulcer performed without analgesia caused pain to a level of $\geq 6/10$. Significant differences were also evident between the percentages of bovine practitioners (84.7%; median level 8), and farmers (71.4%; median level 7; $P = 0.022$) and claw-trimmers (65.6%; median level 7; $P = 0.016$) regarding the pain level perceived by them in treating white-line disease where levels could be $\geq 6/10$. No significant differences could be discerned for digit amputation (level $\geq 6/10$ estimated by 100% of respondents of all groups; median of 10 estimated by the three groups), or for excision of inter-digital hyperplasia: level $\geq 6/10$ estimated by 89.1% (median level 8), 82.9% (median level 8), and 86.7% (median level 9) of bovine practitioners, farmers, and claw-trimmers, respectively.

Benefits and administration of analgesia

Table 7 provides information on the attitudes of each group of respondents towards the benefits of local anaesthesia and subsequent post-operative pain management for three consecutive days during painful interventions to the feet. Detailed information on the administration of local anaesthesia and on both peri-operative and post-operative (for three consecutive days) use of non-steroidal anti-inflammatory drugs (NSAIDs) is given in Table 8.

In general, local anaesthesia was more often administered for the excision of inter-digital hyperplasia and for digit amputation than for the treatment of white-line disease or solar ulcers. Similar results were obtained for the administration of NSAIDs as these were generally more frequently administered during the excision

Table 1

Distribution of decade of birth, gender, year of graduation, years working with cattle, approximate number of claw-trimming procedures carried out/year and continuing education undertaken of the respondents (137 bovine practitioners, 32 claw-trimmers, and 77 farmers), to a questionnaire of attitudes to pain in and painful interventions on the feet of dairy cattle. *n*, number of answers.

	Bovine practitioners	Claw-trimmers	Farmers
Decade of birth			
1930–1949	5.8% (<i>n</i> = 8)	12.5% (<i>n</i> = 4)	7.8% (<i>n</i> = 6)
1950–1969	60.6% (<i>n</i> = 83)	50% (<i>n</i> = 16)	64.9% (<i>n</i> = 50)
1970–1989	33.6% (<i>n</i> = 46)	37.5% (<i>n</i> = 12)	27.3% (<i>n</i> = 21)
Gender			
Female	22.6% (<i>n</i> = 31)		10.4% (<i>n</i> = 8)
Male	77.4% (<i>n</i> = 106)	100% (<i>n</i> = 32)	89.6% (<i>n</i> = 69)
Year of graduation	1986	No information applicable	No information applicable
Median	Minimum 1950 Maximum 2010		
Years working with cattle	22 (20.7)	20 (19.7)	46 (45.2)
Median (mean)	Minimum 2 Maximum 50	Minimum 2 Maximum 46	Minimum 1 Maximum 72
Cattle trimmed by claw-trimmer or treated by bovine practitioner for claw problems/year	50 (77.3)	1350 (2151.6)	No information available
Median (mean)	Minimum 4 Maximum 400	Minimum 200 Maximum 7000	
Continuing education in management of pain = 'yes'	59.1% (<i>n</i> = 81)	No information available	No information available
Continuing education in claw-trimming = 'yes'	64.2% (<i>n</i> = 88)	No information applicable	No information applicable

Table 2
Usefulness of potential indicators of pain in lame dairy cattle on a scale from 1 (not useful at all) to 10 (extremely useful) by Swiss bovine practitioners, claw-trimmers, and farmers.

Pain indicator	Estimations of bovine practitioners Median (min–max) (n = number of respondents)	Estimations of claw-trimmers Median (min–max) (n = number of respondents)	Estimations of farmers Median (min–max) (n = number of respondents)
Teeth grinding	8 (1–10) n = 131	7 (1–10) n = 23	4 (1–10) n = 60
Changes in social behaviour	7 (1–10) n = 136	7 (1–10) n = 32	7 (1–19) n = 72
Reduced food intake	8 (1–10) n = 136	9 (5–10) n = 32	9 (4–10) n = 77
Decreased milk yield	8 (1–10) n = 137	9 (5–10) n = 32	9 (5–10) n = 77
Increased lying time	9 (1–10) n = 119	10 (4–10) n = 32	9 (4–10) n = 77
Increased shifting of weight	9 (1–10) n = 136	9 (4–10) n = 32	8 (3–10) n = 76
Lameness score	9 (3–10) n = 137	10 (5–10) n = 32	9 (5–10) n = 76
Defensive movements during treatment	7 (1–10) n = 137	8 (2–10) n = 32	8 (1–10) n = 76
Changes in manner of rising	8 (1–10) n = 137	9 (4–10) n = 32	8 (2–10) n = 75
Defensive movement at rotation of claw and/or at pressure with hoof-pincers	9 (1–10) n = 136	9 (5–10) n = 32	9 (4–10) n = 53
Exudation	7 (1–10) n = 131	8 (1–10) n = 29	6.5 (1–10) n = 66
Vocalisation (groaning/roaring) during treatment	6 (1–10) n = 133	8 (1–10) n = 31	7 (1–10) n = 76
Increased respiratory rate/heart rate, enlarged pupils	8 (1–10) n = 131	8 (2–10) n = 30	8 (1–10) n = 73

Table 3
Perception of sensitivity of different species to pain of survey respondents (bovine practitioners, claw-trimmers and farmers) on a numerical scale from 1 (no sensitivity) to 10 (highest sensitivity possible), and differences between and within groups of respondents.

Species	Estimations of bovine practitioners (n = number of respondents)			Estimations of claw-trimmers (n = number of respondents)			Estimations of farmers (n = number of respondents)		
	Mean level	Median level (range)	n	Mean level	Median level (range)	n	Mean level	Median level (range)	n
Horses	8.01	8 ^{AB,abcd} (5–10)	127	7.04	7 ^{A,a} (4–10)	25	7.00	7 ^{B,ab} (4–10)	55
Humans	7.74	8 ^{A,efgh} (4–10)	122	7.19	7 (4–10)	32	6.64	7 ^{A,c} (3–10)	74
Small ruminants	7.33	8 ^{AB,ae} (3–10)	124	6.2	6.5 ^A (2–10)	30	6.38	6 ^B (3–10)	58
Calves	7.26	7 ^{AB,bf} (3–10)	127	6.31	6 ^A (3–10)	32	6.22	6 ^{B,a} (2–10)	76
Young mammals (kitten/puppy)	7.22	7 ^{A,ce} (3–10)	119	6.53	7 (2–10)	32	6.35	6.5 ^A (2–10)	66
Dairy cows	7.12	7 ^{AB,dh} (3–10)	128	6.06	6 ^{A,a} (3–10)	32	6.01	6 ^{B,bc} (2–9)	77

^{A–B} Same superscript uppercase letters within rows represents significant differences between groups of respondents ($P < 0.05$).

^{a–h} Same superscript lowercase letters within columns represent significant differences within a group of respondents ($P < 0.05$).

Table 4
Percentage of painful interventions performed by farmers, claw-trimmers, bovine practitioners, and other lay persons on the feet of dairy cattle. Responses are from 77 farmers, who chose the appropriate category from the following list: 100%, 99–95%, 95–75%, 75–50%, 50–25%, 25–5%, 5–1%, and 0%.

Frequency of such interventions performed by farmer			
Percentage of farmers who stated they performed such interventions			
Always or in			
>95% of cases	50–95% of cases	1–50% of cases	Never
5.19%	11.69%	35.07%	48.05%
Frequency of such interventions performed by claw-trimmer			
Percentage of farmers who stated that claw-trimmer performed such interventions			
Always or in			
>95% of cases	50–95% of cases	1–50% of cases	Never
41.56%	32.47%	23.37%	2.6%
Frequency of such interventions performed by veterinarian			
Percentage of farmers who stated that veterinarian performed such interventions			
Always or in			
>95% of cases	50–95% of cases	1–50% of cases	Never
2.6%	2.6%	42.85%	51.95%
Frequency of such interventions performed by other lay persons			
Percentage of farmers who stated that other lay persons performed such interventions			
Always or in			
>95% of cases	50–95% of cases	1–50% of cases	Never
0%	1.3%	9.09%	89.61%

of inter-digital hyperplasia and digit amputation than for the treatment of solar ulcers and white-line disease. In >50% of the practices surveyed, xylazine hydrochloride (Xylazin, Streuli Pharma; 97.8%), lidocaine hydrochloride (Lidocain 2%, Streuli Pharma; 97.8%),

ketoprofen (Dolovet, Dr. E. Graeb; PO 92%, IV 77.4%), ketamine (Ketasol-100, Dr. E. Graeb; 78.1%), flunixin meglumine (Flunixin Biokema; 73%), meloxicam (Metacam, Boehringer Ingelheim; 67.9%), and carprofen (Rimadyl Rind, Pfizer; 53.3%) were available

Table 5

Frequency of painful interventions on the feet of lame dairy cows (with or without analgesia) performed by bovine practitioners. Responses from 137 practitioners, who chose from the following list of possible answers: 'very often', 'often', 'sometimes', 'seldom', 'very seldom', and 'never'.

Intervention	Very often (%)	Often (%)	Sometimes (%)	Seldom (%)	Very seldom (%)	Never (%)
Digit amputation	0	0	5.84	21.9	45.3	27
Excision of inter-digital hyperplasia	2.2	11	40.2	29.2	15.3	2.2
Excision of solar ulcer	15.3	33.6	36.5	13.1	1.5	0
Excision of white-line disease	11	27.7	33.6	21.2	5.8	0.7

Table 6

Differences in perception of pain on a scale from 1 (no pain) to 10 (most severe pain) caused by different interventions on the feet in dairy cattle, performed without analgesia between and within groups of respondents (bovine practitioners, claw-trimmers and farmers).

Intervention	Estimations by bovine practitioners (n = number of respondents)			Estimations by claw-trimmers (n = number of respondents)			Estimations by farmers (n = number of respondents)		
	Mean level	Median level (range)	n	Mean level	Median level (range)	n	Mean level	Median level (range)	n
Digit amputation	9.70	10 ^{abc} (8–10)	137	9.84	10 ^{abc} (8–10)	31	9.64	10 ^{abc} (7–10)	77
Excision of inter-digital hyperplasia	7.82	8 ^{ad} (4–10)	137	8.17	9 ^{ade} (3–10)	30	7.57	8 ^{ade} (3–10)	70
Excision of solar ulcer	7.64	8 ^{AB,b} (3–10)	137	6.66	7 ^{A,bd} (1–10)	32	6.99	7 ^{B,bd} (3–10)	77
Excision of white-line disease	7.39	8 ^{A,cd} (2–10)	137	6.66	7 ^{ce} (1–10)	32	6.71	7 ^{A,ce} (3–10)	77

^{A–B} Same superscript uppercase letters within rows represent significant differences between groups of respondents ($P < 0.05$).

^{a–e} Same superscript lowercase letters within columns represent significant differences within a group of respondents ($P < 0.05$).

Table 7

Differences in opinions of respondents (bovine practitioners, claw-trimmers and farmers) on the benefits of local anaesthesia and post-operative analgesia on painful interventions on the feet of dairy cattle.

Intervention group of respondents	Percentage of respondents considering local anaesthesia reasonable	Number of respondents	Percentage of respondents considering post-operative analgesia for three consecutive days reasonable	Number of respondents
<i>Digit amputation</i>				
Bovine practitioners	100	135	92.6	135
Claw-trimmers	100	32	90.6	32
Farmers	100	76	87.5	74
<i>Excision of inter-digital hyperplasia</i>				
Bovine practitioners	98.5 ^A	134	21.5	130
Claw-trimmers	96.8 ^B	31	26.7	30
Farmers	78.3 ^{AB}	69	23.2	69
<i>Excision of solar ulcer</i>				
Bovine practitioners	78.6 ^{CD}	131	40.3 ^{AB}	129
Claw-trimmers	46.9 ^C	32	3.2 ^A	31
Farmers	41.6 ^D	77	10.4 ^B	77
<i>Excision of white-line disease</i>				
Bovine practitioners	72.3 ^{EF}	130	27.1 ^{CD}	129
Claw-trimmers	29 ^E	31	6.7 ^C	30
Farmers	43.4 ^F	76	10.5 ^D	76

^{A–F} Same superscript uppercase letters within columns represent significant differences between groups of respondents ($P < 0.05$).

for pain management in dairy cattle. Tolfenamine (Tolfedine CS, Vétoquinol; 36.5%), metamizol (dipyrone) (Dolazon, Dr. E. Graeb; 32.9%), detomidine (Medesedan, Virbac; 24.8%), medetomidine (off-label use; 24.1%) were available in some practices.

Costs of pain management

The percentage of respondents who agreed with the statement that 'farmers would like their cattle to be treated with analgesics, but the price is a major concern' differed between the three surveyed groups (Table 9). Significantly more bovine practitioners (46.7%, $P < 0.001$) and claw-trimmers (33.3%, $P < 0.01$) agreed with this statement, compared to 10.8% of farmers. In comparison to 60.9% of bovine practitioners, 27.1% of farmers ($P < 0.001$) considered 16 CHF/case as an acceptable total cost of pain management in the treatment of a solar ulcer. The results for the treatment of

white-line disease were similar ($P < 0.001$). The percentage of farmers considering this level of cost for analgesia as acceptable for the excision of inter-digital hyperplasia was even higher (42.5%), but was significantly lower ($P = 0.02$) than that of bovine practitioners. Further information on the percentage of farmers and bovine practitioners considering different levels of costs deemed acceptable for several interventions are provided in Table 10.

Agreement with statements about pain/pain management

Table 9 provides information on the percentage of respondents who agreed with several statements about attitudes toward painful interventions and pain management in the feet in dairy cattle as well as the significant differences between the three groups of respondents.

Table 8

Frequency of the use of local anaesthesia, and of peri- and post-operative (for 3 days) non-steroidal anti-inflammatory drugs (NSAIDs) during painful interventions on the feet of dairy cattle by bovine practitioners (BP) who reported treating inter-digital hyperplasia ($n = 73$), solar ulcers ($n = 117$), and white line disease ($n = 99$) at least 'sometimes', and digit amputation ($n = 38$) at least 'seldom', respectively. Respondents were asked to select one of the following: 'very often', 'often', 'sometimes', 'seldom', 'very seldom', and 'never'. Possible answers were 0%, 1–5%, 5–25%, 25–50%, 50–75%, 75–95%, 95–99%, and 100%.

Local anaesthesia	Percentage of BP who administered local anaesthesia in 100% of cases	Percentage of BP who administered local anaesthesia in at least 50% of cases	Percentage of BP who never administered local anaesthesia
Digit amputation	100	100	0
Excision of interdigital hyperplasia	94.5	98.6	1.4
Excision of solar ulcer	33.3	65	10.3
Excision of white-line disease	27.3	62.6	10.1
Peri-operative NSAIDs	Percentage of BP who administered peri-operative NSAIDs in 100% of cases	Percentage of BP who administered peri-operative NSAIDs in at least 50% of cases	Percentage of BP who never administered peri-operative NSAIDs
Digit amputation	68.4	73.7	21.1
Excision of interdigital hyperplasia	23.3	41.1	34.3
Excision of solar ulcer	7.7	23.9	48.7
Excision of white-line disease	7	22.2	48.5
Post-operative NSAIDs	Percentage of BP who administered post-operative NSAIDs in 100% of cases	Percentage of BP who administered post-operative NSAIDs in at least 50% of cases	Percentage of BP who never administered post-operative NSAIDs
Digit amputation	68.4	81.6	7.9
Excision of interdigital hyperplasia	12.3	26	37
Excision of solar ulcer	7.7	24.8	24.8
Excision of white-line disease	6.1	20.2	31.3

Table 9

Percentage of respondents (bovine practitioners [BP], claw-trimmers [CT], and farmers [F]) agreeing with statements about attitudes toward painful interventions and pain management in the feet of dairy cattle. Differences between groups are indicated.

Statement	Percentage of BP agreeing (number of respondents)	Percentage of CT agreeing (number of respondents)	Percentage of F agreeing (number of respondents)	Significant differences between groups
Farmers would like their cattle to be treated with analgesics, but the price is a major concern	46.7 (122)	33.3 (30)	10.8 (74)	F < BP ($P < 0.001$) F < CT ($P < 0.01$)
Farmers are willing to pay the costs of analgesics for their dairy cattle	60.9 (92)	70 (30)	74.3 (74)	$P > 0.05$
Some pain is necessary to avoid cows moving too much to prevent progressive damage of the injury/claw lesion	15.5 (129)	16.1 (31)	43.1 (72)	BP < F ($P < 0.001$) CT < F ($P = 0.012$)
The general condition of dairy cattle recovers faster after using analgesics	91.8 (134)	93.3 (30)	87 (69)	$P > 0.05$
Withdrawal times of analgesic drugs are a large concern for farmers	29.3 (133)	29 (31)	15.6 (77)	F < BP ($P = 0.028$)
Analgesics may mask a deterioration of the animal's general condition	39.2 (130)	75.9 (29)	56.9 (72)	BP < CT ($P < 0.001$) BP < F ($P < 0.016$)
If there are no defensive movements, there is no need for analgesia during treatment of claw lesions involving the pododerm	29.9 (137)	78.1 (32)	81.8 (77)	BP < CT, F ($P < 0.001$)
I lack information about the possible benefits of pain management	No information available	54.8 (31)	35.6 (73)	$P > 0.05$
There is sufficient pain management in the dairy cattle I care for: 'yes', 'absolutely/very correct' ^a	35.8 (137)	No information available	87.5 (64)	BP < F ($P < 0.001$)
I would like local anaesthesia to be administered more frequently to the dairy cattle I care for during painful interventions on their feet (F, CT). I would like to administer local anaesthesia more frequently during such interventions (BP)	49.2 (128)	56.3 (32)	12.2 (74)	F < BP, CT ($P < 0.001$)
An important reason for administering analgesia in dairy cattle during painful interventions on their feet is the reduced risk of injury by defensive movements of the person performing this procedure	44.1 (127)	No information available	No information available	

^a Possible answers to the original question were 'absolutely correct', 'very correct', 'rather correct', 'rather incorrect', 'very incorrect', and 'absolutely incorrect'.

Discussion

Our data-set of 137 bovine practitioners completing this survey computes to a response rate of approximately 27%. Although the exact number of bovine practitioners in Switzerland that fit our definition is not known, and therefore a precise response rate cannot be determined, we consider our data-set representative.

Considerable efforts are ongoing by the members of the SVW and SKV to educate those involved in the techniques

of claw-trimming and to increase the involvement of veterinarians in the treatment of painful foot lesions by focusing on the differences between preventive/corrective trimming and painful therapeutic interventions, and on highlighting the obligation to administer analgesia in the case of the latter. Only claw-trimmers that were members of the SKV were surveyed in our study. These respondents would all have been well-trained and experienced in claw-trimming and would have been aware of the obligation to provide appropriate analgesia as necessary.

Table 10

Cost of pain management during painful interventions on the feet of dairy cattle considered acceptable by bovine practitioners and farmers. *n*, number of respondents. CHF, Swiss francs.¹

Intervention	Percentage of respondents that considered these costs acceptable by choosing one of the specified categories							
	0 CHF	1–3 CHF	4–7 CHF	8–15 CHF	16–30 CHF	31–50 CHF	51–80 CHF	>80 CHF
<i>Digit amputation</i>								
Bovine practitioners <i>n</i> = 127	0	0	0	2.3	19.7	37	25.2	15.8
Farmers <i>n</i> = 71	0	0	5.5	9.9	16.9	22.5	21.3	23.9
<i>Excision of inter-digital hyperplasia</i>								
Bovine practitioners <i>n</i> = 128	10.8	1.6	4.6	22.7	35.2	18.8	6.3	0
Farmers <i>n</i> = 66	24.2	1.5	10.6	21.2	25.8	10.6	6.1	0
<i>Excision of solar ulcer</i>								
Bovine practitioners <i>n</i> = 128	10.2	1.6	3.1	24.2	32	24.2	3.1	1.6
Farmers <i>n</i> = 74	55.4	0	2.7	14.8	20.3	5.4	1.4	0
<i>Excision of white-line disease</i>								
Bovine practitioners <i>n</i> = 128	21.1	0.8	2.3	25.8	28.1	17.2	3.1	1.6
Farmers <i>n</i> = 74	52.7	0	5.4	16.1	17.6	6.8	1.4	0

The 32 claw-trimmers surveyed represent 26% of all claw-trimmers registered as SKV-members (123 active claw-trimmers were registered by the SKV in 2010). As participation in this study was voluntary, the percentage of claw-trimmers more interested in/aware of pain management may have been greater than within the SKV as a whole, and this in turn may have resulted in a more positive attitude towards this issue in their responses. Therefore, some alternative attitudes might be underestimated. Compared to 137 bovine practitioners and 77 farmers, the sample size of claw-trimmers was rather small which may have resulted in reduced statistical power in the comparisons between groups. Farmers were systematically allocated to the sample by inclusion of the next farms visited by the claw-trimmer: i.e. the farmers participating in the study can be considered as randomly sampled, although a randomisation scheme was not used. Nevertheless, sampling might have been slightly biased in that some farmers might have been more interested in pain/pain management than the average Swiss farmer, as they frequently employ well-educated claw-trimmers. Thus, overall, the method through which the practitioners, claw-trimmers and farmers were selected for our survey could have resulted in an overestimation of compliance with animal regulations and in the use of anaesthesia/analgesia, i.e. reinforcing the main conclusions of this study.

Despite the obligation to provide analgesia during painful interventions, an extremely high percentage of painful procedures appear to be performed on the feet of cattle in Switzerland without adequate pain management. More than half of interviewed farmers reported that painful claw-trimming was performed without consulting a veterinarian, i.e. without the application of local anaesthesia. This was affirmed by the extremely high percentage of claw-trimmers who stated they treated solar ulcers and white-line disease in >95% of cases. Nevertheless, there seem to be differences in the attitudes towards these interventions as compared to the excision of inter-digital hyperplasia, as the latter was far less frequently performed by claw-trimmers. Nevertheless, 16% of claw-trimmers performed the excision of inter-digital hyperplasia without analgesia in >95% of cases although almost all of them were aware of the obligation to provide analgesia.

Despite the responsibility of veterinarians to minimise and prevent pain, insufficient pain management during painful interventions on the feet of cattle by practitioners frequently occurred, especially in the treatment of solar ulcers and white-line disease. Thus, the current situation with regard to therapeutic claw-trimming in cattle is at odds with both the requirement to provide analgesia and the desire within Swiss society for strict compliance with Animal Welfare legislation (Brandenberg, 2007). Interestingly, the frequency of inadequate pain management is

inconsistent with the importance of reducing pain to the lowest possible level which was a reported concern by the farmers surveyed. More than half of the investigated farmers considered the lowest pain possible to be 'absolutely' important, in contrast to only 34.4% of claw-trimmers and 25.6% of bovine practitioners.

So, on the one hand, farmers seemed to be very concerned about the well-being of their animals but on the other their attitudes with regard to the benefit of analgesia during some interventions differed significantly from that of practitioners and claw-trimmers. Farmers were far less frequently of the opinion that analgesia was required during treatment of solar ulcers, white-line disease and in the excision of inter-digital hyperplasia compared to practitioners. Furthermore, farmer respondents disagreed with the benefit of the application of local anaesthesia administered during the excision of inter-digital hyperplasia more often than claw-trimmers. In turn, the claw-trimmers also considered the application of analgesia during the excision of solar ulcers and white-line diseases less frequently reasonable than the practitioner respondents.

Farmers did not seem to be in favour of increasing the use of local anaesthesia by veterinarians during therapeutic claw-trimming. The decision whether to treat a foot lesion without analgesia or to consult a veterinarian is in most cases made by the farmer, possibly after discussion with a claw-trimmer. Consequently, farmer estimations of pain and the benefit of analgesia are critical and can have a significant impact on animal welfare at farm level (Kielland et al., 2010). However, although more than half of the farmers and claw-trimmers considered their recognition and assessment of pain as 'absolutely' or 'very' good, most farmers were not aware of the obligation to provide analgesia during these interventions and were of the opinion that pain management in their herds was generally sufficient, despite the fact that this study revealed treatment to be frequently inadequate.

Practitioners considered themselves less frequently 'absolutely' or 'very' good in identifying and assessing pain in cattle under their case, which probably reflects a more self-challenging attitude within this group. Additionally, more than one in three farmers and more than 50% of the claw-trimmers stated that they often had insufficient knowledge regarding the potential benefits of pain management. A considerable percentage of farmers (65.9%) and claw-trimmers (75.9%) agreed with the statement that '*analgesia may mask deterioration in the general condition of dairy cattle*'. In comparison, 40% of Danish farmers agreed with this statement (Thomsen et al., 2012).

Another reason for the lack of knowledge of the benefit/necessity of analgesia during these interventions is the frequent under-estimation of pain in cattle. Farmers, as well as claw-trimmers, were less frequently of the opinion that treating a solar

ulcer or white-line disease caused at pain to a score of at least 6 when compared to practitioners. Moreover, some claw-trimmers indicated that treating solar ulcers and white-line disease involving the pododerm would not cause pain. Our results contrast with those of a recent study by Thomsen et al. (2012) who reported generally higher 'pain-score' estimations by Danish farmers than by veterinarians for common painful diseases of dairy cattle, despite the fact that Danish farmers were found to favour the use of analgesics less than their veterinarians.

In our study, all respondent groups considered digit amputation and, except for practitioners, the excision of inter-digital hyperplasia more painful than treating solar ulcers and white-line disease, and were more often aware of the benefit of analgesia during these two procedures. This is in line with the findings of Huxley and Whay (2006, 2007), who also reported higher pain-scores for digital amputation than for the treatment of solar ulcers as estimated by veterinarians and farmers in the UK. However, every treatment procedure that involves the pododerm elicits pain, has a negative impact on animal welfare and, consequently, has long-term effects on productivity (Paul-Murphy et al., 2004; Anil et al., 2005).

An under-estimation of pain may reflect the frequently subtle expression of the signs of pain by cattle (Short, 1998; Phillips, 2002; Underwood, 2002; Fitzpatrick et al., 2006). The difficulty in the recognition of pain is even more pronounced when animals are restrained in chutes. Altered facial expression, increased respiratory rate, teeth grinding or groaning (Short, 1998; Anil et al., 2005; Hudson et al., 2008) may be over-looked if the primary focus is on an animal's feet. Furthermore, falling down in the chute and remaining motionless (a potential expression of an attempt to hide) are common behaviours of cattle in distress (Short, 1998), and may be misunderstood and possibly exploited in easing the process of claw-trimming. This was affirmed by the high percentage of claw-trimmers and farmers who, in contrast to practitioners, agreed with the statement that there was '*no need for analgesia if defensive movements during a treatment of claw lesion were lacking*'. The stoical behaviour of cattle in such situations is an important reason for these estimations of low sensitivity to pain as compared to horses or humans, and as expressed by farmers, practitioners, and to some extent claw-trimmers.

It was quite bewildering that practitioners judged the sensitivity to pain of horses and humans as significantly different from that of cattle given their professional training in this area. Raekallio et al. (2003) reported similar attitudes for veterinarians working in Finland who considered the sensitivity to pain of cattle lower than that of small animals. Nevertheless, practitioners gave higher scores for the sensitivity to pain of almost all species including humans than did farmers or claw-trimmers. However, pain is assumed to be experienced similarly by humans and animals, and serves a broadly similar purpose (Molony, 1992). Although some animals like cattle do not communicate their pain as overtly as humans, this is most likely the consequence of strong evolutionary pressure to mask its expression (Phillips, 2002). The results of our survey suggest increased effort is required to improve the awareness and understanding of pain expression in dairy cattle.

Besides the recognised challenges of assessing pain in cattle, and the differences in perception between practitioners and farmers as to the benefit of analgesia or the level of pain experienced by animals, there are other considerations veterinarians must take into account when administering drugs such as licensing issues, withdrawal times, and cost. In contrast to the US (Fajt et al., 2011), several drugs are licensed for pain management in dairy cattle in Switzerland, and in most cases, at least two different medications were available in the practices surveyed. Approximately 26% of practitioners considered withdrawal times a significant problem for farmers, who, in contrast, did not consider this factor as important. Several analgesics, including some containing ketoprofen,

xylazine hydrochloride, and lidocaine hydrochloride, have short or zero withdrawal times for both milk and meat. Although withdrawal times incur costs, these should be outweighed by the costs of decreased milk production and fertility, which persist in lame cows (Green et al., 2002; Garbarino et al., 2004; Sogstad et al., 2006; Bicalho et al., 2007; Amory et al., 2008).

Despite the fact that more than half of the practitioners considered pain management in treated cattle insufficient, most did not intend to administer local anaesthesia more frequently during future treatments. Furthermore, only 63% of practitioners were aware of the obligation to provide analgesia during these interventions. One reason for the difference between claw-trimmers and bovine practitioners in this regard may be the lesser involvement of veterinarians in this type of work. In addition to the lack of awareness of this obligation by practitioners, only 47% stated they had excellent/very good expertise in pain management. This is a cause of concern and chimes with the findings of a study carried out in the UK by Whay and Huxley (2005). Such a result indicates that greater emphasis is required on this topic in educating veterinarians at both undergraduate and post-graduate level. Although >60% of practitioners administered local anaesthesia during painful interventions in at least 50% of cases, about 10% never administered analgesics during excisions of solar ulcers and in the treatment of white-line disease.

The percentage of cases where local anaesthesia was administered in the treatment of solar ulcers was however much higher than that reported by Huxley and Whay (2006) where only 23% of respondents administered local anaesthesia in some cases. This may reflect the increased efforts made in recent years in Switzerland to raise awareness among practitioners about painful interventions in the treatment of bovine lameness. In contrast to the study by Huxley and Whay (2006), where approximately 39% of practitioners in the UK did not administer NSAIDs for digit amputations, the percentage of cases given such pain management during digit amputation was higher among Swiss bovine practitioners. However, the percentage of peri- and post-operative NSAIDs administered by bovine practitioners in the present study was generally lower than the administration of local anaesthesia. Analgesics in general can mitigate the severity of lameness and pain perceived during painful foot interventions (Whay et al., 2005; Rushen et al., 2007; Flower et al., 2008), and a combination of local anaesthetic and NSAID, acting via different mechanisms and sites, would be the optimal method of treating and preventing pain (Hudson et al., 2008).

The finding that practitioners in Switzerland treat pain in dairy cattle inadequately is similar to the findings of studies in the UK, Canada and US (Huxley and Whay, 2006; Hewson et al., 2007a; Hudson et al., 2008; Fajt et al., 2011). A possible practical reason for this lack of pain management might be the time-consuming commitment to revisit the farm to administer drugs in the days following foot treatments, as well as the attendant cost involved. Interestingly, there were significant differences in the attitudes of practitioners and claw-trimmers on the one hand and farmers on the other concerning the cost of pain management. Although a large percentage of practitioners/claw-trimmers considered the cost of pain management a major concern for farmers, the farmers themselves tended to disagree with this statement with only 11% considering cost as a significant barrier. This finding of differences in the opinions of veterinarians and farmers regarding the management of pain in cattle is similar to that of previous studies (Huxley and Whay, 2007; Thomsen et al., 2012). Our study suggests a lack of awareness of the benefits of analgesia and of pain perception is more likely to result in inadequate provision of analgesia by farmers.

A remarkable percentage of farmers (>25%), considered 16 CHF or more for the analgesia administered as part of the treatment of a

solar ulcer or white-line disease as acceptable, and the percentage of farmers who considered this level of expense acceptable for analgesia during the excision of inter-digital hyperplasia was even higher. Such a sum is more than adequate to cover the cost of local anaesthesia and NSAID therapy. In a UK-based survey by Leach et al. (2010), the cost of treating lameness was considered of much lower importance to farmers than the 'pain and suffering of the cow', reduced profitability, or the negative effects on milk production, fertility and body condition score. Furthermore, a farmer's pride in having a healthy herd and empathy with their lame animals were the top two motivations for reducing the incidence of lameness in their herds.

Our results highlight the importance of communication and close collaboration between farmers and their veterinarian in order to ensure dairy cattle receive sufficient pain relief (Vaarst et al., 2002). An important finding was that most herd-owners were neither aware of the obligation to provide analgesia nor of the degree of pain caused by some therapeutic claw-trimming procedures. Therefore, it is likely that greater training in the recognition of pain and its consequences on animal welfare and production through continuing education programmes and the media would benefit both farmers and claw-trimmers.

Conclusions

This survey found that reducing pain to lowest possible level in dairy cattle being treated for lameness was much more important to farmers than to bovine practitioners. Nevertheless, common painful procedures were frequently performed by all three surveyed groups (practitioners, farmers and claw-trimmers) without anaesthesia. In contrast to the opinion of bovine practitioners and professional claw-trimmers, most farmers did not consider cost as a major limiting factor on pain management. The study found significant differences in the opinions of practitioners, claw-trimmers, and farmers to the level of pain caused by lameness treatments as well as to the sensitivity of dairy cows to pain. There was a lack of awareness of the obligation to provide analgesia by both farmers and bovine practitioners, and of the benefits of pain management (farmers and claw-trimmers). Education and training in the recognition of the sometimes subtle signs of pain exhibited by dairy cows, as well as in the benefits of analgesia needs to be enhanced, and all parties involved in the management of lameness in dairy cattle need to act in a collaborative manner to minimise its negative consequences on animal welfare and health.

Conflict of interest statement

None of the authors of this paper has a financial or personal relationship with other people or organisations that could inappropriately influence or bias the content of the paper.

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