DEHORNING OF CATTLE

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Jose Armando Garcia Buitrago
New Mexico State University

DEHORNING OF CATTLE

INTRODUCTION

Naturally the cattle, both males and females have horns, evolutionary function of horns in the ungulates has been rationed with giving advantages for defense against predators. The horns in natural conditions are used by the animals for the defense and maintenance of the position in the herd. Hornedness, it is a male secondary sex character (Kupczyński et al., 2014); there are indications that horns serve as honest signals of genetic quality considerate by females in choosing mating partners (Estes, 1991) and possibly in the bovid females served the mother to protect their male offspring against the aggression of dominant males (Roberts, 1996). Another potential function of horns may be the thermoregulation. The cattle breeds originating from hot climates often have large horns, it's because the core of the horn is part of the frontal sinus and horns may contribute to nasal heat exchange, which is found in a range of large mammals. This is a mechanism to considerably reduce water loss through cooling of the air during exhalation in giraffes, waterbucks, goats and cows (Langman et al., 1979).

In past times the farmers preferred cattle with horns because they were used as animals to work, and the horns served to tie the yoke, this is observed yet in some regions of countries of third world (Ramaswamy, 1994). Currently, some beef cattle breeds are polled, but most dairy breeds and many beef breeds still grow horns (Stafford and Mellor, 2011). Is argued that cows with horns are more difficult to manage; so many cattle routinely have their horns removed.

On farms where predation is a problem as extensive livestock, cows may be left with horns to protect their calves and themselves; and also in organic dairy farm horns may not be removed (Grandin, 2010). Removing the horns is one of main zootechnical procedures in the beef and dairy livestock around of the world (USDA, 2007; Gottardo et al., 2011; Cozzi et al., 2009; Kupczyński et al., 2014), but now is also an issue critical in terms of animal welfare as it violates the integrity of the animals and causes stress and pain.

Figure 1. Location of horn bud and horn in growing in the calf.

TECHNICAL JUSTIFICATION FOR APPLICATION OF DEHORNING

Horned cattle are perceived by beef producers to be more aggressive than polled (Goonerwardene et al., 1999), according to farmers' reports, horned cattle seem to be more self confident and ready to defend themselves in any unpleasant situation, e.g. when they have to be restraint for injections or other treatments; for these reasons, cattle workers (veterinarians, cattle dealers and cattle handlers) prefer managing dehorned cattle (Knierim et al., 2009). However, practically there is not scientific evidence of differences behavioral or in temperament scores between horned and hornless cattle during handling. Contrarily to frequent expectations that horned cattle would be more aggressive than dehorned ones, some observations of herds' behavior cited by Irrgang (2012), showed that threats without physical interaction were more effective and physical agonistic interactions less frequent in horned flocks than in hornless herds; it concluding that is possible that horned animals are receiving more respect from their conspecifics than of those hornless. But, it is really certain that the dehorned cattle are considered less dangerous for ranchers. In some countries it is illegal to transport long horned cattle, so must be cut their horns-tip before they be transported (Stafford and Mellor, 2011), although this practice is not properly a dehorning, only procure the safeness of workers and animals.

Horned animals have more problem due to the risk of injuries caused by horn thrusts amongst the animals, which can occur especially when they are kept in loose housing and during transport (Knierim et al., 2009). Injuries caused by horn during the transport may be a reason for damage of edible carcass tissues, which considerably reduces meat quality (SANCO, 2009), increasing the carcass wastage due to bruising, and trimming associated with hurting to tissues (Sylvester et al., 2004).

In the dairy pens serious injuries could are especially problematic when udder or vulva is affected. Horn thrusts in the udder can result in the occurrence of visible blood in the milk, which also has economical implications, because the milk cannot be sold before it is free of blood again, and the affected cow may need medical treatment (Knierim et al., 2009). Strong thrusts in the body can even result in a rupture of the abdominal wall or abortion (Rosenberger, 1970 cited by Knierim et al., 2009). Stafford and Mellor (2011) reported having treated horses with serious abdominal injuries caused by the horns of cows with calves, and bulls. These accidents often increase the costs and negatively affect the farm's profits (Goonewardene et al., 1999; Gottardo et al., 2011). Also, dehorned cattle require less feeding trough space and easier handling and transporting (Faulkner and Weary, 2000; Prayaga, 2007).

At the same time that the concentration of animals is increasing in the modern farms, there has been a decrease in the number of workers employed; So increasing the number of animals per worker and increasing workers' risk to be hurt by the animals. Any normal head movements of the animal, e.g. to chase away flies, could hurt unwary stockmen accidentally. And evidently an intentional attack of horned animals can cause much more harm as if done by hornless animals (Knierim et al., 2009).

Figure 2. Intentional attack of horned animals can cause much more harm as if done by hornless animals.

Cattle horn injuries have been commonly observed in rural areas around of world (Wasadikar et al., 1997). Several retrospective studies had pointed, that open globe injuries by cow horns are relatively common (Helbig and Iseli, 2002; Ibrahim and Olusanya, 2014). Cow horns also have caused facial lacerations and fractures of facial bones (Ugboko et al, 2002), abdominal injuries (Abita et al., 2008), anorectal injuries (Chirdan and Uba, 2004), urethrorectal injuries (Pal et al., 2002) and non-obstetric vulvo-vaginal injuries (Habek and Kulas, 2007). Reports of injuries to people by cattle horns are very infrequent in livestock operations of developed countries, perhaps because dehorning is a practical frequent and facilities for livestock management allow working more safely.

METHODS TO REMOVE THE HORNS "DISBUDDING AND DEHORNING"

The cattle when birth not has horns. The horn is formed at the corium, from cells located at the place between where will be the future horn on skull and the skin (Figure 1). First is shaped the "horn bud" in calves up to about 2 months of age and it is an structure free in the skin layer above the skull. As the calf grows older, the horn bud attaches to the frontal bone and a small horn then starts to grow. Around the age of 7 - 8 months, the horn is attached to the skull and the horn core opens directly into the frontal sinuses of the skull (Budras and Habel, 2003).

Removal of the horn buds of the calf at an early age (less of 2-month age) when the horn itself is not formed still is named *"Disbudding"*, while the *"Dehorning"* is used in animals older than 2 or 3 month and implies the amputation of the horns; but in the literature and everyday language *"dehorning"* is used as a generic term that includes disbudding and dehorning (Irrgang, 2012).

Disbudding is to destroy the small ring of skin encircling the horn bud. Chemical (caustic paste) and by a physical method cautery disbudding methods destroy the horn's stem cells using a bar or tube hot, or could make it a surgical removal of the horn's producing area or amputation-dehorning. To be successful the procedure, anyone these methods should be used before that a significant horn growth occurs (Grandin, 2010).

During *chemical disbudding* a paste or a stick of sodium hydroxide or calcium hydroxide is used to destroy the horn bud (Weaver, 1986). These chemicals burn the tissues, and this substance can continue burning tissue as long as the chemical is present. The caustic material may spread onto surrounding tissue especially following rain, also could be licked when calves kept in groups producing damage to other calves, or cause damage to the udders of suckling cows (Stafford and Mellor, 2011).

Figure 3. Paste of sodium hydroxide or calcium hydroxide used during chemical disbudding.

Cut-cautery disbudding is carried out on calves in the first 4–6 weeks of life. The horn bud and the horn generative tissue are destroyed by searing with a heated bar, usually one with a concave tip which heats the bud and surrounding tissue, for some seconds (Weaver, 1986).

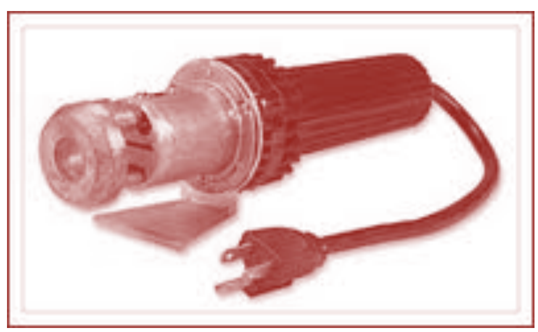

Figure 4. Electric bar used for cut-cautery disbudding

The bar may be heated electrically or by gas. During the process calves struggle violently and have to be restrained manually or in a head bail (Stafford and Mellor, 2011).

Amputation-dehorning is preferably used when horn growth already have started, using devices to remove the horns and to inhibit their further growth. In a timely procedure just will be need a cutting off of a ring of skin of at least 1 cm around the base of the horns, but in cattle older than 6 months the bony horn core has to be cut. Various special tools for the amputation of the grown horn may be use: the keystone dehorner, electrical saw or wire saw. The cut should be clean do not crushing or cracking the bones of the skull. A hemorrhage can become a concern in dehorning older calves and adult animals. Pressuring the hurt can aid to clot formation, or the cauterization with a hot iron is used to stop bleeding. Is necessary avoiding infections and worms in the wound caused by flies, dehorning should be done in clean places and dry weather conditions (Knierim et al., 2009). Chronic sinusitis also can be a frequent complication of a septic dehorning. The wound caused by amputation dehorning may take weeks or months to heal and dehorning, with negative effects on weight gains until by approximately 15 weeks (Goonewardene and Hand, 1991). This procedure always will be performed more easily and a less traumatic way in young calves; and it is not recommended in older animals (Stafford and Mellor, 2005).

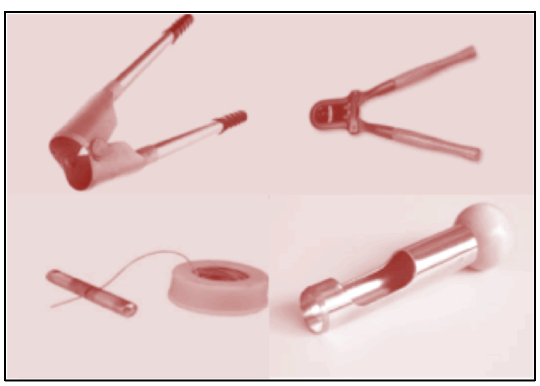

Figure 5. Tools used for the amputation dehorning: keystone dehorner, shears wire saw.

AGE FOR DISBUDDING OR DEHORNING

Setting a optimum age for disbudding or dehorning is difficult, as the development of horns in some beef breeds occurs much later than in the dairy breeds (Stafford and Mellor, 2011). It is a common opinion that in neonate and young animals the nociceptive system might be not yet developed completely, but from a biological point of view, there are no reasons for such a speculation, in particular in precocious animals such as cattle (Graf and Senn, 1999).
Histological examinations of the horn bud and the adjacent area in calves from birth until 4 months age did not show apparent differences in the density of cutaneous innervation (Taschke and Folsch, 1997 cited by Graf and Senn, 1999).
In practice this procedure generally is most relative to livestock system. Dairy calves are managed intensively from birth and dehorning is commonly made on all female calves during the first few weeks of life (Misch et al., 2007; Fulwider et al., 2008). In beef cattle commonly is previous weaning and its application will depend on the available handling facilities and staff capacitated to do it, the understanding of dehorning effects, but mainly of the market available for the calves. Some calves born in extensively managed herds, are not handled until they are weaned at about 5 to 6 months of age when horn size makes amputation necessary (Stafford and Mellor, 2011). Preconditioned calves (castrated, dehorned and vaccinated) have a premium price, while horned cattle have a discounted cost at auction, derived to cost of handling (labor and medicine) and of reductions in performance resulting from its application (Smith et al., 1996).
Cattle breeders with guaranteed buyers can be willing to sell complete calves or “green calves” (with horns and testicles) at the same price as processed calves (dehorned and castrated), generally could avoid these procedures; although, these

buyers are very exceptional.

Figure 6. Dehorning using whatever method will be performed more easily and a less traumatic way in young calves.

PHYSIOLOGICAL AND BEHAVIOURAL RESPONSES OF CALVES TO THE DEHORNING PROCEDURES

All methods of dehorning used in young calves as surgical, chemical and thermal involve tissue destruction (Graf and Senn 1999; Knierim et al., 2009; Stilwell et al., 2009); these procedures are painful and its implementation is related to discomfort and stress at any age (Sylvester et al., 2004; Stafford and Mellor, 2005; Vickers et al, 2005; Stiwell et al., 2012).

Physiological and behavioral reactions to different dehorning procedures indicate pain and distress. Stress in calves during and post procedures is mainly associated to the pain resulting of the actions of physical or chemical factors. The methodologies used to measure stress include direct observations of the behaviors and an assessment of physiological reactions as alterations in heart rate or the changes hypothalamic hormones concentration related with stress (Graf and Senn, 1999; Ayala et al., 2012). Cortisol concentration in blood serum is one of the most often methods used as stress markers. An instant reaction to painful stimuli immediately a response of hypothalami-Pituitary-adrenal axis; the result is an accelerated cortisol and corticosterone secretion. Cortisol causes various systemic effects, which are helpful in stress attenuation (Hart, 2012). A cortisol discharge has been observed with values above baseline concentrations almost immediately following dehorning, irrespective of use anaesthesia or not (Mosher et al., 2013; Allen et al., 2013). The highest concentration of cortisol is observed up to 1.5 hours after in most of the procedures. Generally the cortisol response can be divided in 2 major phases. A peak in plasma cortisol concentrations is presented probably due to strong stimulus caused by tissues injury or horn amputation and after the plateau may represent a phase where inflammation-related pain and its resolution dominate the response, posteriorly there is a declination to normal concentrations (McMeekan et al., 1998). The cortisol secretion responses have suggested that dehorning causes a marked pain and distress at least 8 hours post-procedure (Allen et al., 2013).

Some behavioral signs of the calf's pain during the dehorning procedure are movements like struggling, scurrying, urging forward, head jerking, standing up intents and quick tail shaking. Postoperative behaviors indicating pain and distress are restlessness, repeated shaking of the head, ear flicking, tail flicking, hind leg kicking, scratching the lesion with the hind foot, neck extension and reduced feeding time (Morisse et al., 1995; Graf and Senn, 1999; Faulkner and Weary, 2000). Also reduced play behavior as run, buck, buck-kick and head to head contact with their companion (Mintlinea et al., 2013). Other responses can be very subtle, especially younger calves, these may respond to strong pain simply by becoming lethargic, it showing inert lying with head on flank and no-reaction to stimuli to difference of other calves (Stilwell et al., 2009). It is a general problem in the interpretation of behavioral indicators that a low overt response does not necessarily mean absence of suffering (Knierim et al., 2009).

Figure 7. Physiological and behavioral reactions to different dehorning procedures indicate pain and distress in calves.

Other methods for stress assessment in the calves during dehorning procedure are measurement of physiological parameters such as: heart rate (Grøndahl-Nielsen et al., 1999), respiration rate (Heinrich et al., 2009), the heart rate is subject to a clear increase directly after dehorning, especially without local anesthesia application; the eye temperature measured thermo-graphically is too a non-invasive tool in stress assessment in the animals, this temperature increases as a result of stress (Stewart et al., 2005 and 2008). Other measures of pain include evaluation of mechanical nociceptive threshold using pressure algometry (Heinrich et al., 2010).

Handling of discomfort, stress and pain during and afterward of disbudding or dehorning

Understanding of the animal's behavior responses and the resultant pathologies during of the procedures and during inflammatory process experienced on subsequent hours, days or weeks, has permitted to find out how using some products that permit minimizing the pain during dehorning procedure and improve the welfare and productivity of calves in the modern livestock.

The efficacy of treatments used to pain alleviation caused by disbudding and dehorning has been subject of multiple researches and some references them are showed in the table 1. Its application is relative to alleviation of the different forms of pain and resultant pathologies according to method used, and the pharmacological activity is of crucial significance in animal welfare assurance during dehorning, except for the competency in its application (Kupczynski et al., 2014).

Chemical disbudding. The application of a caustic paste does not cause much pain response during application and this may give a false impression of be a non-painful method (Stilwell et al., 2009). However, there was a significant rise in plasma cortisol concentrations within 1 hour following application of caustic material (Morisse et al., 1995; Stilwell et al., 2009) and this returned to pre-treatment levels 4 to 24 hours later (Morisse et al., 1995). Calves showed behaviours indicative of pain (head shaking and restlessness) after treatment and these continued near to 4 hours later (Morisse et al., 1995; Stilwell et al., 2009). Morisse et al. (1995) and Vickers et al. (2005) did not find a significant reduction of behavioral indicators of distress with application of a local anesthetic prior to disbudding with caustic paste. They argued that deficient effectiveness of anesthesia during caustic disbudding might be related with the effect of pH of the caustic paste on the action of the local anesthetic, or the volumes of the anesthetic used. Stilwell et al. (2009) concluded from that 5 ml of 2 % lidocaine injected around the cornual nerve was efficient in reducing the pain behaviors, but not prevented the cortisol ascent. When local anesthesia was combined with a non-steroidal anti-inflammatory as Flunixin-meglumide, the cortisol rise and pain behavioral responses were eliminated (Stilwell et al., 2009), but not once Flunixin-meglumide was used without local anesthesia (Stilwell et al., 2008). Chemical burns unlike cautery burns, continue as long as the chemical is in contact with tissue and may cause longer periods of pain (Stilwell et al., 2009). A analgesic as tramadol administered intravenously or in a form of suppositories, helped to reduce pain, although not had a complete effect to release the pain during the first 30 minutes after application (Braz et al., 2012).

Cautery disbudding. Some behaviors indicative of pain or distress in calves disbudded are evident during the first 4 hours after cautery (Heinrich et al., 2009). Cautery disbudding causes a plasma cortisol response that reach peaks at 30 min, also the heart rate remains higher than in control calves (non disbudding) for almost four hours (Grondahl-Nielsen et al., 1999). Significantly higher plasma cortisol concentrations were found 24 hours after cautery disbudding (Morisse et al. (1995), indicating pain and wound sensitivity. Has been observed an increase in plasma ACTH and vasopressin concentrations with a peaked after 5 min, these concentrations remain elevated for 20 and 60 min, respectively (Graf and Senn, 1999). The pain behaviors observed during cautery disbudding and afterwards process are eliminated by an effective local anesthesia application (Graf and Senn, 1999; Grondahl- Nielsen et al., 1999). Stafford and Mellor (2005) concluded that a cornual nerve blockade using lignocaine reduces the immediate pain behavioral responses observed during the disbudding procedure, and decrease the plasma cortisol response. Use of sedatives can help too. Stilwell et al. (2010), reported that the sedation using xylazine makes the administration of local anesthetic easier. Using just xylazine, did not eliminate the behavioral responses to cautery disbudding completely, but were reduced. It was necessary to give local anesthetic in addition to xylazine, to eliminate the calves' physical activity produced by pain during disbudding.

Changes in behavior suggest that use of non-steroidal anti-inflammatories were effective for reducing post-surgical pain and distress associated with calf cautery disbudding. Oral administration of ketoprofen in the milk 2 hours before and 2 and 7 hours after hot iron disbudding in 4 to 8 week old calves, combined with xylazine and lidocaine injections, reduced significantly the head shaking from 3 to 12 hours after disbudding and ear flicking from 3 to 24 hours after disbudding, compared to control animals only treated with xylazine and lidocaine (Faulkner and Weary, 2000). In calves treated with Meloxicam and the anesthetics Lidocaine, were displayed less behaviors indicative of pain or distress (ear flicking and head shaking, less restlessness, and lower sensitivity to mechanical stimuli) during 44 hours post-disbudding (Heinrichs et al., 2010).

Dehorning. An acute pain caused by amputation-dehorning have been observed in calves (Stafford and Mellor, 2011). The total plasma cortisol concentration rises immediately, peaking after about 30 min, and it then decreases to a plateau, which persists up to six hours before returning to pre-treatment levels (Sylvester et al., 1998). Evident behaviors indicative of pain and distress until for 8 hours post dehorning have been reported (McMeekan et al., 1999; Sylvester et al., 2004).

Local anesthesia as a cornual nerve block with lidocaine, virtually eliminates pain during dehorning, and eliminates cortisol response for 90 to 120 minutes while the block persists (Sylvester et al., 2004; Stafford and Mellor, 2005); and then cortisol concentrations increase markedly for about 6 hours (Petrie et al., 1996; Sylvester et al., 1998). A delayed cortisol response indicates a pain period related to subsequent inflammation (McMeekan et al., 1998; Sutherland et al., 2002); so, systemic analgesics and non-steroidal anti-inflammatory drugs could be needed. An adequate level of anesthesia may provide a substantial decrease in the stress response in calves at the time of dehorning. Animals that were administered with 5% lidocaine showed relatively less behavior discomfort during dehorning compared with calves given minimal (2% lidocaine) or no anesthesia (Doherty et al., 2007).

Use of ketoprofen intravenously before horn amputation does not reduce the peak in plasma cortisol concentration. The behavior of calves dehorned without analgesia and the dehorned after ketoprofen injection was similar for about 2 hours; but when the anti-inflammatory was used, a positive effect was carried out to return the plasma cortisol to pre-treatment levels at about 2 hours, rather than 8 hours without ketoprofen (McMeekan et al., 1998).

After used this last method, is common use cauterizing the wounds to reduce hemorrhage; has been observed that cauterization of the wound following the administration of local anesthesia eliminates the plasma cortisol response during the first 24h after dehorning. Probably is that the local anesthesia blocks the pain of the amputation and cautery, and plenty of nociceptors in the wound are destroyed by the cauterization, so the nociceptor impulse input could be kept below the pain threshold when the effect of local anesthesia has finished (Sutherland et al., 2002).

PHARMACOLOGICAL AGENTS	PRODUCTS	ACTION	RESEARCHES
Anesthetics	Lidocaine, Bupivacaine, Mepivacaine	Block nerve conduction by inhibiting influx of sodium ions through ion-selective sodium channels in nerve membrane, leading to impairment of the generation of action potential.	Grøndahl-Nielsen et al. (1999) Graf and Senn. (1999) McMeekan et al. (1999) Duffield et al. (2010) Espinosa et al. (2013) Mintline et al. (2013)
Non-steroidal anti-inflammatory drugs	Flunixin Meglumine Ketofren Carprofen Acetylsalicylic acid Meloxican Phenylbutazone	Prevent inflammation by inhibiting cyclooxygenase-2, enzyme which produce prostaglandins PGE2 and presumably PGI2 these exhibit the highest influence on pain signals.	McMeekan et al. (1998, 1999) Stilwell et al. (2009) Duffield et al. (2010) Heinrich et al. (2010) Stilwell et al. (2012) Huber et al. (2013) Allen et al. (2013) Mintline et al. (2013)
Analgesics or sedatives	Xylazine Butorphanol Tramadol	They bind to opioid receptors, in many regions of the nervous system, inhibiting synaptic noradrenaline reuptake and inducing intrasynaptic serotonin release.	Stafford et al. (2003) Stilwell et al. (2010) Grøndahl-Nielsen et al. (1999) Faulkner and Weary (2000) Duffield et al. (2010) Stafford and Mellor (2011) Braz et al. (2012)

Table 1. Agents pharmacologic used for treatment of discomfort, stress and pain in some researches over calves dehorning and disbudding.

Use of genetic for production of polled cattle

Considering that horns are inherited as an autosomal recessive gene and the polledness is a dominant trait (Long and Gregory, 1978); a producer can take your herd of horned cows and breed them with a polled bull (homozygous for the polled condition) and so produce an entire calf crop of polled calves. Therefore, breeding polled cattle is a non-invasive genetic tool to replace the practice of dehorning. Selection and breeding of polled cattle has been proposed as an alternative because it eliminates both animal pain and production expenses associated with dehorning.

For breeders the use of polled sires can be conditioned by belief that horned bulls may have been superior to their polled counterparts. There is no scientific evidence that polled animals are inferior (Frisch et al., 1980). Goonewardene et al. (1999) found that phenotypically dehorned (genetically horned) and polled bulls were similar for birth and weaning weight, pre- and post-weaning average daily gain, carcass weight, grade fat, marbling, rib-eye area, cutability and carcass grade; and suggested that use of polled sires may be recommended to eliminate horns. Another possible reason for the low use of bulls without horns could be the limited availability of tested sires. However, around of the world has been reported a gradual increase in the numbers of polled sires registered in the breeders associations. Likewise, artificial insemination enterprises are showing an increased interest in polled genetics, and are actively seeking young polled bulls that have good pedigrees for use in their progeny test programs, and are strongly promoting the polled trait (Specht, 2008). In addition when polled bulls are a minority in the population as is the dairy bulls case, the selection for other desired traits (milk yield or milk solids) is usually best be achieved using horned bulls. So, the polled bulls use continues being minor in the dairies breeds. Currently transgenic approaches have been suggested as a means to rapidly insert polled genetics into high performing sires lines. Also, polled bulls have been introduced progressively through selective breeding, to achieve a balanced progress using a range of selection criteria.

Regulations governmental and the producers' opinions

Together with other invasive practices used in modern livestock as beak trimming of laying hens or tail docking, dehorning has been recently under the scrutiny of public opinion and nongovernmental organizations and has captured the public attention toward the need of promoting welfare of farm animals. Concern for the protection of animal welfare should not be viewed as incompatible with efficient management for high productivity (Watts, 2012). How improving the welfare and the animal production jointly? Must be looked as an imperative purpose for all those involved in livestock development.

European Commission Health and Consumers (1998), regulates the practice of dehorning in European Union (EU). Dehorning can be performed without anesthesia exclusively by means of cauterization (thermal or chemical) within the third week of the calf's life and, in any case, under veterinary supervision.

Australian Veterinary Association and National Animal Welfare Advisory Committee (2005) of New Zealand recommend disbudding at the youngest age possible, and chemical dehorning is not deemed to be acceptable unless it is performed within the first few days after birth. National Farm Animal Care Council (2006), recommends that disbudding be performed within the first week of life.

The use of appropriate anesthetic and analgesic protocols during the dehorning procedure are recommended in several countries. Pain control is required for all calves under the Canadian Code of Practice for the Care and Handling of Dairy Cattle (National Farm Animal Care Council, 2009). Furthermore, the Australian Model Code of Practice for the Welfare of Animals, recommend the use of local analgesics for dehorning calves over 6 month of age (Primary Industries Standing Committee, 2004).

Disbudding and dehorning of cattle in the United States is not currently regulated. But, American Veterinary Medical Association Animal Welfare Division (2014), recommend using anesthetics and analgesics but this suggestion is not compulsory.

Recent results of surveys assessment

showed than more than two thirds of farmers affirmed that they had not received any specific training on how to perform dehorning (Gottardo et al., 2011); more than half of the interviewees did not recognize dehorning as painful and have belief that the pain associated with the procedure not justifies the use of a pain control. Likewise, majority of interviewees expressed the belief that the adoption of practices to minimize pain and stress, such as dehorning very young calves using caustic paste and pain control, would increase labor and the costs associated to process (Hotzel and Snedon, 2013).

Consistent with these results, farmers indicated limited willingness to pay the cost of analgesia or to call a veterinarian to perform the procedure (Gottardo et al., 2011). This lack of incentive of the respondents toward the adoption of practices able to reduce pain related to dehorning might be arise too from their insufficient knowledge on undesirable effects of early painful experiences on behavior of dairy heifers (Hotzel and Snedon, 2013).

The need to meet industry standards and the availability of suitable dehorning pain relief regimens for commercial production remain a challenge (Espinoza et al., 2013).

CONCLUSIONS

The prevention of horn growth (disbudding) or removals of horns (dehorning) are common practices on modern livestock. The cattle without horns are safer and easier to handle, cause less injury especially during transport and require less space. All method of disbudding or dehorning used causes distress and pain in the treated animals, which should be alleviated as soon as possible.

The combined use of pharmaceuticals products anesthetics, analgesics and anti-inflammatory appears to be the most effective method for controlling pain associated with procedure of disbudding and dehorning. But these procedures equally can burden producers in additional costs and need of more veterinary assistance for to access to regulated extra-label medicaments potentially useful; also may involve additional handling of the animals, animal's stress and extra time required to perform the procedures, therefore these facts are considered presently as obstacles to its application.

The search of non-painful alternative as is the use of polled bulls, must be encouraged mainly in dairy cattle.

Extension programs could influence in recognizing and adoption of practices to control pain and discomfort consequence of the dehorning procedures and improving the animal welfare and the herds' productivity.

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Author: Eng. MSc. Jose Armando Garcia Buitrago. Ag. Research Scientist. New Mexico State University. College of Agricultural, Consumers and Environment Sciences. Department of Extension Animal sciences and Natural Resources. Dairy Extension Program.

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