PAIN MINIMIZATION DURING DEHORNING AND DISBuddING IN GOATS AND GOAT KIDS

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ABSTRACT

Dehorning and disbudding are the routine management practices in goat farm. Benefit of dehorning and disbudding includes less space required during feeding, easy management, good carcass quality and are required before dairy goats are used as a show animal in the United States. Dehorning is the process of surgically removing horns from adult goats. Dehorning causes severe pain during the surgery and several complications thereafter. Four to six weeks is needed for healing dehorned wound. Dehorning is not generally practiced unless necessary. Disbudding is the process of removing horn buds at an early age. Pain and complications during and after disbudding are less compared with dehorning, nevertheless disbudding causes 100% increase in blood concentration of stress hormones and kids exhibit stress behaviors. Injection of local anesthetic (lignocaine) alone has no benefit but injection of non-steroidal anti-inflammatory drug (NSAID; meloxicam) before local anesthetic helps to minimize disbudding stress. There are several disbudding techniques. It is necessary to adopt disbudding technique that minimizes stress.

Keywords: Anesthesia, dehorning, disbudding, goat, kid, pain

INTRODUCTION

Dehorning and disbudding is preferred in goats and kids for several reasons such as less fighting with each other, requires less feeding space, easy to handle and easy to market (Alvarez and Gutiérrez, 2010; Alvarez et al., 2015). In the United States, dairy goats are required to dehorn before use as a show animal (Al-Sobayil, 2007). However, dehorning and disbudding involves painful procedure and raises issues of animal welfare (Stafford and Mellor, 2005; Stafford and Mellor, 2011). There are several techniques for dehorning and disbudding (Alvarez and Gutiérrez, 2010; Gascoigne, 2015; Molaei et al., 2015). Very few studies are available that measured stress hormone and stress behaviors during and after dehorning and disbudding. This article summarizes different techniques that minimizes pain during and after these procedures.

Dehorning adult goat

Dehorning adult goat is a very complicated process therefore generally not preferred. Care should be taken to avoid exposing large sinuses at the base of the horn (Buttle et al., 1986). At first, goat should be sedated with xylazine at the rate of 0.1 to 0.2 mg/kg intravenously (Hull, 1995). A dose of 10 ml of 2% lignocaine is sufficient for 45 Kg goat to block lacrimal and infratrochlear nerve. For blocking nerves in each horn 1 ml lignocaine is applied at four different locations (Hull, 1995). Before dehorning, skin around the base of the horn should be incised to prevent regrowth of horn. Horn can be removed using obstetric wire saw or a dehorning saw. Two possible complications are hemorrhage from arteries located at the ventral edge of the horn and opening of large sinuses. Problem of hemorrhage can be resolved by pulling the arteries (Hull, 1995). Prominent hemorrhage can be controlled by thermal cautery (Hull, 1995). Tetanus antitoxin and antibiotics are recommended after horn removal (Buttle et al., 1986). Head bandage for a week is also recommended after surgery (Hull, 1995). A dry scab forms 48 hours after the surgery and for complete healing it will take up to 5 weeks (Hull, 1995). Dehorning during fly season could cause maggot formation (Hull, 1995). Thirty nine percent of producers and 77% of veterinarians in the United States and Canada use wire saw for dehorning goat (Valdmanis et al., 2007).

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Elastrator dehorning

This method is best to dehorn mature or nearly mature horns. In this method a groove of 1/8 inch deep and 1/8 inch wide is made around the base of the horn (Shelton and Haenlein, 2003). Elastrator is used to stretch a rubber ring and to place it around goat's horn (Marongiu, 2012). Rubber is released over the groove. It usually takes 4 to 8 weeks to slough off horn. It may bleed if horn slough off prematurely, therefore, regular observation is needed. This method doesn’t involve injection of anesthesia. In the United States and Canada 36% of the producers and 3% of veterinarians prefer elastrator dehorning method for dehorning adult goats (Valdmanis et al., 2007).

Thermal cauterization

In this method, 1 ml of lignocaine (20 mg/ml) is administered 15 minutes before disbudding. Two injections are given intramuscularly, first to block corneal branch of lacrimal nerve and second to block cornual branch of the infratrochlear nerve (Alvarez and Gutiérrez, 2010). Electrically heated dehorner is applied for 3 to 4 times (3 to 4 seconds each time) in five second interval. In general, heated dehorner is applied until corium of the button is completely cauterized (Alvarez et al., 2015). This is the most common method adopted by veterinarians and producers across the United States and Canada (Valdmanis et al., 2007). An online survey carried out in summer of 2006 reported 97% of veterinarians and 95% of producers use thermal cauterization method for disbudding kids (Valdmanis et al., 2007). Plasma cortisol level is generally used as a pain indicator in livestock. A study was done to compare plasma cortisol and pain-related behavior in disbudded kids with or without lignocaine. They concluded that injection of 1 ml of 2% lignocaine with epinephrine did not prevent acute cortisol secretion and pain-related behaviors in kids (Alvarez, 2015). Cortisol levels in lignocaine administered and cauterized kids were increased by 100% compared with previous value indicating severe pain and sufferings (Alvarez, 2015). Cortisol levels remained high for four hours after disbudding (Alvarez, 2015). Pre-medication with meloxicam and injection of 1 ml of 2% lignocaine was less stressful compared with using lignocaine alone (Chandrahans et al., 2015). Injection of meloxicam alone before disbudding have no advantage in controlling pain (Ingvast-Larsson et al., 2011). Use of higher doses of local anesthetics (lignocaine) alone alleviated some degree of pain in cattle (Doherty et al., 2007), however, a test done in kid with 2 ml of 2% lignocaine did not decrease cortisol level nor any stress behaviors (Alvarez, 2009). Studies on use of more than 2 ml of 2% lignocaine are rare or are not done in kids. On the other hand, kids are susceptible to toxic effects of using higher doses of local anesthetics (Hull, 1995; Buttle et al., 1986).

Caustic chemicals (NaOH, KOH)

Caustic chemicals such as sodium hydroxide (NaOH) and potassium hydroxide (KOH) in the form of stick are generally used to destroy horn producing epidermis (Vickers et al., 2005; Weaver et al., 2013). In this method, a caustic potash stick is broken off about an inch size and one end is wrapped with cloth. Hair around the bud is clipped off (Richards, 1921). Grease is applied around the bud to avoid damage by caustic potash in surrounding area. Caustic potash stick is soaked slightly before rubbing over epidermis of the bud. Caustic potash need to rub over the area about the size of five cent and continue to rub until the skin begins to break (Richards, 1921). Kids need to restrain for 30 minutes after rubbing. This method is effective when applied to 3 to 5 day old kids (Richards, 1921). Several studies were done on use of caustic chemicals and their pain assessment in calves, however, similar studies are rare in kids. Both, use or no use of local anesthesia before disbudding in calves exhibited signs of stress for longer than 3 hours (Stilwell et al., 2009). In a study, calves disbudded using caustic paste and xylazine provided less pain compared hot iron cauterization using xylazine and lidocaine (Vickers et al., 2005). In another study with calves, injection of NSAID (flunixin meglumine) and lignocaine before disbudding was found better in controlling pain compared with injection of lignocaine alone (Stilwell et al., 2009). There are several drawbacks of using caustic chemicals. If other kids lick the caustic chemical applied area then it could result their acute death (Jordan, 1990). Suckling kids can harm udder of the dam. Care also need to take to avoid leaking of caustic chemicals outside the grease. It is not recommended during raining season when animals are kept outside. This method of disbudding is still in practice in South Asian countries. In the United States and Canada neither veterinarians nor produces use caustic chemicals for disbudding kids (Valdmanis et al., 2007).
Disbudding with Clover oil (*Eugenia caryophyllata*)
In this technique, disbudding is done in 2 to 7-day old kids. This is a simple method recently developed to minimize pain and anesthesia. At first clover oil is extracted using hydrodistillation method (Molaei et al., 2015). The active component of clover oil is Eugenol. Eugenol has NSAID like effect when injected in animals (Anpo et al., 2011). Eugenol also controls growth of neoplastic cells (Ghosh et al., 2005). Only one study is available in which authors concluded injection of 0.2 ml of clover oil at the base of horn bud in kids (Molaei et al., 2015). It could be possible that eugenol component in the clover oil inhibited proliferation of horn germinating cell and have resulted no horn growth in experimental animals (Molaei et al., 2015). No further studies were done. Pain after disbudding with clover oil were not measured (Molaei et al., 2015). This method successfully controlled growth of horn and no complications were reported during and after the trial (Molaei et al., 2015). This method of dehorning is simple, requires less time and is farmers friendly.

CONCLUSION
Disbudding and dehorning is necessary for easy management, required by rule for dairy goat when used as a show animal and to minimize fighting between the animals (Alvarez et al., 2015; Alvarez and Gutiérrez, 2010). Plasma cortisol, an indicator for stress increases for 8 to 9 hours (Sutherland et al., 2002) and behavioral differences can be observed till two days after dehorning (Stafford and Mellor, 2005). Dehorning can also lead other complications such as tetanus, heat meningitis and brain abscess (Battini et al., 2014). Disbudding is preferred over dehorning because of less pain and less complication (Valdmanis et al., 2007). Nevertheless, cortisol level increases by 100% after disbudding indicating acute pain (Alvarez et al., 2015). Injection of 1 ml of 2% lignocaine has no benefit in minimizing cortisol level or stress behavior after disbudding kids (Alvarez et al., 2015). Injection of slightly higher doses of lignocaine (2 ml of 2% lignocaine) has no advantage (Alvarez, 2009). Studies higher than 2 ml are not done in kids (Alvarez and Gutiérrez, 2010) because kids are susceptible to lignocaine related toxicity (Hull, 1995). Injection of meloxicam before lignocaine minimizes stress compared with using lignocaine alone (Chandrahas et al., 2015). It could be beneficial to investigate methods for disbudding that excludes the use of anesthesia. Recently a research was done using injection of oil for disbudding kids (Molaei et al., 2015). Author reported injection of clover oil controlled horn growth in kids, however, stress response was not measured (Molaei et al., 2015). Techniques that cause less stress during disbudding in kids should be adopted.

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