

Pain Control Surrounding Castration and Tail Docking in Lambs

Tail docking and castration are important management procedures for the sheep industry globally; however, they are both painful procedures that can impact animal welfare. Therefore, it is critical that these procedures are performed using best management practices, including pain control. In fact, the Canadian Veterinary Medical Association (CVMA) Pain Control in Animals position statements (2014 and 2021) requires that pain control is provided to all animals (including livestock) when a painful procedure is performed. This technical note offers some of the science around pain management to ensure these practices are done properly and effectively when performed.

Take Home Messages

- Tail docking and castration are important practices for the industry. Scientific studies demonstrate that tail docking is painful no matter the method used, with rises in cortisol and pain behaviors noted following the procedures
- From available literature, it seems there are differences in the level of pain experienced when different methods are used, with the use of a rubber ring causing the highest level of pain for both castration and tail docking
- Importantly, scientific studies have demonstrated that pain can be effectively managed, no matter the method used; these practices and the above-mentioned pain control strategies are also supported in the Code of Practice
- The combination of a local anesthetic and NSAID may result in the best pain relief for both tail docking and castration

Tail Docking

Tail docking is commonly practiced to manage fecal soiling to reduce the risk of fly strike (myiasis) (French et al., 1994) and is completed using many different methods. No matter the method, it is painful as it stimulates nociceptors by causing tissue damage and by triggering physiological pain pathways (Meintjes, 2012). As a result of the pain associated with tail docking, lambs will commonly exhibit behaviors, such as vocalization, tail wagging, and restlessness.

Does Method Matter When it Comes to Pain?

A study by Grant (2004) found that it does when the use of tail docking by hot iron or rubber ring were directly compared.

Hot Iron Docking

When evaluating hot docking, the largest pain response was seen at the time of application with vocalizing and struggling commonly observed. In addition, docking irons that had the temperature too low resulted in slow and prolonged cutting times, whereas high docking iron temperatures led to rapid cutting but inadequate cauterization, highlighting the need to have properly maintained and functioning equipment. Other than the initial pain response, few indicators of pain occurred other than an increase in active pain behaviors observed 40 min following the tail docking. This response is consistent with burn pain where shock and destruction of nerve endings from deep injuries delay pain.

Rubber Ring Docking

Tail docking with rubber rings lead to large behavioral and postural responses associated with pain. The response was much greater than hot iron docking. The reason for this is that the tight rubber rings prevent blood supply to the tail but don't prevent the conduction of nerve impulses from the painful, ischemic tail (Molony et al., 1993; Kent et al., 1995). In contrast, with hot docking, the nociceptors at the tail stump are destroyed or the removal of the entire tail leads to all input from nociceptive receptors contained within the tail to be eliminated, leaving only receptors in the stump. The Code of Practice for the Care and Handling of Sheep (Canada, 2013) requires that tail docking with rubber rings be done before 6 weeks of age and recommends administration of pain-relieving drugs (anesthetics and/or analgesics) when and wherever possible.

What About Other Methods?

Both Molony et al. (1993) and Kent et al. (1995) compared other methods to rubber ring docking. Specifically, Molony et al. (1993) compared the use of a Burdizzo, surgery or rubber ring docking and found that the use of a Burdizzo may be the least painful method, with the rubber ring being most painful. Similarly, Kent et al. (1995) found that the Burdizzo was a less painful method.

Pain Management Strategies

Rubber Ring Docking

Using a local anesthetic administered subcutaneously at the site of application or giving an epidural with a local anesthetic prior to the application of the ring has been shown to reduce cortisol responses and pain behavior in the hours following application (Kells et al., 2020; Graham et al., 1997; Kent et al., 1998).

Beyond the application of local anesthetic, a new product is currently under development that has lidocaine implanted directly in the band (Saville et al, 2020). This may allow for the slow release of lidocaine into the site of application over time.

With regard to non-steroidal anti-inflammatory drugs, several studies have shown a benefit. Graham et al. (1997) found that the injection of an NSAID reduced cortisol response but no behavioral indicators of pain, whereas Pollard et al. (2001) found the oral administration of an NSAID reduced restlessness, active behavior, and abnormal posture following tail docking.

Other Methods

Similar to rubber ring castration, benefits have been shown when providing a local anesthetic for hot docking and surgical removal (Dunthorne, 2021). For NSAID administration, further evidence supports its use, especially when hot docking. In lambs that were either provided with meloxicam or a placebo at a combined hot docking of the tail and surgical castration, a large reduction was found in behaviors indicative of pain as well as an increase in the time spent grazing, suckling, and lying was observed in the meloxicam group (Small et al., 2014). Kells et al. (2019) found that using meloxicam in combination with a local anesthetic with hot docking and rubber ring castration led to reduced behavioral signs of pain. Cumulatively, there is an existing body of evidence highlighting that to best manage pain a combination of a local anesthetic with an NSAID is required (Dunthorne, 2021).

Castration

Castration is commonly practiced in ram lambs to eliminate sexual behavior and reduce fighting as well as allow male and female lambs to be managed together. In addition, there is no risk of ram taint in rams that have been castrated which improves meat quality. There are few alternatives to performing castration and it is a necessary practice in the industry.

Does Method Matter When it Comes to Pain?

The method of castration also influences the level of pain that is noted following castration.

Surgical Castration

Surgical castration causes the largest spike in cortisol in the hours following castration compared to other methods (Mellor and Stafford, 2000). When compared to a clamp method, an increased cortisol response was noted in the first 6 or 9 hours following the procedure as well as an increased amount of time with an abnormal posture and a larger response to scrotal palpation (Melches et al., 2007). This highlights the need to control pain, especially acute pain, when applying this method.

Rubber Ring Castration

Similar to tail docking, rubber ring castration could be one of the more painful methods of castration. Compared to the use of a clamp (i.e., Burdizzo), ring castration increased abnormal postures (Dinniss et al., 1999), whereas compared to surgical castration, there were higher levels of abnormal lying behavior and restlessness; although, lower cortisol was noted (Colditz et al., 2012; Lester et al., 1991). In addition, until the scrotum falls off after 4 weeks following the application of the rubber ring, it remains swollen and appears to cause behavioral signs of discomfort (Cockram et al., 2012).

Clamp Castration

Using a clamp technique (i.e., Burdizzo) has been shown to cause an increased level of cortisol and for the first 15 minutes after the procedure an increased number of pain behaviours are shown (Mellor et al., 1991). However, when compared to other techniques, the signs of pain are found to be lower as highlighted above. Interestingly, using a clamp prior to the placement of a rubber ring seems to decrease some pain associated with ring castration alone (Kent et al., 1998; Thorton and Waterman-Pearson, 1999); however, it is more painful then compared to solely using a clamp (Molony et al., 1997).

Pain Management Strategies

Surgical Castration

Local anesthetic injected into the scrotal neck, cord, and testis can reduce plasma cortisol in response to surgical castration (Thorton and Waterman-Pearson, 1999); however, an increased cortisol level is seen 3 to 6 hours following the administration of a local anesthetic (Melches et al., 2007). Although, there have not been any formal studies evaluating the use of a local anesthetic in combination with an NSAID for surgical castration, it would seem that solely a local anesthetic on its own may not be enough to achieve optimal pain control.

Rubber Ring Castration

Administration of local anesthetic into the scrotal neck and cord or the testis can lead to reduced cortisol responses as well as behavioral indicators of pain and discomfort, especially in the period immediately following application of the band (Kent et al., 1998; Thornton and Waterman-Pearson, 1999).

When it comes to the use of NSAIDs, few studies have been completed. However, one study found that the injection of an NSAID reduced cortisol and behavioral responses associated with pain in the hours following castration (Paull et al., 2012). Others have found few differences on acute pain behaviour (Kells et al., 2020) or a slightly reduced ADG but lower level of lamb losses (Small et al., 2020). More research is needed to highlight the utility of using NSAIDs to control chronic pain.

Clamp Castration

Using a combination of a local anesthetic and NSAID likely provides optimal pain control when the clamp technique is used. Durand et al. (2019) found that using a local anesthetic (administered into each spermatic cord and around the scrotal neck) and an NSAID, flunixin, lead to reduced behavioral signs of pain and discomfort and lower cortisol levels, with the authors suggesting multimodal analgesia for up to 3 days post castration.

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