

Assessing and Alleviating the Pain of Castration and Tail-docking in Sheep

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Introduction

Castration and tail-docking are routine lamb husbandry procedures traditionally performed without anaesthesia or analgesia. In an increasingly welfare-conscious society, practices that cause pain are becoming less acceptable to consumers. The Australian sheep industry has been under global scrutiny in recent years, with international boycotting of Australian sheepmeat and widespread disgust at an industry that appears cruel to animals. This has led to increased research into methods to decrease the pain and stress of castration and tail-docking procedures.

Discussion

Pain is not directly measurable but measurements of plasma cortisol concentrations and behavioural response scores can be used to provide an indication of pain. Mellor and Stafford (2000) claim that plasma concentrations of cortisol, adrenocorticotropic hormone and corticotropin-releasing factor indicate how unpleasant an experience is and can be used to provide a measure of the distress caused by castration and tail-docking. Typically, abnormal behavioural responses, such as tremors, lateral lying and abnormal walking/standing, are observed and recorded within a period after the intervention to give a score of total abnormal behaviours (Lester *et al.*, 1996), but there are limitations when comparing ring and knife treatments as these procedures elicit different behaviours. A 2009 study by Paull *et al.* concluded that castration by rubber ring has less impact than knife castration when serum biochemistry, haematology, behavioural responses and growth parameters are considered together. Conversely, in 2010 Lomax *et al.* found that ring castration and tail-docking elicits significant abnormal behaviours that persist for more than 2 hours. Grant (2004) supports this finding yet states that the different behavioural responses due to ischaemic pain and surgical wound pain may not be directly comparable.

Knife castration is associated with a more significant and sustained elevated cortisol concentration than ring castration (Paull *et al.*, 2009). However, Lomax *et al.* (2010) question the validity of using cortisol concentrations to compare treatments because cortisol secretion is a physiological response to surgical wounding even in the complete absence of pain. Thus increased cortisol secretion may reflect greater breaching of skin in knife-castration and tail-docking wounds and not indicate increased levels of pain. It is evident that neither behavioural analysis nor measurements of plasma cortisol concentrations provide a clear comparison of ring treatment versus knife treatment.

Anaesthetics and analgesics have the ability to reduce the pain of castration and tail-docking (Dinniss *et al.*, 1997; Mellor & Stafford, 2000). Despite the effectiveness of injectable local anaesthetics, they are not practical for general farm use due to economic constraints, increased handling times of lambs and veterinary intervention required (Lomax *et al.*, 2010; Paull *et al.*, 2009). Tri-Solfen is a "farmer-applied" topical anaesthetic, haemostatic and antiseptic gel formulated to provide pain relief for mulesing wounds in sheep (Lomax *et al.*, 2009; Lomax *et al.*, 2010). Studies by Lomax *et al.* (2010), Paull *et al.* (2009) and Lomax *et al.* (2009) have examined the efficacy of Tri-Solfen to provide pain relief for other wound types, specifically tail-docking and castration wounds. Topical anaesthetics are rapidly and highly effective on open wounds and mucosal surfaces but penetrate intact skin poorly and thus are more suited as a post-procedural treatment and less effective as pain relief in ring treatments (Lomax *et al.*, 2009; Paull *et al.*, 2009).

Lomax *et al.* (2010) and Lomax *et al.* (2009) used behavioural responses to light touch and pain stimulation by Von-Frey monofilaments to assess the effectiveness of Tri-Solfen as pain

relief in castration and tail-docking. Involuntary pain responses such as skin twitching, head jerks and lifting of the tail were scored according to vigour and added to give each animal a cumulative score. Both studies found that Tri-Solfen was successful in significantly reducing hyperalgesia in knife tail-docking and the hyperalgesia response was absent in Tri-Solfen-treated knife-castrated animals compared with placebo and untreated animals. Hot-iron docking produced a mild and transient secondary hyperalgesic response, which was absent in treated lambs. Lomax *et al.* (2010) found that ring-treated lambs were unsuitable for wound sensory testing as their distress made them oblivious to additional external environmental stimulation.

Lomax *et al.* (2010) also assessed pain-related behaviours using a Numerical Rating System developed by Lomax, Sheil and Windsor in 2008, where individual lambs were given a score between 0-3. Significant changes in lamb behaviour were found after castration and tail-docking, with Tri-Solfen-treated lambs showing significantly less pain-related behaviours than all other groups, including ring-castrated and docked animals.

Carprofen, a systemic anti-inflammatory, and Tri-Solfen have also been assessed recently for their ability to reduce cortisol concentrations and abnormal behaviour associated with knife and ring castration (Paull *et al.*, 2009). Subcutaneous injection of carprofen 90 minutes prior to the procedure significantly reduced total pain-associated behaviours and restlessness in ring-castrated animals. In knife-castrated animals, carprofen reduced cortisol concentrations 6 hours post procedure but at 24 and 48 hours treated animals had higher cortisol concentrations than untreated knife-castrated animals. Tri-Solfen was effective at reducing cortisol concentrations in knife-treated animals yet increased abnormal lying behaviour. Using carprofen and Tri-Solfen in conjunction provided no added benefits.

Conclusion

From these studies it is evident that Tri-Solfen is effective in reducing the pain associated with knife castration and docking, and hot-iron docking. However, due to its poor penetration of skin it does not relieve the pain associated with ring castration and docking. Carprofen injection provides pain relief for ring castration but is less practical as an on-farm treatment and requires double handling of lambs. It is difficult to compare the different methods of castration and docking due to the limitations of the current methods of assessing pain in animals. Nevertheless, these methods do allow a comparison of Tri-Solfen- or carprofen-treated animals versus untreated animals when the same castration or docking method is used. The results demonstrate that Tri-Solfen is an effective form of pain relief for surgical procedures. Tri-Solfen currently has a restricted permit for use in alleviating post-mulesing pain. However, its wider application in pain relief for surgical castration and tail-docking has the potential to improve the welfare of millions of lambs.

References

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