

The Welfare Implications of Mulesing Alternatives

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Introduction

Mulesing is the surgical removal of skin folds adjacent to the perineum and tail of sheep, to reduce the incidence of flystrike in this area (Hemsworth *et al.*, 2009). Traditionally, this procedure is carried out without anaesthesia or analgesia and hence presents significant welfare issues. Due to pressure from welfare groups and consumers, the Australian Wool Industry pledged to phase out mulesing by 2010. With this deadline fast approaching, studies are being conducted into mulesing alternatives. Research into intradermal injections, plastic clips and topical anaesthetic are discussed here, along with the welfare implications of each.

Discussion

Colditz *et al.* (2009a) assessed the physiological and behavioural responses of lambs to an intradermal injection of cetrimide (n=11), compared with surgically mulesed (n=11) and unmulesed (control) groups (n=10). Cetrimide is a quaternary ammonium compound that causes necrosis of dermal cells and wool follicles. It was injected 1mm into the dermis either side of the perineum and on the tail using a compressed-air gun. This technique induced an inflammatory reaction, both at the site of injection and systemically. Systemic sequelae included high fever for six days post-treatment and elevated concentrations of plasma cortisol and acute phase proteins, compared with mulesed lambs. Wound healing was slower; at 28 days mulesed lambs exhibited a closed linear scar, whereas intradermal lambs still retained scabs over the necrotic tissue. Abnormal behaviour, as compared with control lambs, was also observed. Due to the magnitude of these physiological and behavioural responses, Colditz *et al.* (2009a) concluded that intradermal cetrimide significantly compromised lamb welfare.

A second part to this study, also performed by Colditz *et al.* (2009b), assessed whether pretreatment with the non-steroidal anti-inflammatory drug carprofen improved lamb welfare, when combined with cetrimide injection. The use of carprofen (n=10) slightly lowered the time spent in some abnormal behavioural activities, but not all, when compared with control lambs (n=10). A local and systemic inflammatory response was again observed and the research group concluded that lamb welfare was still compromised.

The age of the lambs used in the two studies differed, thus limiting the ability to compare results. The lambs in the study by Colditz *et al.* (2009a) were suckling and remained in pens with their mothers following treatment, whereas lambs given carprofen were weaned. This could have affected observed behavioural responses, as the presence of the ewe may have comforted the lamb and thus introduced a confounding variable when comparing the studies. Nevertheless, the physiological and behavioural responses seen in both studies transcends these differences, and the use of cetrimide, with or without carprofen, was deemed to compromise lamb welfare.

A final point raised by Colditz *et al.* (2009b) is that of host exposure to the toxic products created by skin necrosis. They suggest that separating the host from these products, by ligatures or clips, may reduce the severity of systemic sequelae observed. This idea was explored in a study by Hemsworth *et al.* (2009). Two methods of non-surgical mulesing, an intradermal injection (n=11) and plastic clips (n=11), were compared with mulesed (n=11) and control lambs (n=11). Behaviour, gait, live weights and plasma physiology for the four trial groups were compared. The intradermal injection induced skin necrosis, in a similar way to cetrimide, but used a different protein denaturing chemical (sodium lauryl sulfate in benzyl alcohol). In another group, plastic clips were attached to the skin normally removed during mulesing causing ischaemic necrosis of the enclamped skin. Interestingly, no behavioural or live weight differences were found among any of the four treatment groups. However, differences in physiology were found: both alternative techniques elevated plasma cortisol

concentrations and acute phase proteins when compared with control groups, with the intradermal group showing a longer systemic effect than the clipped group, providing some evidence for the theory of Colditz *et al.* (2009b). Significantly, these elevations were lower and of shorter duration than those observed in the mulesing treatment. Hence these non-surgical mulesing techniques were deemed to improve lamb welfare over surgical mulesing.

Ultimately, the use of these non-surgical mulesing techniques in the industry will be influenced by their practicality and cost-effectiveness. The mulesing operation has proved cost efficient and effective at reducing the incidence of flystrike in the industry for many years (Rothwell *et al.*, 2007). Research has been directed into adapting the procedure to improve animal welfare. Lomax *et al.* (2008) trialled a recently developed topical anaesthetic and antiseptic spray, Tri-Solfen[®], applied to the mulesing wound immediately after the procedure. This product contains lignocaine (a local anaesthetic), bupivacaine to prolong the duration of anaesthesia, and adrenaline to reduce systemic absorption, concentrating anaesthetic effect at the site. Von-Frey monofilaments were used to stimulate touch and pain sensations in the wound area; reactions of sheep were scored by observers. These filaments are held against the wound and are calibrated to bend at predetermined pressures, thereby maintaining a constant level of stimulation across the trials.

Wound healing rates and weight gains were also measured. Lambs treated with Tri-Solfen[®] (n=121) were found to have absent, or significantly decreased, responses to the touch simulation and faster initial wound contraction when compared with mulesed lambs (n=121). Furthermore, no significant difference in weight gain was found when compared with control groups. Hence the use of Tri-Solfen[®] was concluded to significantly reduce the “stress” response and improve the wound healing of mulesed sheep. This study, unlike those previously mentioned, did not use physiological parameters to quantify responses among trial groups. The authors felt measurements of heart rate, cortisol concentration and endorphin release were unreliable and would be spuriously affected by handling stress and the adrenaline incorporated into the Tri-Solfen[®] product. Instead, results were based upon scores determined by human observers, which inevitably allows room for subjective observations.

Conclusion

Research into alternatives to mulesing has yielded some options for improving lamb welfare: plastic clips or topical anaesthetics. However, these techniques are not completely welfare-friendly. It remains to be seen whether these improvements are satisfactory for animal welfare advocates and consumers. With 2010 approaching, pressure on sheep farmers to change their mulesing operation will increase, which could result in these alternatives becoming economically viable.

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