Topical anaesthesia for the amelioration of mulesing pain in sheep

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1.Introduction

Mulesing, the practice of cutting loose folds of skin from the breech area of sheep, is a common husbandry procedure routinely performed on Merino lambs annually in Australia. This procedure is necessary to prevent breech flystrike in sheep, which is a painfully debiltating and potentially lethal disease. Despite its health benefits, mulesing has been proven to cause acute pain and stress, which has led to a growing international concern for the welfare of lambs. These developments set a challenge to develop effective methods of pain alleviation that are practical, affordable and applicable to farming operations. Tri-solfen®[1] is a multi-function topical anaesthetic, haemostatic and antiseptic spray on gel developed for immediate post-procedural application to mulesing wounds in sheep. Since 2005 we have been undertaking research to examine it's efficacy as a tool for minimising the welfare impact of mulesing and other painful husbandry procedures in livestock. We have previously undertaken studies that have shown that topical anaesthesia can significantly reduce wound pain, and improve wound healing and recovery in the first 8 hours[2], and have extended these observations to include up to 24 hours.

OBJECTIVE: To assess the efficacy of topical anaesthesia for the alleviation of pain up to 24 hours post-mulesing

2. Materials and Methods

Trial 1 (published data[2])

1. 24 lambs randomly allocated to groups: "*mulesed untreated*" (n=12) and "*mulesed, Tri-Solfen® treated**" (n=12).
   - **Wound sensitivity** assessed pre- and at 3 minutes, 4 and 8 hours post mulesing
2. 64 lambs allocated to groups: "*unmulesed*" (n =8), "*mulesed untreated*" (n=28) and "*mulesed, Tri-Solfen® treated**" (n=28)
   - **Behavioural observations** pre- and at 5 minutes, 1 and 4 hours post mulesing

Trial 2:

42 mixed sex Merino lambs (21.04±0.5kg) randomly allocated to 3 treatment groups:

1. Unmulesed control (n = 14)
2. Mulesed untreated (n = 14)
3. Mulesed , Tri-Solfen® treated* (n = 14)

- **Behavioural observations** – pre- and at 1 and 24 hours post-mulesing
- **Wound sensitivity testing** - pre- and at 1 minute and 24 hours post mulesing

*lambs treated with 6-12mL Tri-Solfen® based on weight

Observation Techniques

- **Behavioural observations**
  - Assessed using a customised numerical rating scale (NRS)[2] ranging from 0-3:

0	1 - Mild	2 – Moderate	3 - Severe
No pain-related behaviours	Mild kyphosis, mild stiffening of gait	'Statue standing', prominent kyphosis, moderate stiffening of gait, ventral recumbency with hind legs fully extended	Twisting or writhing, high frequency of postural, distressed vocalisation, dog sitting or tremors

FIGURE 1. Postural indicators for numerical rating of pain-related behaviours

- **Wound sensitivity testing**
  - Weighted von Frey monofilaments calibrated to bend at a predetermined pressure (75N) to provide repeatable pain (P) stimulation of the wound
  - Evidence of hyperalgesia (exaggerated response to painful stimuli) and anaesthesia
  - Local involuntary and central cognition responses recorded via a customised NRS:

	0	1	2	3
Rump	No response	Minor involuntary motor response	Partial rump withdrawal reflex	Full rump withdrawal reflex
Head	No response	Minor facial "awareness"	Partial startle reflex of the head	Full startle reflex of the head

FIGURE 2. von Frey stimulation of wound

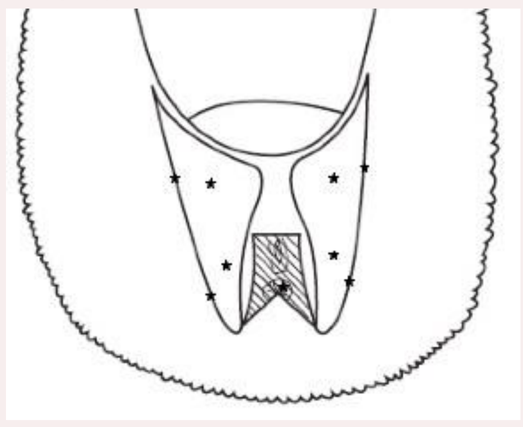
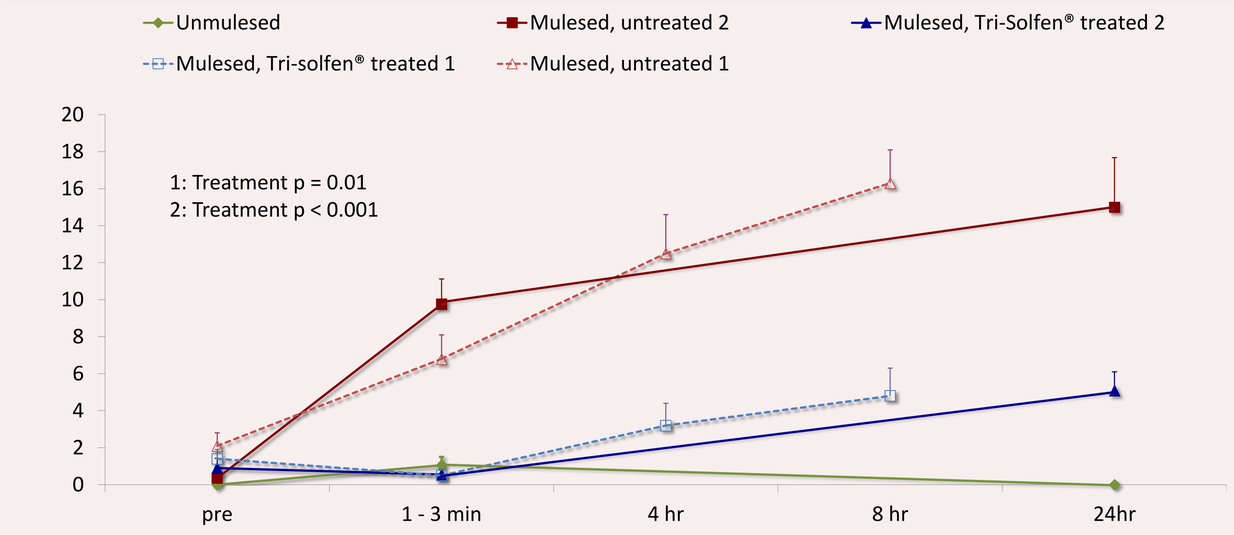


FIGURE 3. Sites for sensitivity testing of the wound site

3. Results



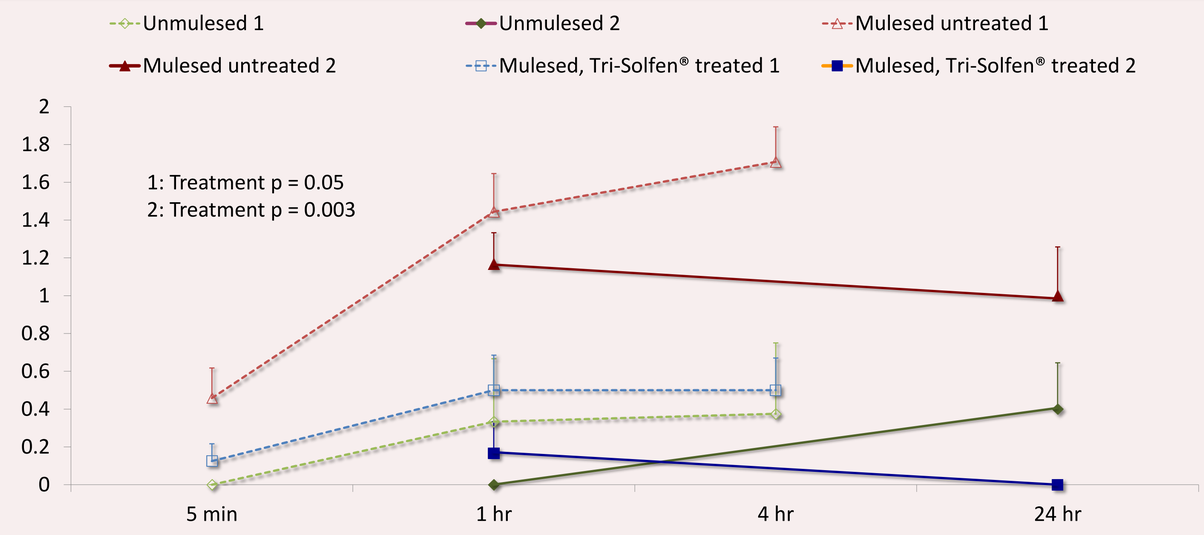


FIGURE 4. Mean total head and rump response score to P stimulation of wound site where for Trial 1 (1) and Trial 2 (2)

FIGURE 5. Mean total NRS score for pain-related behaviours post-mulesing for Trial 1 (1) and Trial 2 (2)

- **Trial 1:** Mulesed, untreated lambs had increased pain response over time. Tri-Solfen® treated lambs had significantly lower responses than untreated lambs at 3min, 4hr and 8hr post-mulesing
- **Trial 2:** Mulesed, untreated lambs displayed increased pain response over time, with significantly greater wound sensitivity compared to unmulesed controls and mulesed Tri-Solfen®-treated lambs at 1 min and 24hr post-mulesing

- **Trial 1:** Tri-Solfen® treated sheep had significantly lower pain–related behaviour scores compared untreated mulesed lambs and were not significantly different from unmulesed controls
- **Trial 2:** Mulesed, untreated lambs demonstrated higher NRS scores for pain behaviours compared to unmulesed controls and mulesed, Tri-Solfen® treated lambs at 1 hr and 24 hrs post-mulesing

4. Conclusions

- Topical anaesthesia is effective at alleviating wound pain in lambs and improving recovery up to 24hrs post-mulesing.
- Topical anaesthesia has the capacity to dramatically reduce the burden of acute animal husbandry related pain and suffering in lambs and has the potential to be extended to other species worldwide.

[1]Tri-Solfen® (Bayer Animal Health, Gordon, NSW Australia) contains lignocaine hydrochloride 40.6g/L, bupivacaine hydrochloride 4.5g/L, adrenaline (tartrate) 24.8mg/L and cetrimide 5.0g/L.

[2]Lomax S, Sheil M, Windsor PA. Impact of topical anaesthesia on pain alleviation and wound healing in lambs after mulesing. *Australian Veterinary Journal* 2008;86:159-168