

FLOCK & HERD

CASE NOTES

THE WELFARE REVOLUTION OF TOPICAL ANAESTHESIA ON WOOL SHEEP FARMS IN AUSTRALIA: IS THERE A PLACE FOR XYLAZINE &/OR NSAID'S?

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INTRODUCTION

Mulesing of Australian Merino lambs with the 'skin wrinkle' phenotypes, provides effective life-long protection against the risk of 'breach strike' caused by *Lucilia cuprina*, the sheep blowfly. It is estimated that at least 2million sheep would die annually of flystrike if mulesing were banned. Although the breeding of wool sheep that are less susceptible to flystrike continues, in the period until wrinkle-free breach sheep no longer need to be mulesed, it is advocated that mulesing should continue in areas where it is considered necessary. The welfare concerns of mulesing have been significantly ameliorated with the availability and widespread uptake of the farmer applied spray-on topical anaesthesia (TA) formulation (Tri-Solfen®, Bayer Animal Health, Australia) that is administered in the immediate post-operative period. Introduced in late 2005 on APVMA permit for sale through veterinarians, this product has been recently registered (late 2011). It has been estimated that 70% of mulesed lambs in 2011 received treatment with TA (A Giffard, pers. comm.).

Several studies have shown that TA significantly reduces wound sensitivity and pain-related behavior scores plus improves wound healing and recovery for the first 8hrs (Lomax et al, 2008) and up to 24hrs following mulesing (Lomax et al, 2012; in-press) compared with placebo gel treated (P=0.03), and untreated mulesed lambs (P<0.001). It has also been shown to be efficacious in surgical castration and tail docking (Lomax et al, 2010). To address concerns that lambs should also receive analgesia prior to the marking procedure, we have been examining the efficacy of low dose intramuscular xylazine &/or NSAID treatment in lambs prior to the spray-on TA administered at surgery. Low dose xylazine in particular has been shown previously to provide analgesia in treated lambs (Grant and Upton, 2004). Several of our recent unpublished studies examining the efficacy of xylazine and/or NSAIDs are briefly presented here. Note that these studies are aimed at 'proof of concept' only and are not intended to advocate the use of these drugs as considerable regulatory concerns need to be addressed prior to consideration of adoption of this approach by industry.

MATERIALS AND METHODS

Experiment 1: young lamb castration with xylazine (0.05mg/kg) & TA.

Merino male lambs (n=48) age 6-8 wks (7-9 kg) were randomly allocated into 6 treatment groups; 'Sham' uncastrated (n = 6), 'Sham + Xyl' uncastrated receiving xylazine (n=6), 'Mark' castrated and untreated (n = 6), 'Mark + Xyl' castrated receiving xylazine without TA (n=6), 'Mark + TA' castrated with Tri-Solfen, 'Mark + Xyl +TA' castrated with xylazine and Tri-Solfen. Xylazine was administered IM (0.05mg/kg) 15-20mins prior to marking. Wound pain was assessed by quantitative sensory testing, using a 75g Von Frey instrument to quantifying the animal's response to mechanical stimulation of the wound over time to assess wound anaesthesia and/or sensitivity. Results were recorded using a Numerical Rating Scale (NRS) to record central cognition and peripheral reflex responses that were compared between groups for analysis by an ordinal logistic regression proportional odds model as previously published (Lomax et al, 2008).

Experiment 2: mulesing of older lambs, Tx with xylazine (0.05mg/kg), carprofen (40mg/kg) & TA

Merino weaner ewes (n=48, weight 21.04 kg +/- 0.05kg) were assigned to 6 groups (n=8 per group) and received the following: unmulesed sham manipulated (control), mulesed only, mulesed and Tri-Solfen®, mulesed plus xylazine plus Trisolfen®, mulesed plus carprofen plus Tri-Solfen®, mulesed plus Tri-Solfen® plus xylazine plus carprofen. Pain-related behaviour was assessed by a NRS, observed at 1.5, 4 & 24hrs post-mulesing. Wound anaesthesia was assessed by wound sensitivity testing using an electronic Von-Frey anaesthesiometer, applied to 4 mulesing wound sites, with pain threshold identified as the pressure (g) exerted before animal withdrawal occurs, assessed prior to, at 1min, 6hr & 24hrs post-mulesing. Comparisons between groups were analysed by an ordinal logistic regression proportional odds model as previously published (Lomax et al, 2008).

Experiment 3: mulesing older lambs, Tx with xylazine (0.1mg/kg) & TA

Merino lambs (n = 44) aged 6-8months were randomly allocated into 3 treatment groups; a sham mulesed 'Control' (n = 6) group (perineal skin manipulation only), 'Untreated' (n = 16) receiving Tri-Solfen® only at mulesing, and 'Treated' (n=22) receiving Tri-Solfen® and IM xylazine (0.1mg/kg). Assessment of peri-operative response to mulesing was conducted using a NRS to record central cognition and peripheral reflex responses. Comparisons between groups were analysed by an ordinal logistic regression proportional odds model as previously published (Lomax et al, 2008).

RESULTS

Experiment 1: castration of young lambs.

Results (Figure 1) show significant differences between groups at 1minute post-op with elevated NRS scores for the 'Mark' castrated and untreated and the 'Mark + Xyl' castrated receiving xylazine only groups. Although both the 'Mark' and 'Treated' groups displayed significantly higher NRS scores than the 'Control' or sham mulesed animals (Figure 3), the xylazine 'Treated' animals did have significantly reduced pain scores compared to the 'Untreated' group (P < 0.001).

Experiment 2: mulesing of older lambs.

Mules only lambs displayed significantly more pain-associated behaviours post-mulesing compared to control and treated lambs. There was no significant difference in pain behaviours

between control lambs and those treated with any analgesia regime (Figure 2a). Mules only lambs had significantly lower pain threshold as determined by anaesthesiometer than all treated lambs at all times post-mulesing. There was no significant difference between analgesic combinations (Figure 2b).

Experiment 3: mulesing of older lambs.

Results (Figure 3) show that although both the 'Untreated' and xylazine 'Treated' groups displayed significantly higher NRS scores than the 'Control' or sham mulesed animals, the xylazine 'Treated' animals did have significantly reduced pain scores compared to the 'Untreated' group ($P < 0.001$).

CONCLUSION

Castration and mulesing of lambs are painful procedures but are generally accepted in Australia as they improve the life-time welfare of Merino wool sheep by considerably reducing injury and disease risk respectively. It is a remarkable development that farmer-applied TA has been so enthusiastically adopted for mulesing by a majority of producers who are prepared to pay between \$0.50-0.90 for pain relief that provides a better welfare outcome for their lambs, enabling a movement of our grazing husbandry from the welfare category of 'a life worth living' to a 'good life'. That widespread adoption of TA for mulesing has occurred voluntarily and in the absence of direct financial returns is presumably motivated by a combination of a desire to improve welfare and address the market risk of a mulesing ban.

This paper presents some of our recent work with drugs aimed at enhancing the profound effects of TA for lamb marking and mulesing. Experiments 1 and 2 used low dose xylazine (0.05mg/kg) to avoid sedation; this dose has been suggested as sufficient for analgesia (Grant and Upton, 2004). In both experiments, statistical significance between the small-sized treatment groups was not achieved, although the technique used to compare treatments by assessing wound pain NRS score was found not to be as robust for castration as mulesing, probably because the TA is applied into the dorsal scrotum where wound pain cannot be readily measured. In these trials we were not convinced that xylazine offered a superior result for castration and mulesing than TA alone. However in experiment 3 we used twice the dose of xylazine (0.1mg/kg) and although some sedation did occur, significance between the larger-sized groups was achieved. We also measured 'mothering up' in lambs treated with xylazine and found no significant compromise. This suggests that further work with xylazine to examine whether it has a place on a larger scale for mulesing may be warranted.

Our preliminary work with peri-operative treatment with xylazine in addition to TA does appear to offer a superior welfare outcome for mulesing but not castration than TA alone, although the benefits may appear marginal. Our current position is that if xylazine is to be promoted for 'best practice mulesing', the numerous animal safety, OH&S, 'inappropriate use' risk and other concerns to regulators, needs careful consideration. . A national meeting of interested agencies was hosted by APVMA in November 2011 in Canberra where these issues were openly discussed in a constructive manner, including the issue that xylazine is well known to have profound side-effects including thermoregulatory compromise. Further, products provided for injection that contain material with human health risks will injure farmers (Windsor et al, 2005), although new injection devices may ameliorate this. If we are to adopt products such as xylazine for wider use, the veterinary profession may need to develop new approaches to address these risks. In addition to the supply and care of such drugs, more direct veterinary supervision of the administration plus provision of the necessary post-operative supervision of animals is required.

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Figures

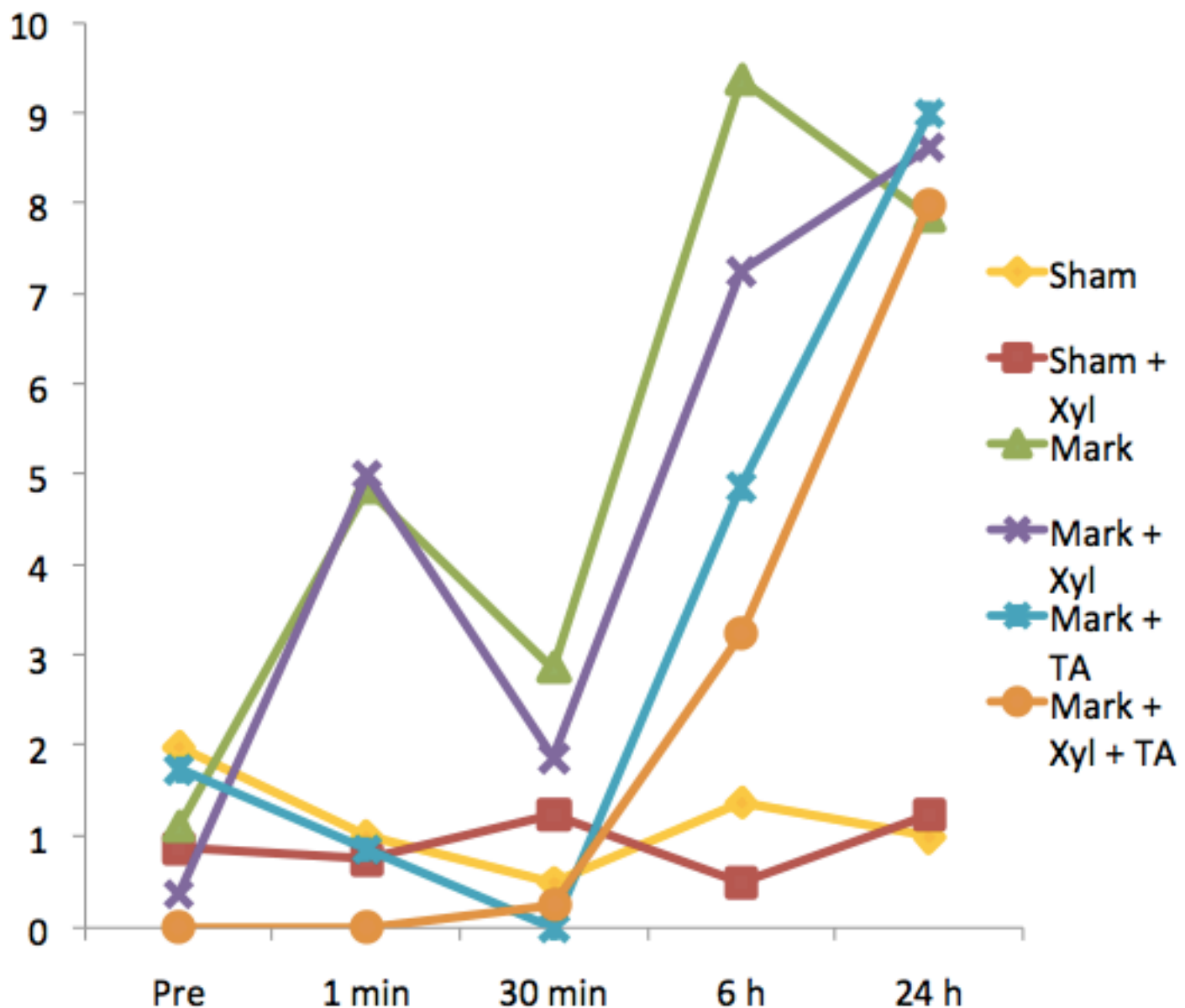


Figure 1. NRS scores in 6 treatment groups of young lambs at castration

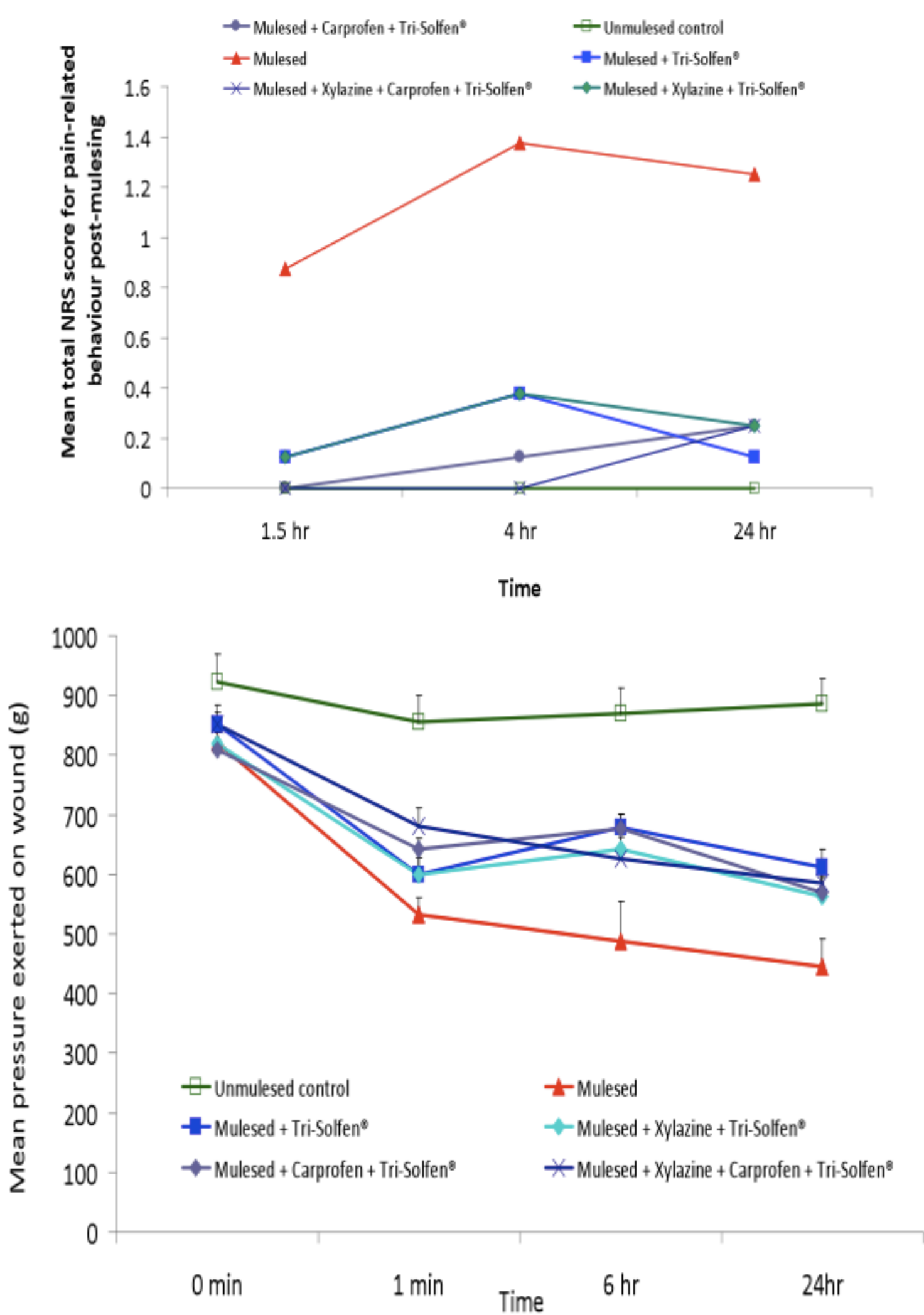


Figure 2. NRS scores in 6 treatment groups of older lambs at mulesing (i) and anaesthesiometer pressures in 6 treatment groups of older lambs at mulesing (ii)

Mean NRS scores for all treatment groups

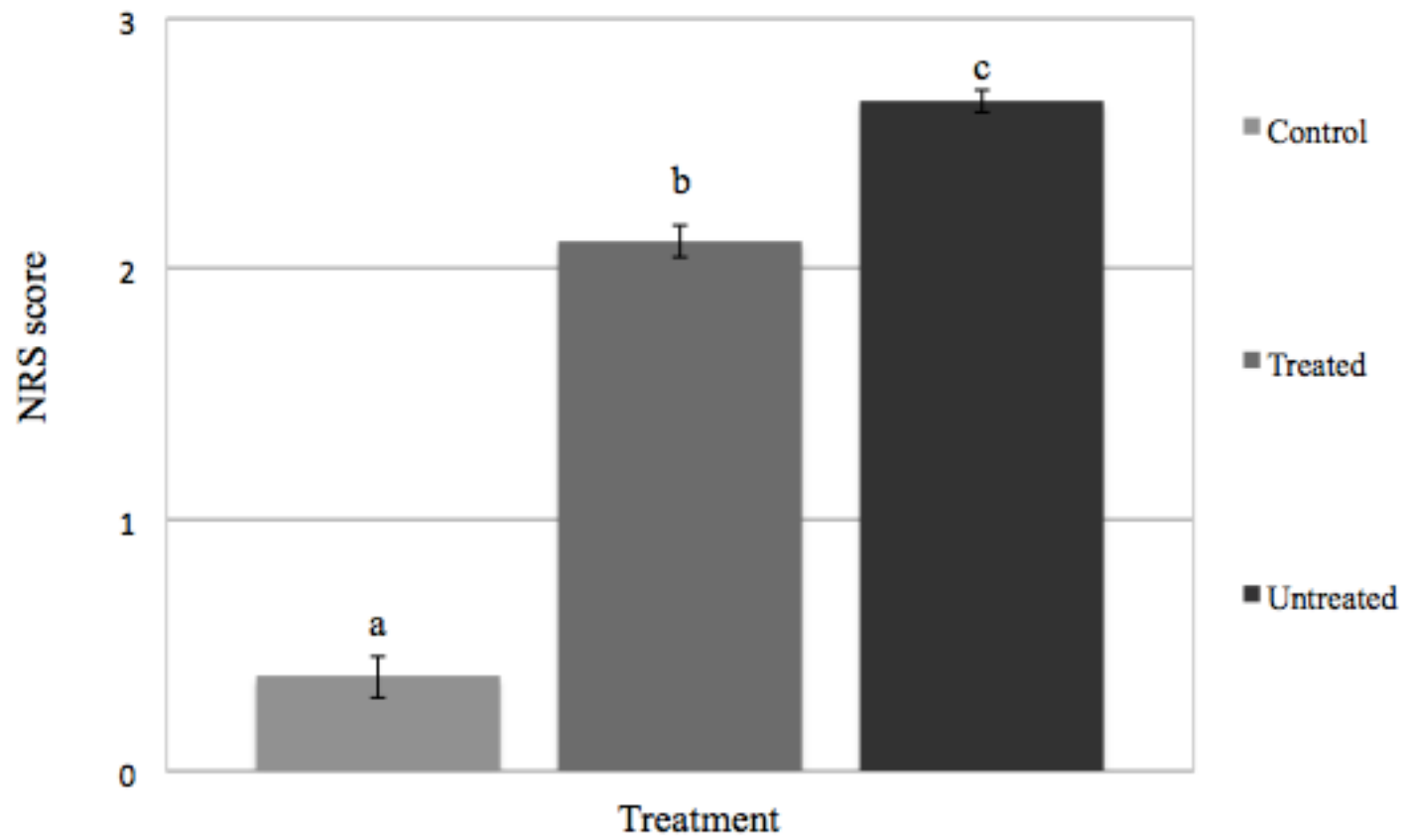


Figure 3. NRS scores for 3 groups of older lambs at mulesing, with a marginal but significant decrease in NRS scores for lambs treated with 0.01mg/kg xylazine (b) in addition to TA than TA alone (c)