

# PAIN RELIEF IN LAMBS

Adrian Baker



# Welfare Benchmarks & Framework

- Society and consumer expectations
- Industry standards and guidelines
- Encapsulated in the “5 freedoms”
- Assessment of welfare (including pain) in animals remains subjective & challenging, especially the mental and psychological dimensions
- objective measures of welfare remain elusive: mulesing, live exports

# Producer's Guide To Sheep Husbandry Practices MLA (2013)

Best practice for mulesing and docking: “as young as possible, ideally two weeks after the end of lambing and before 3 months of age; hot knife for docking; ring for castration; pain relief”.

# **Animal Welfare Standards and Guidelines For Sheep (2016)**

“Tail docking, castration and mulesing should be accompanied by pain relief when practical and cost-effective methods become available”



# **Veterinary Chemical Control Regulations (2006)**

“A person must not use a registered veterinary product on sheep other than in a way stated in instructions on the approved label”.

# Pain

- Unpleasant, extremely complex phenomenon associated with actual or perceived tissue damage and involving multiple interactive dimensions causing variable responses
- Can be transient, progressive or chronic
- Protective mechanism against further tissue damage (not all bad)
- No single model can explain the physiological basis of pain
- Perception, tolerance, impact and coping vary between individuals
- Nociceptive pain is initiated by activation of peripheral nerve receptors in response to noxious chemical, mechanical, thermal or ischemic stimuli (or combinations)

# The Pain Pathway

- **Stimulation** of nerve receptors by noxious stimuli
- **Transmission** via nerves and various spinal pathways to the brain stem
- **Perception** and responses following processing in various areas of the brain  
→ variable between individuals, variable between species

# Implications for the Lamb

- Simple, short-term nociceptive pain is distinguished from post-operative/post-procedural pain by the induction of changes in the reception, conduction and perception of pain and if these occur in the neo-nate they can permanently increase sensitivity to sensory stimuli i.e. concepts of sensitisation and neuroplasticity
- Fear and anxiety can enhance responses to and interpretation of painful events

# Inflammation

- Part of the cascade of events involved in healing
- Mediated by chemical messengers
- Heat
- Swelling
- Redness
- Pain
- Loss of function

# Benefits of Relief from Pain

- Difficult to quantify
- Improved animal welfare
- 'Social licence' to operate
- Personal satisfaction of providing best practice
- Commercial: animal performance, market access

# Analgesia

- Misconceptions about the place of different pain relief options; they are not alternatives to each other, they complement each other; different mechanisms and durations of action
- Multi-modal (>1 drug) analgesia maximises additive or synergistic interactions
- Three days is a useful guideline for duration of analgesia following acute surgical pain
- Local anaesthetics inhibit conduction of nerve impulses at the site of application
- Non-steroidal anti-inflammatory drugs (NSAID's) inhibit the synthesis of chemical mediators of inflammation (prostaglandins from arachidonic acid):  $\text{PgE}_2$  acts peripherally on sensory neurones and centrally on receptors in the spinal cord and brain

# Pain Relief Options

- Topical anaesthesia: **Tri-Solfen**: lignocaine, bupivacaine
- NSAID's: **Buccalgesic**, **Metacam**: meloxicam
- Regional anaesthesia: **Numnuts** ("the new kid on the block"): lignocaine







## TRI-SOLFEN<sup>®</sup>

Topical anaesthetic and antiseptic solution

### How to use TRI-SOLFEN<sup>®</sup>

Tri-Solfen is a gel spray designed for topical use on mulesing wounds only. It is a once-in-a-lifetime treatment. Apply Tri-Solfen spray to the wound immediately after the mulesing procedure is completed using the Tri-Solfen applicator as per the dosage table. The applicator applies 2 mL per application. It is important that Tri-Solfen is applied evenly covering the wound area and tail, particularly the wound edges. Do not spray to run-off.

Liveweight	Number of sprays x 2 mL	Dose
5-10 kg	3	6 mL
11-15 kg	4	8 mL
16-20 kg	5	10 mL
Over 20 kg	6	12 mL



Apply Tri-Solfen immediately after mulesing.



Apply Tri-Solfen as a series of stripes up and down the wound for full coverage of the wound and tail.

Registered low volume insecticidal preparations registered to treat mulesing wounds can be applied AFTER application of Tri-Solfen. However, high volume fly treatments are not recommended as they are likely to wash the Tri-Solfen off the wound.

### Withholding periods:

**MEAT:** Treated sheep must not be supplied or sold for slaughter for human consumption for at least 90 days following treatment with this product.

**MILK:** This product must not be used in lambs that will in the future produce milk or milk products for human consumption.

**EXPORT SLAUGHTER INTERVAL (ESI):** Not established.

### Pack sizes available:

1L, 5L and 20L

### References:

1. Lomas S, Shell M, Windsor PA. Duration of action of topical anaesthetic formulation for pain management of mulesing in sheep. Aust Vet J 2013; 91: 160 – 167.
2. Lomas S, Shell M, Windsor PA. Impact of topical anaesthesia on pain alleviation and wound healing in lambs after mulesing. Aust Vet J 2008; 86: 159 – 168.
3. Lomas S, Windsor PA, Shell M. Topical anaesthesia for the amelioration of mulesing pain in sheep. Proceedings of the 44<sup>th</sup> Congress of the International Society for Applied Ethology (ISAE), Sweden 2010; 234.



You can make a difference to their lives and yours by using Tri-Solfen.

Angus Carter and his daughter Mary, Calliope, Kentucky, NSW

The Better Choices Program is all about best welfare practice and the sustainability of the Australian sheep industry. The program provides farmers with a voice and aims to promote the fact that the majority of Australian woolgrowers use pain relief when mulesing because they care about their animals. Become a Better Choices wool producer by treating all mulesed lambs with Tri-Solfen. Visit [www.betterchoices.com.au](http://www.betterchoices.com.au) to register as a Better Choices wool-grower to receive your Better Choices declaration form



[www.betterchoices.com.au](http://www.betterchoices.com.au)

(renewed annually). With a current registration, you are entitled to stencil all your wool bales under Better Choices as a clear signal that you have adopted pain relief, and certify and declare your wool uses best-practice methods when completing the National Wool Declaration (NWD). This provides international retailers an assurance that they are purchasing wool from woolgrowers that are supporting the best possible welfare practice for their lambs.



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## TRI-SOLFEN<sup>®</sup>



Active Constituents: 40.6 g/L Lignocaine (as hydrochloride), 4.2 g/L Bupivacaine (as hydrochloride), 24.8 mg/L Adrenaline (as acid tartrate), 5.0 g/L Cetrimide

Topical anaesthetic and antiseptic solution for pain relief in lambs following mulesing







# TRI-SOLFEN®



## Topical anaesthetic and antiseptic solution

### It's time to talk TRI-SOLFEN®...

Fly strike is a major animal health and welfare problem for sheep production in Australia. Whilst the long-term aim is to breed sheep that are less susceptible to this condition, the current and most effective way of reducing the incidence of fly strike is mulesing. Mulesing involves the surgical removal of the skin folds under the crutch area to reduce the moisture and wrinkle that blowflies find attractive.

However, this procedure is performed without anaesthesia and causes acute pain and stress to lambs and therefore has attracted growing international concern for animal welfare. With the demand for ethically produced meat and fibre products ever increasing, best welfare practice is being advocated in the production of wool to support the sustainability of the Australian wool industry.

Tri-Solfen is the first product of its kind to address the legitimate animal welfare concerns being expressed regarding mulesing. Tri-Solfen delivers effective and fast pain relief and reduces mulesing procedure-related impacts on lambs. This pioneering treatment is easy to use and apply, and is a low cost solution that visibly improves animal care. The RSPCA and USA National Retail Federation fully endorse the use of Tri-Solfen as an industry best practice to meet animal welfare requirements. Thousands of Australian wool producers are now making the better choice to use Tri-Solfen at mulesing, demonstrating leadership and commitment to providing best animal welfare practice.



“Lambs need every advantage to help mother up and put on weight before weaning. Using pain relief helps us achieve this by helping lambs through the mulesing phase. We are delighted with Tri-Solfen.”

Paul Walker, Victoria



# TRI-SOLFEN®

## Topical anaesthetic and antiseptic solution

### How does TRI-SOLFEN® work?

Tri-Solfen is a gel spray formulation containing a combination of local anaesthetics, adrenaline and an antiseptic applied as a one-off treatment to the mulesing wound. The unique formulation of Tri-Solfen offers three major benefits to lamb welfare:

#### 1. PAIN RELIEF

Tri-Solfen contains two proven topical local anaesthetics; Lignocaine (40.6g/L) and Bupivacaine (4.2g/L). Both anaesthetic agents block the conduction of nerve signals responsible for the sensation of pain and thereby reduce the subsequent pain escalation response. Local anaesthetics act directly on the damaged skin. Lignocaine is a fast-acting anaesthetic that has been shown to reduce pain immediately following application. Bupivacaine is a long-acting anaesthetic that works to keep post-operative pain at low to mild levels, providing extended pain relief. Together, they provide rapid wound pain relief within 1 minute of application of Tri-Solfen and prolonged pain alleviation and reduction in pain-related behavior for at least 24 hours (Fig. 1).

#### 2. REDUCES BLEEDING

Tri-Solfen contains Adrenaline (24.8 mg/L). Adrenaline is a vasoconstrictor, which reduces wound haemorrhage and results in less shock and stress of blood loss. Adrenaline can also reduce the rate of systemic absorption of the local anaesthetics in order to intensify and prolong the local anaesthetic effect on the wound.

#### 3. PROMOTES WOUND HEALING

Tri-Solfen also contains Cetrimide (5g/L), an antiseptic agent widely used to cleanse skin and wounds. It reduces the likelihood of contamination and therefore reduces the risk of bacterial infections which, if untreated, can result in prolonged pain, stress and potential mortality. The product's gel base allows the active ingredients to adhere to and seal the wound, coating the damaged nerve endings from ongoing environmental exposure to provide a 'barrier' effect. The gel formulation moisturises the wound to promote formation of healthy granulation tissue and results in enhanced wound healing for lambs treated with Tri-Solfen.<sup>2</sup>

“We have used pain relief for two years now and seen real production gains. We are concerned for the welfare of our animals and will continue to use pain relief to ensure they get the best care.”

Clinton Ware, Western Australia



# TRI-SOLFEN®

## Topical anaesthetic and antiseptic solution

### TRI-SOLFEN® provides fast (1min) and long (24hrs) pain relief

The University of Sydney trials measured wound pain using the von Frey monofilaments to determine sensitivity to pain stimulation.

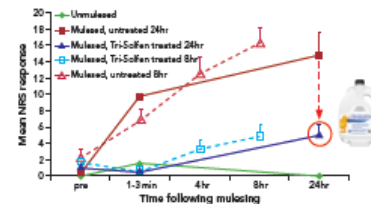


Fig. 1: Graph showing a significant lower pain response in Tri-Solfen treated lambs at all time points (The lower the numerical rating scale (NRS), the lower the measure of pain).

### The welfare benefits

More and more woolgrowers are seeing the benefits of using Tri-Solfen at mulesing to support a faster recovery for lambs post-mulesing. The improved welfare outcome for lambs is clearly visible by a reduction in pain-related behaviours, such as less stiff walking and less standing with hunched posture compared with untreated lambs.<sup>1,2</sup> Lambs treated with Tri-Solfen can walk more freely back to the paddock post-mulesing, allowing them to find their mother quicker and return to feeding. The immediate and ongoing reduction in pain-related behaviour observed in lambs treated with Tri-Solfen undoubtedly confirms that using Tri-Solfen supports the best welfare outcome for mulesed lambs.

### TRI-SOLFEN® pays for itself

Mulesing can cause fatal losses in animals due to blood loss, infections and mis-mothering. Tri-Solfen enables woolgrowers to improve the welfare of their lambs that does not necessarily result in additional costs. If the average value of a lamb is \$80, a sheep producer only needs to wean another one in every hundred lambs (or 1%) for Tri-Solfen to pay for itself.

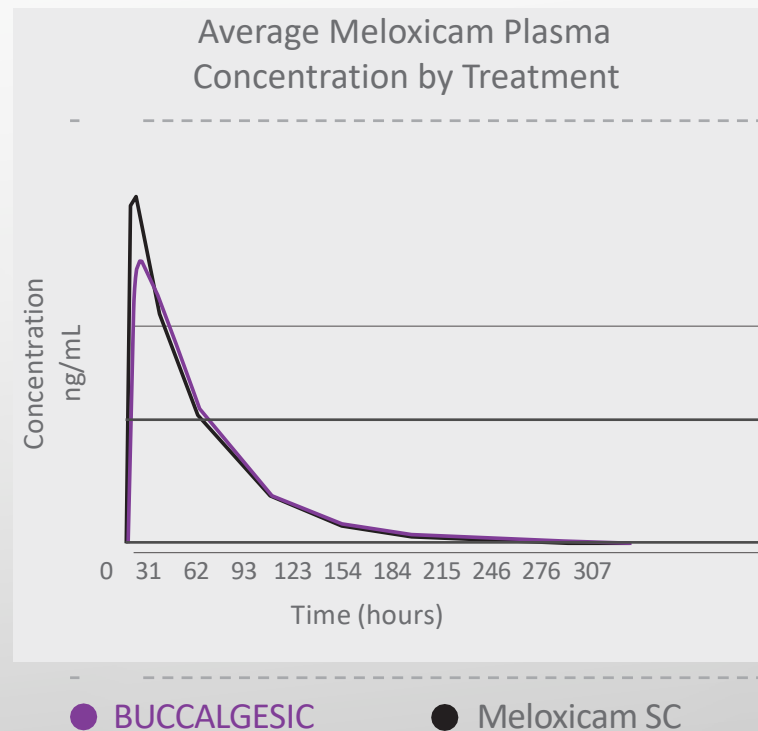
“It's a productivity increase – which covers the cost. It's the best for lambs, the best for productivity. The best for my business.”

Red Taylor, Western Australia

# BUCCALGESIC: THE PRODUCT OF CHOICE

## Meloxicam options

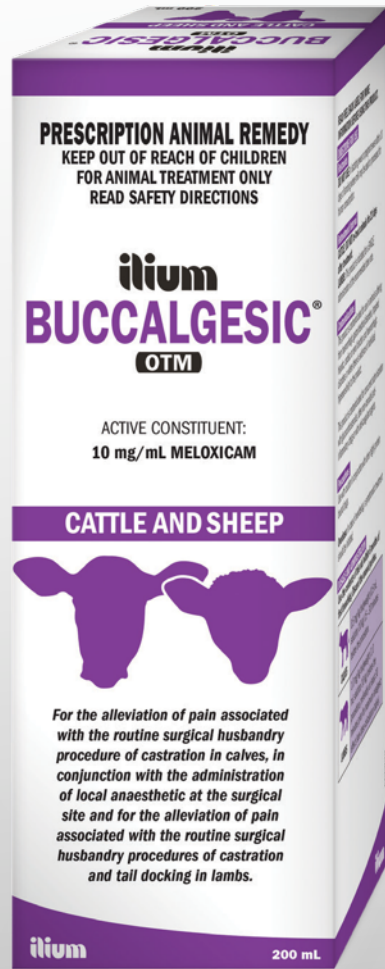
- BUCCALGESIC contains 10mg/mL meloxicam, a non-steroidal anti-inflammatory drug (NSAID) that alleviates pain and inflammation by inhibiting the COX-2 enzyme
- METACAM contains 20mg/ml meloxicam for SC injection
- BUCCALGESIC demonstrated no significant difference to meloxicam subcutaneous injection for AUC(0–∞) and elimination half-life



### BUCCALGESIC BENEFITS

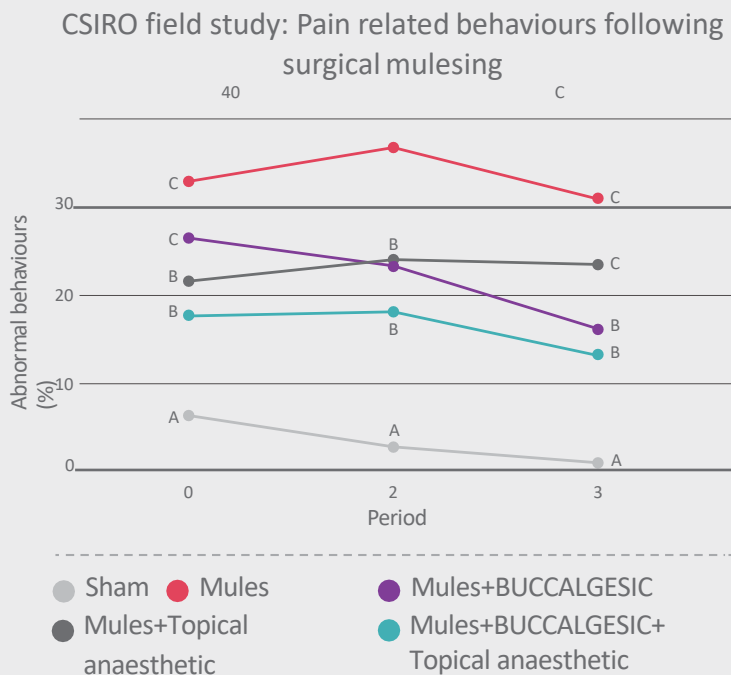
- ✓ Analgesic
- ✓ Anti-inflammatory
- ✓ Anti-exudative (reduces fluid production caused by tissue damage)
- ✓ Antipyretic (helps reduce fever)
- ✓ Inhibits leukocyte infiltration into inflamed tissue
- ✓ Helps prevent bone and cartilage destruction

# BUCCALGESIC: SIMPLE BUCCAL DELIVERY



- APVMA-registered, ready-to-use formulation containing 10 mg/mL meloxicam
- Formulated as a viscous, blue-coloured solution to facilitate oral transmucosal (OTM) absorption, and dosing visibility
- Applied to the buccal area inside the mouth between the gums and cheek
- Safe, fast delivery with no needles (avoids potential for carcass damage and needle-stick injury to operator)

# MULESING IN LAMBS

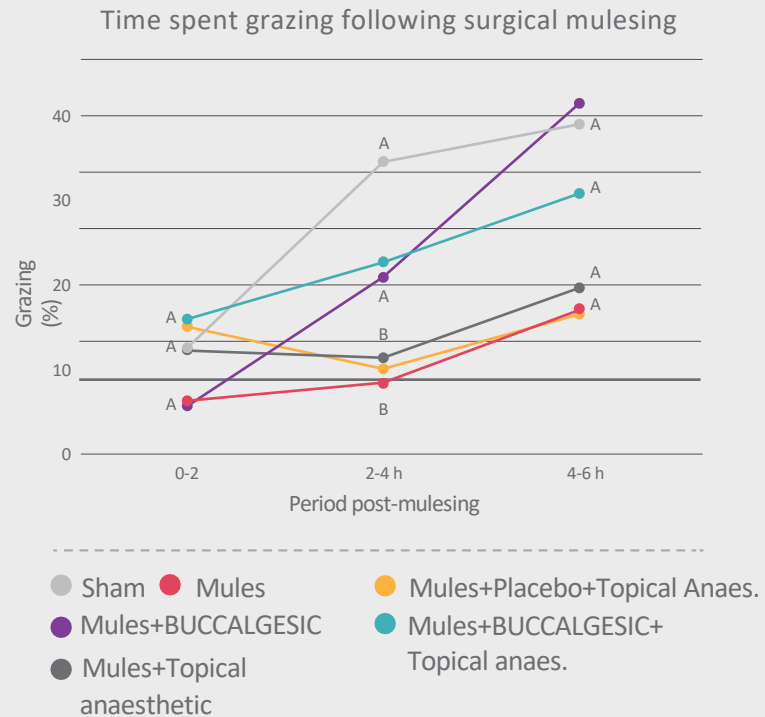


## In mulesed lambs:

- BUCCALGESIC significantly reduced pain-related behaviours **from 2 hours post procedure**
- Pain-related behaviours were significantly reduced **immediately** with BUCCALGESIC + topical anaesthetic

The effects of BUCCALGESIC, topical anaesthetic, and a combination of the two agents on pain-related behaviours, body weight change and wound healing were studied over a 10-day period following surgical mulesing of young lambs, aged between 6 and 10 weeks, kept in a paddock situation. A,B,C: common letters designate no significant difference between groups; different letters designate a significant difference between groups.

# MULESING IN LAMBS



## 2-4 hours post-mulesing:

- Time spent grazing was significantly greater in lambs who received BUCCALGESIC (with or without topical anaesthetic)

## 4-6 hours post-mulesing:

- Grazing behaviour in BUCCALGESIC-treated lambs remained almost double

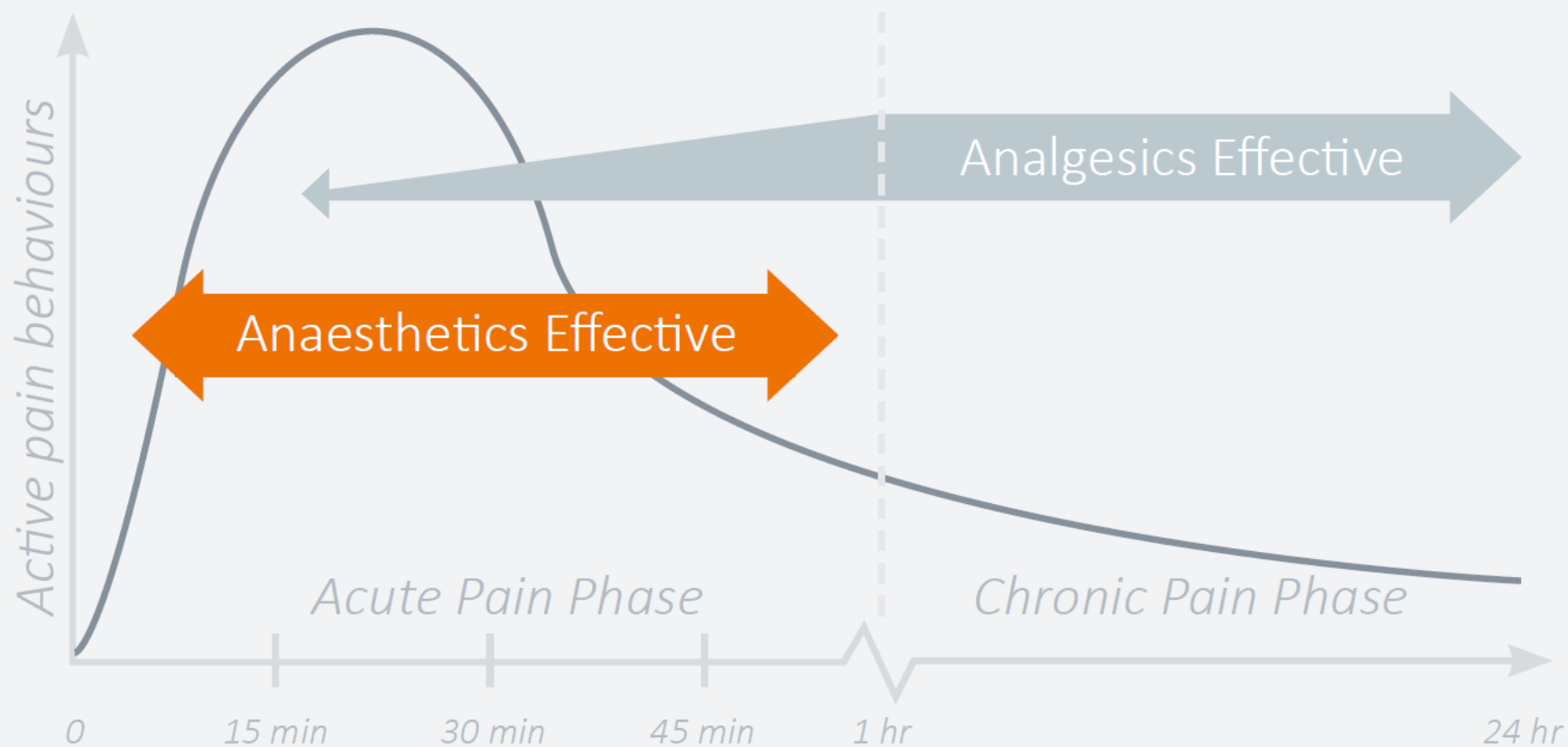
Percentage of time spent grazing observed in lambs on the day of treatment (day 0). Lambs, aged between 6-10 weeks, were observed for 6 hours following surgical mulesing; period 1 for 0-2 hours, period 2 for 2-4 hours and period 3 for 4-6 hours. A,B: common letters designate no significant difference between groups; different letters designate a significant difference between groups.

The background features a light gray gradient with decorative circuit-like lines in light blue and teal. These lines are concentrated on the left and right sides, with some extending towards the center. They consist of vertical and horizontal segments connected by small circles, resembling a stylized circuit board or data flow diagram.

numnuts<sup>®</sup>

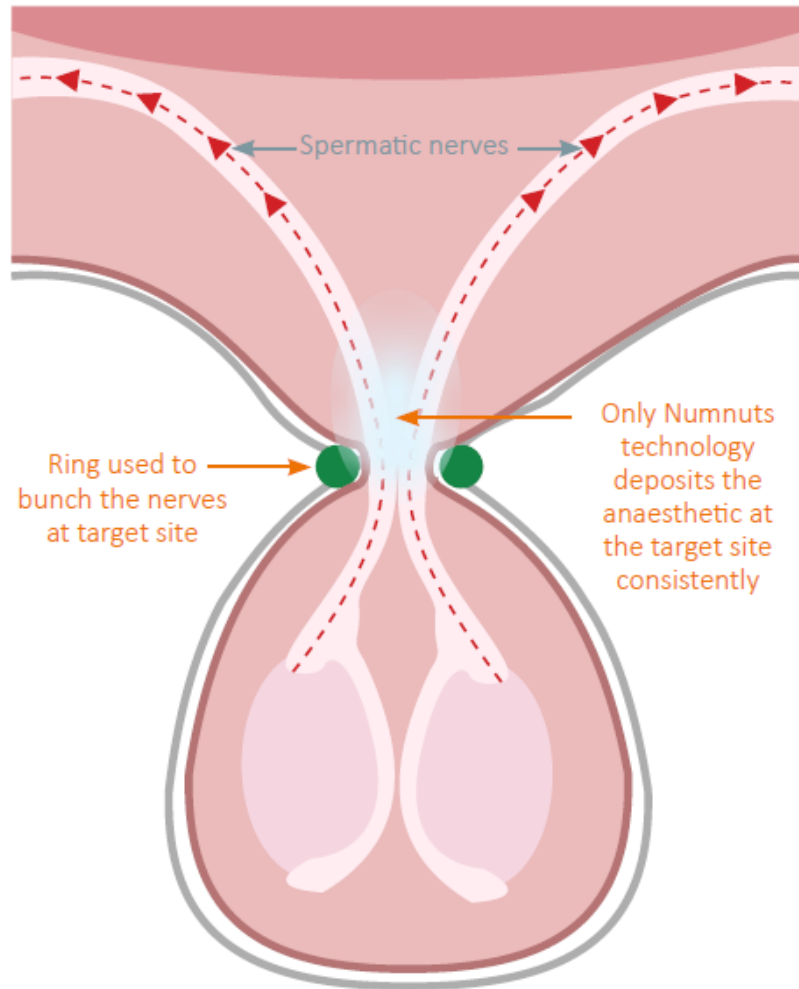


*Illustration showing Anaesthetics and Analgesics alleviating the Ischemic Pain from rubber ring over time.*

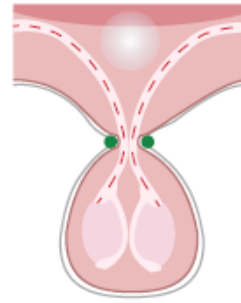


## Dispensing Local Anaesthetic to Testes

### With Numnuts



### Without Numnuts



Using an existing banding tool and separate injector may occasionally work but inaccuracy can lead to either missing the location or only affecting one nerve.



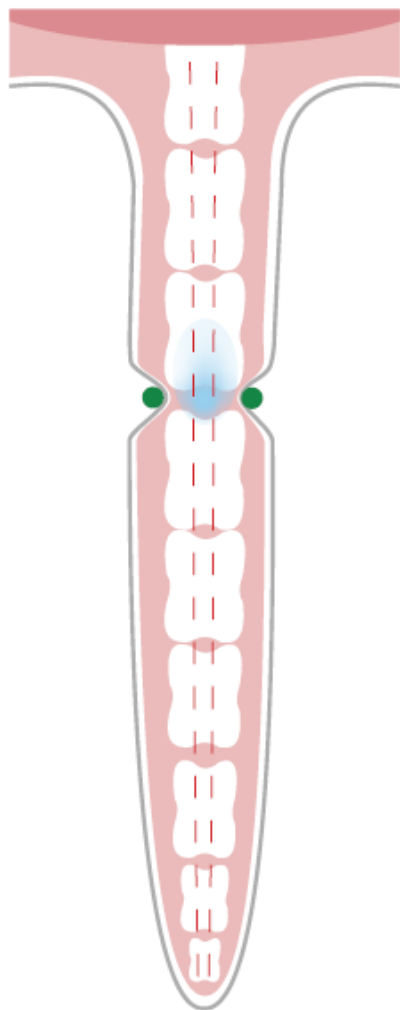
Not using banding fails to bunch the spermatic cords and the outcome is not as effective. Local anaesthetic must be deposited in the nerve pathway to have rapid nerve transmission 'blocking' effect.



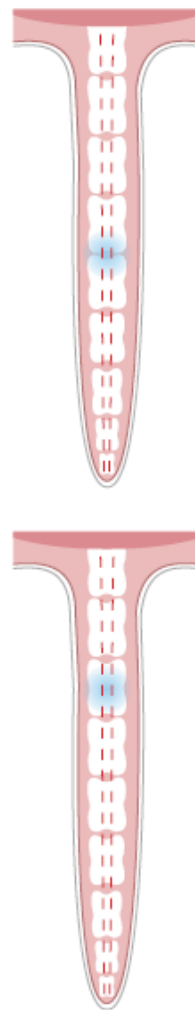
Operator speed is critical on commercial farms. Without the consistency and accuracy that Numnuts provides anaesthetic can be delivered into the wrong location.

## Dispensing local anaesthetic to tail

With Numnuts



Without Numnuts



Numnuts Starter Pack  
\$350 (ex GST)





# Numocaine 100ml



- Approximately 67c/dose (vet dependant)
- Fixed dose 1.5ml per procedure
- Quick fit, purpose specific

## Numnuts in Action



# NUMNUTS – feedback & take home message

- “The males are definitely more alert and not displaying the usual symptoms. That and the fact we use meloxicam is a good combination I believe” DH, 2500 Merino ewe flock, Cleary WA
- “Works a treat. Will be using on all male lambs next year” MW, after trial on 1000 ram lambs; 20,000 Merino ewe flock, Boyup Brook WA
- “Great product, idea and design” AB, 1200 Merino lambs, Wickepin WA
- **Numnuts has a dramatic impact on behaviour of ram lambs following application of a ring to the sac**

# Useful Ancillary Tools

- Short mating: 21-35d → consistent sized lambs → ease of management
- Vaccination: rings create an anaerobic environment → risk of tetanus; enterotoxaemia risk increases as management improves; too many producers are implementing ineffective immunisation protocols
- Low stress management and sound husbandry practices improve pain management outcomes