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For the latest in red meat R&D

Pain Mitigation in Sheep and Cattle

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Key messages

- The provision of pain relief with routine husbandry practices is now an expectation.
- Producers need to assess the need to undertake painful husbandry procedures
- Products are available and include local anaesthetics and NSAIDs

Most pain relief products help with some of the pain an animal experiences, but not all. **Using a combination of products will provide greater pain relief. Local anaesthetics** provide relief from immediate pain, but are short-acting. **NSAIDs** provide a longer duration of pain relief but do not deal well with the immediate pain.

Pain mitigation – producer obligations

The Australian Animal Welfare Standards and Guidelines -good husbandry principles include:

- *"assessment of the need to undertake any husbandry procedures that may result in significant short-term pain against alternative strategies for the long-term welfare of the sheep /cattle*
- *undertaking of any husbandry procedures required for planned flock herd management in a manner that reduces the impact of these procedures and minimises risks to sheep /cattle welfare. "*

Sheep:
"G6.14 Tail docking and castration and G7.8 Mulesing should be accompanied by pain relief when practical and cost-effective methods become available. Operators should seek advice on current pain minimisation strategies.

Cattle:
"G6.2 Surgical procedures should be done with pain relief. Operators should seek advice on current pain minimisation strategies."

- The provision of pain relief with routine husbandry practices is now an expectation.
- Producers need to assess the need to undertake painful husbandry procedures
- Pain relief products are available

Registered Products available

Tri-Solfen® (Bayer Australia)-local anaesthesia, post-op
NumOcaine® (Mavlab, sheep only)- local anaesthesia, pre-op
Ilium Buccalgesic OTM® (Troy Laboratories, meloxicam)- NSAID
Metacam®20 (Boehringer Ingelheim, meloxicam)- NSAID

Tri-Solfen®	NumOcaine®	Buccalgesic®	Metacam20®
Post-op, wound, topical	Ring application, injection	Pre-op, oral (cheek)	Pre-op, injection
Sheep and cattle	Sheep only	Sheep and cattle	Sheep and cattle*
Local anaesthetics + adrenaline, cetrimide	Local anaesthetic	NSAID	NSAID
Short /medium	Short analgesia	Medium /long	Medium /long
Varies	Set dose	1 ml/10 kg lambs 1 ml/20 kg calves	1 ml/20kg s/c sheep
$1/lamb mulesing; $0.50 /lamb, $1/calf castration	$0.67 castration	$0.50 /lamb, $1/calf	$1/lamb
Mulesing, surgical castration	Ring application	All procedures	All procedures

numnuts

https://www.sheepcentral.com/

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Costs of Products

Prices quoted are approximate, and may vary from region to region and with supplier and quantity purchased. S4 vet only drugs (NumOcaine, Buccalgesic and Metacam) can only be sold to clients, and price is likely to vary, depending on client relationship and volume.

Trisolfen Table

Lambs							Calves		
	Mulesing		Tail docking		Castration				
Weight kg	Dose ml	Cost $	Dose ml	Cost $	Dose ml	Cost $	Weight kg	Dose ml	Cost $
<=10	6	0.86	1.5	0.21	3	0.43	30-100	6	0.86
15	8	1.15	2	0.29	4.5	0.64	>100	9	$1.29
20	10	1.43	2	0.29	4.5				
>20	12	1.72	2	0.29	4.5				

Vet Only

NumOcaine
$0.67 /dose
Applicator ~ $400

Vet Only

Injectable NSAIDs
approx 2x
Buccalgesic

Buccalgesic Table 10mg/ml meloxicam

Sheep (1 ml/10kg)			Cattle (0.5 ml/10kg)		
Weight kg	Dose ml	Cost $	Weight kg	Dose ml	Cost $
<10	1	0.40	30	1.5	0.60
15	1.5	0.60	40	2.0	0.80
20	2.0	0.80	50	2.5	1.00
25	2.5	1.00	60	3.0	1.20
30	3.0	1.20	70	3.5	1.40

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Cost: benefit of pain relief

- Peace of mind
- Protect markets
- No production benefits
- Individual company contracts

A note on the cost: benefit of pain relief in sheep and cattle. While pain experienced during well carried out routine husbandry procedures may result in decreased feed intake in the short term, animals generally compensate subsequently and 2-4 weeks later there is no measurable benefit from pain relief. The benefit for producers in using pain relief during routine husbandry procedures is not only their own peace of mind, but also in meeting consumer expectations and therefore protecting the product they market. Where producers engage in quality assurance programs that require pain relief as part of these programs, specific financial benefits may accrue to individual producers.

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Terminology

Anaesthesia -loss of physical sensation.

Analgesia - pain relief without total loss of feeling or consciousness.

I**mmediate** (or fast) pain

Chronic (or slow) pain.

Expect both fast and slow pain for painful animal husbandry procedures.

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Local anaesthetics

Good for immediate pain control.
Does not deal with slow pain

NumOcaine -lignocaine <1 hr

Tri-Solfen – lignocaine plus bupivacaine (plus adrenaline, cetrimide) 2-4 hrs (stops wound hyperalgesia for 24 hrs)

bayer.com.au

High degree of analgesia (pain relief), but no pain relief once they wear off.

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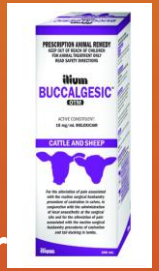
Non-Steroidal Anti-inflammatory Drugs (NSAIDs)

- reduce inflammation, pain and fever
- block synthesis of prostaglandins→ block the transmission of pain signals



Buccalgesic and Metacam (and flunixin)

Used in people for years – eg Aspirin,**Nurofen, Voltar**
and cattle (eg flunixin injections), but

Recently registered in sheep (Metacam, Buccalgesic- both meloxicam).

Deal with **medium** term pain

15-30 minutes to take effect

Provide pain relief for at least **9 hours**, and often longer
eg Colditz et al (2019),Small et al (2014)

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Approach to Pain Mitigation

- Assess if procedure necessary
- If necessary, choose appropriate product (s)

SHEEP
Mulesing
Castration
Tail Docking

CATTLE
Castration

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Mulesing

- Tri-Solfen and Buccalgesic both provide pain relief
- Tri-Solfen providing a faster less prolonged response (mainly in first 4 hrs) (>24 hrs for wound hyperalgesia)
- Buccalgesic 4-6 hrs post treatment (and probably longer)

Combination of Buccalgesic and Tri-Solfen -best pain relief

Notes: Metacam -similar to Buccalgesic
Pain still occurs after these products wear off

Liquid nitrogen -still be a painful procedure, meloxicam reported to have limited benefit, pain mitigation being evaluated.

Castration - lambs

For ring castration,

- Lignocaine appears to provide short term pain relief → NumOcaine should decrease short-term pain (<1 hr).
- Tri-Solfen is not suitable, as there is no wound.
- NSAIDs have not been shown to decrease behaviour responses (despite decreasing cortisol response), but would be expected to have some effect on pain.

A combination of NumOcaine (ie ring application using Numnuts) and meloxicam should provide the best pain relief, given current registered products.

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Castration – lambs (cont)

For surgical castration,

- Tri-Solfen has been shown to have beneficial effects at reducing pain behaviours.
- **a combination of meloxicam and Tri-Solfen should provide the best pain relief.**

Tail docking

- Hot iron is considered least stressful
- Local anaesthetic ↓ behavioural responses to hot iron docking
- Tri-Solfen not as effective on the cauterised tail.

Pain relief Table for Sheep- mulesing, castration and tail docking

Animal Husbandry Procedure	Meloxicam	NumOCaine+	Trisolfen	Meloxicam plus Trisolfen	Meloxicam plus NumOcaine+	Numocaine plus Trisolfen
Mulesing	Suitable		Suitable	Best		
Hot iron docking (33-75%)	Suitable					
Ring docking	Suitable	Suitable			Best	
Ring castration	Suitable	Suitable			Best	
surgical castration (3%)	Suitable		Suitable	Best		
Hot iron docking/ring castration	Suitable	Suitable			Best	
Hot iron docking/surgical castration	Suitable		Suitable	Best		
Ring docking / ring castration	Suitable	Suitable			Best	
Ring docking / surgical castration	Suitable			Suitable	Suitable	Suitable
Hot iron docking/ring castration + mulesing *	Suitable			More Suitable*	Suitable	Suitable
Hot iron docking/surgical castration + mulesing	Suitable		Suitable	Best		
Ring docking / ring castration + mulesing *	Suitable			Suitable	Suitable	Suitable
Ring docking / surgical castration + mulesing *	Suitable			Suitable	Suitable	Suitable

* The use of all three PR options (Meloxicam, Trisolfen and NumOcaine in combination would be BEST, but the use of 3 PR products may not be practically feasible in most enterprises)

+ this table assumes NumOcaine is administered as part of Numnuts, and so is done in association with the application of rings (for either castration or tail docking or both)

NB **Bolded Procedures** are expected to occur in most situations, other Procedures are included for completeness, ring docking / surgical castration is included but is unlikely to be used as a combination.

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Putting it all together - lambs

- Assess if mulesing and /or castration need to occur.
- Hot iron docking and ring combination best method
- If mulesing as well:
  - pre-operatively treat all lambs with Buccalgesic
  - use a hot iron for tail docking,
  - apply a ring to castrate male lambs with Numnuts (NumOcaine)
  - apply Tri-Solfen to the mules wound.

  If this system is not suitable, then alternatives are provided in the Pain Relief Table.
- If tail docking and castration only:
  - pre-operatively treat all lambs with Buccalgesic
  - use a hot iron for tail docking,
  - apply a ring to castrate male lambs with Numnuts (NumOcaine).

If this system is not suitable, then alternatives are provided in the Pain Relief Table.

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Combination best- get longer, better pain relief

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"Although local anaesthesia does provide amelioration of the acute pain response to painful husbandry procedures, the pharmacodynamic duration of action is short-lived… it appears that durations of greater than 3-4 hours are not currently achievable ."

Use of local anaesthesia with NSAIDs, for livestock undergoing routine husbandry procedures does provide greater amelioration of the pain response than use of a single agent alone , and should be recommended as current best practice."

Gap Evaluation of Pain Alleviation Research

Alison Small, Andrew Fisher, Caroline Lee and Ian Colditz, AWI Final report, ON-00550, June 2020

TAKE HOME MESSAGE

Local anaesthetics provide relief from immediate pain, but are short-acting.

NSAIDs provide longer duration pain relief but do not deal well with immediate pain.

Using a combination of products will provide greater pain relief.

Castration - calves

For ring castration,

- local anaesthetics ↓behaviour / cortisol
  → suggests effective method for short term pain.
- Numnuts® is not currently adapted for cattle,
- Buccalgesic
  - ➢ did not result in any benefit in the first 3 hrs following ring castration in a NZ study,
  - ➢ a Canadian study in dairy calves where oral meloxicam was given 2 hrs prior to either ring or surgical castration reported pain relief for up to 3 days.

In both these studies the dose given was double the recommended dose.

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Castration - calves

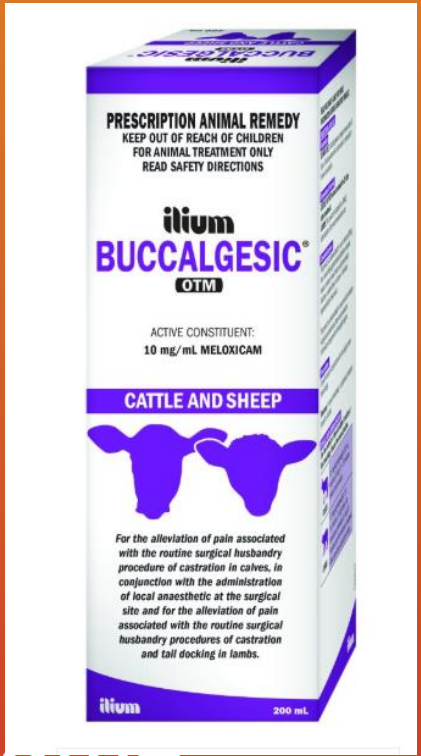
For surgical castration,

- surprisingly, local anaesthesia has not resulted in substantial analgesia.
- Tri-Solfen® sprayed onto the spermatic cords and cut edges of the scrotum reduced pain-related behaviour

(+↓ the development of hyperalgesia of the wound site).

- Meloxicam provides some pain relief, but Buccalgesic® is only registered for pain relief with castration in calves when combined with local anaesthesia, which is not currently available routine in cattle, other than as administered by a veterinarian.

Castration – calves (cont)



http://www.troylab.com.au/news/ilium-buccalgesic-otm-new-registration-for-sheep-and-cattle/

For the alleviation of pain associated with the routine surgical husbandry procedure of castration in calves, in conjunction with the administration of local anaesthetic at the surgical site and for the alleviation of pain associated with the routine surgical husbandry procedures of castration and tail docking in lambs.

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Putting it all together - calves

- Ring castration with pre-operative treatment with Buccalgesic would appear the best approach on what is currently available.
- If surgical castration, use of Tri-Solfen and Buccalgesic is likely to be the best approach, despite the lack of research data supporting this.

Alternative practices leaving males entire

- Leaving males entire → heavier (10-15%), leaner carcase.
- In some overseas countries, male animals not castrated.
- Issues:
  - age and diversity of turn-off of steers
  - safe handling, meat quality and processing
  - managing large numbers of entire male

At present, no established pathway for commercial beef production with entire males

Alternative practices

- Need to consider if practice necessary

Mulesing

- Plainer breeches in Merino sheep
- dag management, additional crutching
- additional reliance on chemical usage
- Price premiums

Flyboss article:
https://www.wool.com/globalassets/wool/sheep/research-publications/welfare/improved-breech-flystrike-management/btb-sept2018-making-transition-to-ceased-mulesing-flock-p54-55.pdf

AWI's Geoff Lindon's "Planning to move to a non-mulesed Merino enterprise":
https://www.wool.com/globalassets/wool/sheep/welfare/breech-flystrike/breeding-for-breech-strike-resistance/planning-for-a-non-mulesed-merino-enterprise.pdf

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Alternative practices - castration

Producers who run:

- a well managed flock
- good fencing
- good pastures-turn off lambs early
- need to do homework with the market and the abattoir.

- Castration of males is a routine procedure in almost all commercial Australian flocks
- In some overseas countries, male animals are not castrated.
- Leaving males entire → heavier (10-15%), leaner carcase.
- meat taint - little evidence for entire male lambs to cause meat taint.
- Meat processing - adapt quickly if most lambs were entire.
- Main reason to castrate meat lambs (or those destined for slaughter in their first 6 months or so) is from a management perspective.

Certainly this is a space to watch.

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Take home messages

- The provision of pain relief with routine husbandry practices is now an expectation.
- Producers need to assess the need to undertake painful husbandry procedures
- Products are available and include local anaesthetics and NSAIDs

Using a combination of products will provide greater pain relief.

Tools and resources

Link

https://www.mla.com.au/research-and-development/animal-health-welfare-and-biosecurity/husbandry/pain-relief/

www.wool.com

Thank you and Questions

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