GOLD STANDARD
PAIN RELIEF

TECH UPDATE

Providing effective pain relief during disbudding, dehorning and castration.

A better choice

Disbudding, dehorning, castration and other animal husbandry procedures are necessary to improve animal welfare, livestock management and productivity. Until recent years, these procedures have often been performed without any form of pain relief.

Providing pain relief during surgical animal husbandry procedures is a better choice for your livestock, your business and your industry as a whole. Consumers are increasingly demanding food and fibre that have been produced in accordance with their expectations in regards to animal welfare and sustainability. Providing pain relief helps all sectors of the livestock industry to meet these expectations and protect the long-term 'social licence' of our industry.

Australian Animal Welfare Standards and key industry organisations, including Meat & Livestock Australia and Animal Health Australia, advocate the provision of pain relief during disbudding, dehorning and castration of calves.[1,2]

Pain relief options for calves

Animals experience acute (fast) and chronic (slow) pain during and after animal husbandry procedures. This pain can be alleviated via the administration of anaesthetic or analgesic products. In general, local anaesthetics provide rapid relief from acute pain but are short-acting. NSAIDs provide longer relief from chronic pain but are less effective in relieving acute pain.

Anaesthesia refers to loss of physical sensation with or without loss of consciousness. Local anaesthetics, such as Tri-Solfen®, reduce or eliminate pain by blocking the nerve signals from damaged tissue that are responsible for the sensation of pain. Examples include lignocaine and bupivacaine, which are commonly used to provide pain relief in humans. Lignocaine provides immediate (within 60 seconds) pain relief on surgical wounds. Bupivacaine provides longer-acting pain relief on surgical wounds.

Analgesia refers to pain relief without total loss of feeling or consciousness. Common analgesic products include Non-Steroidal Anti-Inflammatory Drugs (NSAIDs), which block the synthesis of prostaglandins that cause inflammation, swelling and pain. They are typically used to reduce inflammation, pain and fever in humans. NSAIDs take 15–30 minutes[2] to take effect and can provide pain relief for 24–72 hours.[3] Examples include Butec® OTM and various injectable meloxicam formulations.

Pain relief options for calves

	TRI-SOLFEN®	BUTEC® OTM	BUCCALGESIC® OTM	MELOXICAM 20
Manufacturer	Dechra	Troy Animal Healthcare	Troy Animal Healthcare	Various
Drug type	Local anaesthetic	NSAID analgesic	NSAID analgesic	NSAID analgesic
Scheduling	S5 (over the counter)	S6 (over the counter)	S6 (veterinary prescription)	S4 (veterinary prescription)
Active ingredient(s)	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	10 mg/mL meloxicam	10 mg/mL meloxicam	20 mg/mL meloxicam
Registered indications	Pain relief following disbudding, dehorning or surgical castration.	Pain relief following disbudding or dehorning in conjunction with the administration of a cornual nerve block. Pain relief following surgical castration in conjunction with local anaesthetic at the surgical site.	Pain relief following disbudding or dehorning in conjunction with the administration of a cornual nerve block. Pain relief following surgical castration in conjunction with local anaesthetic at the surgical site.	Reduction of pain associated with surgery.
Application method	Fan spray applicator	Oral application in the buccal (cheek) pouch	Oral application in the buccal (cheek) pouch	Subcutaneous or intravenous injection
Dose	Disbudding /dehorning: 4 mL per horn Castration (30–100 kg BW): 6 mL Castration (≥100 kg BW): 9 mL	5 mL/100 kg BW	5 mL/100 kg BW	2.5 mL/100 kg BW
Withholding periods	Meat: 90 days ESI: 90 days	Meat: 14 days ESI: 21 days	Meat: 14 days ESI: 21 days	Meat: 8 days ESI: Not established
Storage	<30°C (room temperature)	<30°C (room temperature). Protect from light	<30°C (room temperature). Protect from light	<25°C (air conditioning)
Shelf life after manufacture	18 months	24 months	24 months	24 months

First choice for acute pain relief

Tri-Solfen is the first choice for acute pain relief and wound care following surgical procedures (e.g. disbudding, dehorning and castration) in calves. This easy-to-apply, spray-on gel provides immediate and lasting relief against acute pain, reduces bleeding; protects against infection; and facilitates wound healing. Tri-Solfen is available in 1, 5 and 20 L packs from your rural supplier or veterinarian. Tri-Solfen contains four active ingredients:

- **Lignocaine** and **bupivacaine**, two local anaesthetics commonly used to provide pain relief in humans. Lignocaine provides immediate (within 60 seconds) pain relief on surgical wounds. Bupivacaine provides longer-acting (up to 24 hours) pain relief on surgical wounds. Lignocaine and bupivacaine block the nerve signals from damaged tissue that are responsible for the sensation of pain, reducing the animal's pain response.

- **Adrenaline**, which reduces bleeding and slows the 'inflammatory cascade'.[4] Adrenaline constricts blood vessels that have been cut during surgery, reducing blood loss and the risks associated with increased stress and shock to the animal. Reducing blood flow to surgical wounds means nerve endings are not exposed to inflammatory compounds that would normally sensitise them. Adrenaline also reduces the rate of systemic absorption of lignocaine and bupivacaine, prolonging their anaesthetic effect.[4]

- **Cetrimide,** an antiseptic and surfactant that helps to start the healing process and protect against infection. The gel formulation helps to seal and protect the wound for improved wound healing.

Tri-Solfen is ideal for use in combination with NSAID treatments (e.g. meloxicam) to provide multi-modal relief from both acute and chronic pain.

Scientifically proven

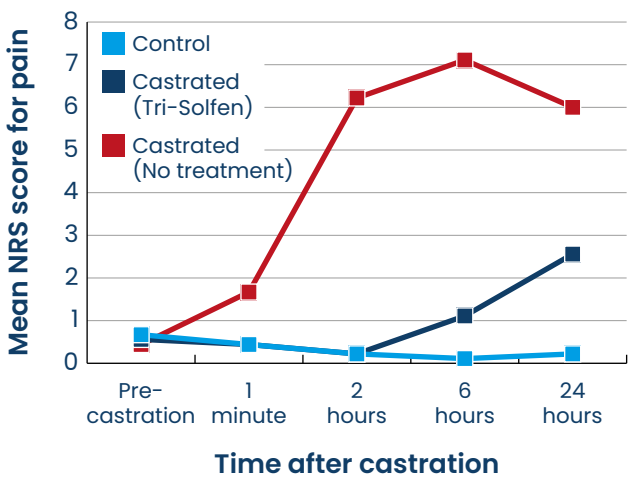
Clinical studies have shown Tri-Solfen provides rapid pain relief in beef and dairy calves following disbudding, dehorning and surgical castration.[5-9] These studies demonstrate that provision of a topical anaesthetic, ideally in combination with an analgesic product, to beef and dairy calves undergoing disbudding, dehorning and surgical castration improves animal welfare.

A study conducted by the University of Sydney examined the pain response of dairy heifer calves following scoop dehorning.[5] In this trial, calves treated with Tri-Solfen displayed significantly lower pain-related behaviours following dehorning than untreated calves at all time points from 30 minutes to 5 hours following dehorning.[5] There was no difference in pain-related behaviours between calves treated with Tri-Solfen and calves that were not dehorned over the same time points.[5] Calves treated with Tri-Solfen had reduced pain sensitivity on the wound and surrounding skin area following dehorning compared to untreated calves.[5]

Another study conducted by the University of Sydney found that Tri-Solfen provides rapid and prolonged pain relief in calves up to 24 hours after surgical castration.[6] In this trial, 27 Angus bull calves aged three to four months (average 135.8 kg liveweight) were randomly allocated to one of three groups for either surgical castration, surgical castration in combination with topical anaesthetic or sham castrated controls. In this trial, calves treated with Tri-Solfen exhibited less pain-related behaviours than untreated calves at all time points after castration and similar behaviours to uncastrated calves.[6] Skin sensitivity of wound and peri-wound surfaces was assessed 1 minute and 2, 4, 6 and 24 hours after surgical castration.[6] Calves treated with Tri-Solfen exhibited significantly higher pain thresholds in wounds and surrounding skin compared to untreated calves.[6]

A third study conducted by the University of Sydney found that calves treated with Tri-Solfen had lower plasma cortisol concentrations (an indicator of stress) than untreated calves for up to six hours following surgical castration, although these differences were not significant.[7]

Mean pain response scores to pain stimulation of wound following castration[6]



Best practice pain relief

Best practice guidelines recommend the provision of both acute and chronic pain relief (i.e. multi-modal programs) during disbudding, dehorning and castration.[1,2] Ideally, this should involve the administration of an anaesthetic to manage acute pain and an analgesic to manage chronic pain.

There are practical and economic limitations to implementing best practice pain relief programs. For example, some products must be prescribed and administered by a veterinarian, which may not always be feasible. Likewise, there is currently no practical option to address acute pain following ring castration in cattle.

In most situations, best practice pain relief during and after surgical procedures in calves will involve the concurrent use of Tri-Solfen and a buccal analgesic (e.g. Butec OTM). Both products are available from rural suppliers and veterinarians.

Concurrent use with meloxicam

A study conducted by the University of Sydney assessed the effect of Tri-Solfen and/or a buccal analgesic on behaviour and weight gain following surgical castration and dehorning in a commercial beef herd in Queensland. In this trial, calves treated with Tri-Solfen in combination with a buccal analgesic demonstrated less signs of pain (e.g. head turns, tail flicks) and spent more time lying down following castration and dehorning than untreated calves or those treated with Tri-Solfen or a buccal analgesic alone.[8] Calves treated with Tri-Solfen in combination with a buccal analgesic also demonstrated significantly greater weight gain than untreated calves following castration and dehorning.[8]

Demonstrate your commitment

Demonstrate your commitment to delivering best-practice animal welfare standards by registering in the **Better Choices** program. This independently-audited program enables livestock producers to certify they implement best-practice animal welfare standards. To create or renew your registration, visit **betterchoices.com.au** or call **1300 595 250**.

ACUTE PAIN RELIEF		CHRONIC PAIN RELIEF
Tri-Solfen (disbudding, dehorning and surgical castration)	+	**Non-steroidal anti-inflammatory drugs** (e.g. meloxicam)

Contact your Dechra territory manager, rural reseller or veterinarian about how you can deliver Gold Standard pain relief in your livestock business.

For more information, visit trisolfen.com.au

References: 1. Australian Animal Welfare Standards and Guidelines – Sheep Animal Health Australia (AHA). Edition 1 Version 1. Endorsed January 2016. 2. Meat & Livestock Australia (2020.), Fact sheet – Pain mitigation in sheep and cattle. 3. Colditz, I. *et al.* (2019). Efficacy of meloxicam in a pain model in sheep. *Aust Vet J.* 97:23-32. 4. Lomax, S. *et al.* (2013). Duration of action of a topical anaesthetic formulation for pain management of mulesing in sheep. *Aust. Vet. J.* 91:160-167. 5. Espinoza, C., *et al.* (2013). The effect of a topical anaesthetic on the sensitivity of calf dehorning wounds. *J. Dairy Sci.* 96:2894–2902 6. Lomax, S. & Windsor, P. (2013). Topical anaesthesia mitigates the pain of castration in beef calves. *J. Anim. Sci.* 91(10):4945-52. 7. McCarthy, D. *et al.* (2016). Effect of a topical anaesthetic formulation on the cortisol response to surgical castration of unweaned beef calves. *Animal.* 10(1):150-156. 8. Van der Saag, D. *et al.* (2018). Effects of topical anaesthetic and buccal meloxicam treatments on concurrent castration and dehorning of beef calves. *Animals* 8(3):35. 9. McCarthy, D. *et al.*, (2016). Effect of topically applied anaesthetic formulation on the sensitivity of scoop dehorning wounds in calves. *PLoS ONE* 11(9):e0163181.

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