

THE BENEFITS OF PAIN RELIEF IN NZ DAIRY CALVES

Veterinarians have the opportunity to improve wellbeing and reduce inflammation and pain in dairy calves by using and authorising non-steroidal anti-inflammatories (NSAIDs).

The desired outcomes from the use of NSAIDs are;

1. Pain relief (analgesia)
2. Anti-inflammatory effect
3. Anti-pyretic (reducing fever)

Both ketoprofen and meloxicam are considered to be safe to use in calves from birth although meloxicam is more commonly used in New Zealand, particularly for calf disbudding. Although gastrointestinal ulceration is a known possible side effect of NSAID use in other species, this has not been proven in cattle.^{1,2} Additionally whilst many neonatal animals have immature renal function this has not been found to be the case in calves so the risk that NSAID use might affect renal function and development is considered to be low.³

Measuring pain in calves

There is no standardised model for the assessment of pain in calves. Both the physiological and the psychological effects should be considered but it is becoming more common for researchers to focus on the psychological effects of pain using behavioural observations, even though measuring this can be difficult. Parameters such as time spent standing, lying and 'playing' are becoming more common measures of calf welfare.³

Pain relief at birth

Dystocia is not just painful for the dam, it is also painful for the calf. The effects of a hard calving can have an impact on the first days and weeks of life.⁴ Assisted calves take significantly longer to stand, have lower packed cell volumes (PCVs) and higher plasma lactate concentrations. These changes are related to intrapartum hypoxaemia, so calves born after dystocia are at significant risk of tissue damage.⁵

In a Scottish study, calves born after assisted parturition showed behavioural differences suggesting increased pain and discomfort compared to calves born unassisted. However a single injection of ketoprofen within a few hours of life reduced pain and improved welfare in all calves regardless of whether they were born with assistance or not.³

In another study the latency to stand and first attempt to stand were both increased by dystocia, but a single dose of meloxicam at birth improved the standing ability of low-vitality calves.⁶

Assisted calves treated with meloxicam had improved weight gain in the first week of life⁷ and better health from birth to 6 weeks of age compared to placebo treated calves.⁸

Pain relief for calf scours

From a human perspective diarrhoea is often painful because of gas bloating and strong peristaltic contractions (cramping).

There is increasing evidence that pain relief given at the onset of calf scours improves calf wellbeing and gets calves drinking earlier. Meloxicam given at the onset of diarrhoea in calves has been shown to improve behaviour, feed intake and faecal consistency while reducing rectal temperature, dehydration and signs of visceral pain.⁹

In another study, meloxicam-treated scouring calves began consuming starter ration earlier and at a greater rate and consumed more water compared with placebo treated animals. Calves treated with meloxicam gained body weight at a faster rate and while there was no difference in weaning weight, they tended to wean earlier than placebo treated calves.¹⁰

Pneumonia

There is increasing evidence to support the use of NSAIDs in cattle with pneumonia. In a study of 30 calves with naturally occurring bronchopneumonia, animals that were given oxytetracycline and meloxicam had a faster normalisation of rectal temperature and a greater improvement in clinical illness index score (cough, nasal discharge, dyspnoea, depression, anorexia) than those receiving oxytetracycline alone or oxytetracycline and flumethasone (a corticosteroid).¹³

Pain relief for surgical castration

A 2002 NZ study evaluated the physiological effects in calves following castration, by measuring cortisol levels. When calves were castrated surgically, local anaesthesia minimised pain during incision of the scrotum but otherwise did not apparently reduce the acute pain and distress. However, giving ketoprofen in addition to a local anaesthetic virtually eliminated the acute pain and distress caused by surgical (pull or cut) methods.¹¹

A similar study revealed that after surgical castration there was an increase in plasma cortisol and acute-phase proteins and a decreased immune function, feed intake, and growth rate.¹² Ketoprofen effectively reduced the cortisol response to castration and the author concluded that systemic analgesia with ketoprofen is an effective method for alleviating acute inflammatory stress associated with castration.

Pain relief for disbudding

The alleviation of pain for calf disbudding has received a lot of attention and research because all of the common methods used for disbudding result in obvious pain and distress for the calf.

It has been known for over 20 years that both local anaesthetic and a systemic analgesic should be given before disbudding. In a 1999 NZ study, four key behaviours were measured to assess pain - lying time, grazing or ruminating, tail shaking and ear flicking. All of these were significantly different during the first 4-6 hours of observation in control calves, which were not dehorned, compared to calves dehorned without anaesthesia or analgesia. The same study then found that the behaviour of calves dehorned after both a local anaesthetic and a non-steroidal anti-inflammatory agent (ketoprofen) had been administered was similar to control calves. The behaviour of calves given only local anaesthesia or systemic analgesia prior to dehorning was similar to that of calves dehorned without any pain relief. McMeekan et al concluded that calves should be given both a local anaesthetic and a systemic analgesic before dehorning to alleviate the pain associated with this procedure.¹⁴

In a New Zealand study calves disbudded by farm staff without local anaesthetic but with meloxicam had 3 kg additional weight gain over 30 days versus calves disbudded without meloxicam. In the same study, calves disbudded by veterinarians (using sedation and local anaesthetic, with or without meloxicam) grew faster (0.1 kg/day) than untreated calves disbudded by farm staff.¹⁶

Based on qualitative synthesis and meta-analyses of data from 17 research studies, local anaesthetic was associated with reduced plasma cortisol level until 2hrs post-disbudding followed by a rise in cortisol observed at 4hrs post-disbudding. Adding an NSAID to local anaesthetic resulted in a reduction in plasma cortisol level at 4hrs and reductions in pressure tolerance and pain behaviours at 3–6hrs post-disbudding.¹⁵

Based on these results, use of local anaesthetic and an NSAID is recommended as best practice for pain mitigation for cautery disbudding of calves aged up to 12 weeks.

EAR FLICKS PER MINUTE RECORDED IN CALVES AFTER DISBUDDING

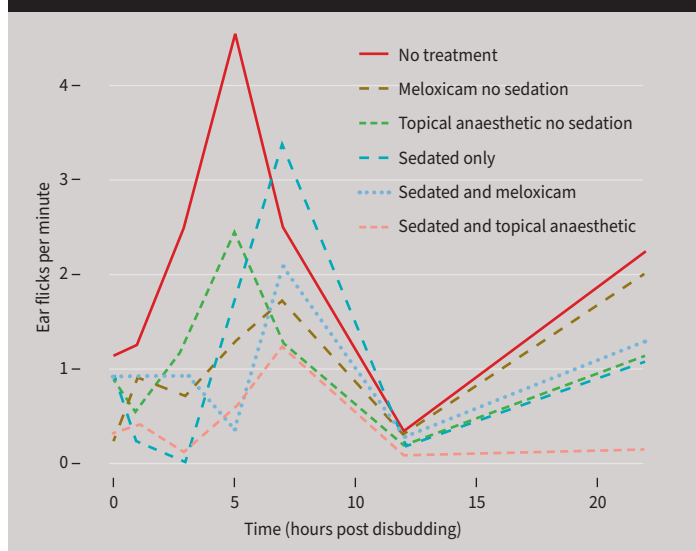


Figure 1. Median number of ear flicks per minute recorded in calves after disbudding

In the largest trial on calf disbudding undertaken in NZ the use of meloxicam or topical anaesthetic resulted in a reduction of ear flicks, in calves that were disbudded in a crate or sedated. (Figure 1). There was a positive effect of disbudding calves under sedation on all outcomes. The authors concluded that there was a benefit to providing calves with topical anaesthetic following disbudding on behavioural responses and pain sensitivity and this benefit was not statistically different to that of treatment with meloxicam.¹⁷

Summary and take-home messages:

NSAIDs reduce both physiological and psychological effects of pain, so that calves can return to normal function and behaviour faster

NSAID pain relief is indicated for calves with dystocia, scours, pneumonia, or undergoing castration or disbudding

Ketoprofen and meloxicam are safe to use from birth, with meloxicam more commonly used in NZ calves

Consumer demand for optimal animal wellbeing and increased scrutiny of farming are factors to consider for increased use of NSAIDs as pain relief in cattle

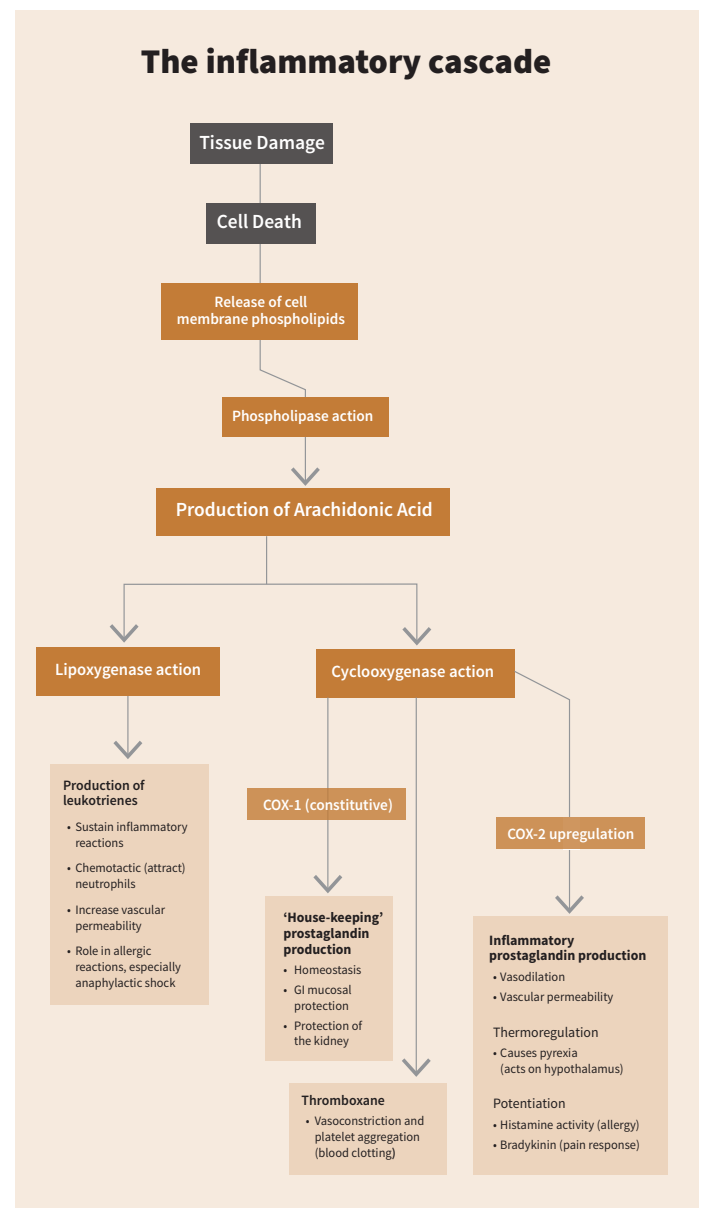
Local anaesthetic AND meloxicam is recommended when disbudding calves

Demonstrating improved calf care contributes to NZ dairy farming sustainability

Melovem 30 ACVM No. A11562 is a Restricted Veterinary Medicine registered to AgriHealth NZ Ltd. Available only under a veterinary authorisation.

References:

- ¹Hund A and Wittek T. Abomasal and third compartment ulcers in ruminants and south American camelids. *Vet clin North Am. Pract.* 34(1), 35-54, 2018
- ²Walsh P, *et al*; Adverse effects of a 10-day course of ibuprofen in Holstein calves. *J Vet pharmacol Ther.* 39(5), 518-521, 2016
- ³Gladden N, *et al.* A single dose of ketoprofen in the immediate postpartum period has the potential to improve dairy calf welfare in the first 48h of life. *Applied Animal Behaviour Science.* Vol 212, 19-29, 2019
- ⁴Mellor D and Stafford K. Animal welfare implications of neonatal mortality and morbidity in farm animals. *Vet Journal.* 168(2), 118-33, 2004
- ⁵Diesch T, *et al.* The physiological and physical status of single calves at birth in a dairy herd in New Zealand. *NZVJ.* 52:5, 250-255, 2004
- ⁶Kovács L, *et al.* Single-dose meloxicam treatment improves standing ability of low-vitality dairy calves. *J Dairy Sci.* 105, 1618-1624, 2022
- ⁷Pearson J, *et al.* Clinical impacts of administering a nonsteroidal anti-inflammatory drug to beef calves after assisted calving on pain and inflammation, passive immunity, health and growth. *J animal science.* 97, 1996-2008, 2019
- ⁸Murray C, *et al.* A field study to evaluate the effects of meloxicam NSAID therapy and calving assistance on newborn calf vigor, improvement of health and growth in pre-weaned Holstein calves. *Amer Assoc of Bovine Pract.* Vol. 49 (1), 1-12, 2015
- ⁹Philipp H, *et al.* Efficacy of Meloxicam (Metacam®) as Adjunct to a Basic Therapy for the Treatment of Diarrhoea in Calves. *Acta Vet Scand.* 44 supp 1, P95, 2003
- ¹⁰Todd C, *et al.* Nonsteroidal anti-inflammatory drug therapy for neonatal calf diarrhea complex: Effects on calf performance. *J Anim Sci.* 88(6), 2019-2028, 2010
- ¹¹Stafford K, *et al.* Effects of local anaesthesia or local anaesthesia plus a non-steroidal anti-inflammatory drug on the acute cortisol response of calves to five different methods of castration. *Research in Vet Sci.* 73, 61-70, 2002
- ¹²Ting S, *et al.* Effect of repeated ketoprofen administration during surgical castration of bulls on cortisol, immunological function, feed intake, growth, and behavior. *J Anim Sci.* 81, 1253-1264, 2003
- ¹³Bednarek D, *et al.* Effect of steroidal and non-steroidal anti-inflammatory drugs in combination with long-acting oxytetracycline on non-specific immunity of calves suffering from enzootic bronchopneumonia. *Vet Microbiol.* 96(1), 53-67, 2003
- ¹⁴McMeekan C, *et al.* Effects of a local anaesthetic and a non-steroidal anti-inflammatory analgesic on the behavioural responses of calves to dehorning. *NZVJ.* 47:3, 92-96, 1999
- ¹⁵Huxley J. Meloxicam and Disbudding in Dairy Calves Product Review. *Animal Health Review*, 2020. <https://www.animalhealthreview.co.nz/an/animal-health-area/Dairy/Dairy/Meloxicam-and-Disbudding-in-Dairy-Calves-Product-R.aspx>
- ¹⁶Bates AJ, *et al.* Effect of analgesia and anti-inflammatory treatment on weight gain and milk intake of dairy calves after disbudding. *NZVJ.* 63:3, 153-157, 2015
- ¹⁷Cuttance E, *et al.* Effects of a topically applied anaesthetic on the behaviour, pain sensitivity and weight gain of dairy calves following thermocautery disbudding with a local anaesthetic. *NZVJ.* 67:6, 295-305, 2019



Melovem 30

Longer acting to treat inflammation, fever and pain



Dose
1mL/60kg
Single use only

Scours hurts

- use when infectious scours occurs (e.g. rotavirus)



Disbudding hurts

- use before the horn buds are burnt



Sick calves

- use for high temperature (fever)
- use when not eating / reduced appetite



Melovem Withholding: Milk 84 hours, Meat 10 days

Pneumonia

- administer pain relief when respiratory infection occurs
- use for high temperature (fever)



treat with Melovem 30



for healthy productive calves

Surgery hurts

- use prior to any surgery (e.g. castration, umbilical hernia repair, removal of extra teats)



Use Melovem 30 for a faster recovery

AgriHealth

What is Melovem 30?

Non-steroidal anti-inflammatory, analgesic and antipyretic injection for use in cattle, pigs and horses containing meloxicam, 30mg/mL.

When should you use Melovem 30?

Melovem 30 should be used when animals are showing signs of pain, inflammation (heat, redness, swelling) or have a high temperature. It is often used in conjunction with other treatments such as antibiotics, metabolic treatments or electrolytes.

How do you use Melovem 30?

CATTLE: Administer 1.0mL per 60kg body weight (0.5 mg meloxicam /kg) by subcutaneous or intravenous injection.

For very young calves weighing less than 50kg a dose rate of 0.3mL per 20kg is appropriate. For single use only.

Additional information

Withholding period

Cattle: Meat- 10 days Milk- 84 hours

STORAGE Store below 25°C in original container.

Use within 90 days of opening

PACK SIZES Available in 100mL bottles

NZ REGISTERED VETERINARY MEDICINE

ACVM Registration Number: A11562

MORE INFORMATION: agrihealth.co.nz/product/melovem-30