

Choosing the best method of disbudding and pain prevention

Disbudding and dehorning are painful procedures for calves, which is why it's important to ensure adequate pain relief is given to avoid any suffering. Using pain prevention prior to disbudding or dehorning not only reduces calves' pain and stress, it also makes the animals easier to handle during the procedure and can improve their feed intake and weight gain. Here we look at different methods of disbudding and pain prevention and consider the risks and benefits of each.



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Methods of disbudding

Cattle are dehorned or disbudded to reduce the risk of injury to other cattle and stock handlers. Disbudding is performed on calves when horn buds are easily palpable, at approximately 5 to 10mm long. However, once the horns grow too large for disbudding techniques, they must be removed by amputation (dehorning)¹. Most farmers (96 percent) use hot iron cautery to disbud calves. Although it is rare (only two percent use it), the second most common practice is the application of a caustic paste.

Cautery disbudding is usually carried out on calves that are four to six weeks old¹, when the horns are still small and haven't yet attached to the skull. This method involves pressing a hot cautery iron, heated using electricity or gas, onto the horn buds for several seconds. This destroys the horn bud tissue. It is common practice to rotate the cautery iron to cut the skin around the bud, then flick out the horn bud tissue. However, some operators leave the horn bud tissue in place after cautery. Leaving the horn bud tissue in place increases the risk of infection and the likelihood (by nine percent) that scurs – incompletely destroyed or developed horn buds – will develop (unpublished data).

Caustic or chemical disbudding involves applying an alkali – typically one with a sodium or calcium hydroxide base – to the horn bud region as a paste. This paste causes a chemical burn that destroys the germinal tissue of the horn bud². The Animal Welfare (Painful Husbandry Procedures) Code of Welfare (2005) recommends this procedure is performed when the calves' horn buds are just palpable, usually at 7 to 10 days of age. Moreover, shaving the horn bud region and applying a ring of petroleum

jelly around the base of the horn bud can help reduce the paste from spreading, reducing injury to surrounding tissues. However, DairyNZ does not recommend using caustic paste because there are significant welfare risks involved. Through rubbing, calves can easily spread caustic paste to other parts of their bodies, and

KEY POINTS

- All methods of disbudding cause pain, so farmers should always use pain prevention.
- From October 1, 2019, it will be mandatory to use a local anaesthetic for disbudding and dehorning cattle of any age.
- Disbud calves when the horn bud is small – don't wait until the horns grow and require amputation.
- Use polled terminal sires for beef calves because this negates the need for disbudding. Polled dairy sires are available in New Zealand, are increasing in popularity and may provide the ultimate long-term solution.



"Whichever method is used, it is critical to ensure the animal has received sufficient anaesthesia before you begin disbudding."

onto other calves, which can result in painful burns. This risk is even greater in wet conditions, when treated animals should be kept inside.

Another method of disbudding is horn amputation, which can be performed in various ways, including a scoop dehorner or embryotomy wire¹. These methods cause more pain than disbudding and have a greater risk of infection because more tissue is removed¹. Therefore, DairyNZ recommends that farmers disbud calves when the horn buds are small.

A final note: whichever method of disbudding or dehorning you choose, it is important to perform the procedure correctly so regrowth does not occur.

Methods of pain prevention

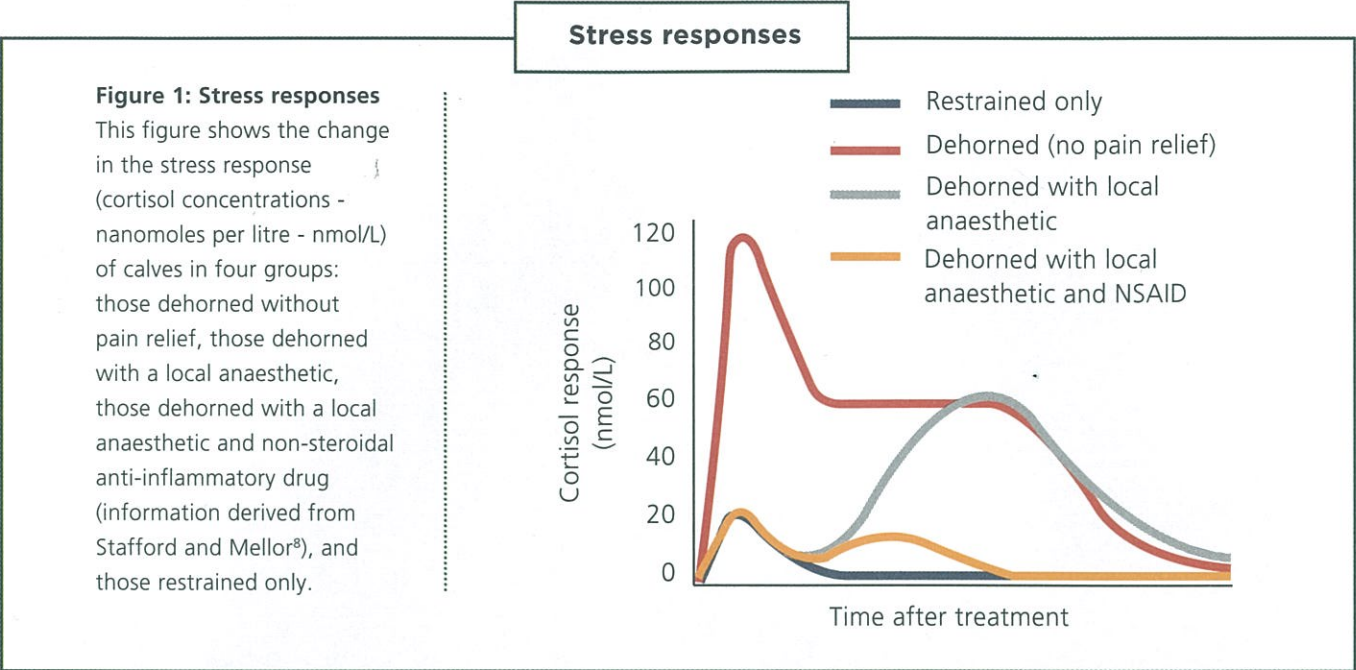
All methods of disbudding and dehorning cause behavioural and physiological changes that indicate pain. For that reason, DairyNZ strongly recommends the use of pain prevention. Not only does pain prevention reduce the suffering and stress experienced by calves, it makes the animals easier to handle during the procedure, and can improve their feed intake and weight gain³.

Cautery disbudding and amputation dehorning cause an immediate pain-related behavioural response in the animal, whereas the response to caustic paste is more evident sometime

after application of the paste. Dehorning by amputation causes the greatest pain response¹, which re-emphasises the importance of early horn removal.

The most common pain prevention method is injecting a local anaesthetic (about 15 minutes before disbudding/dehorning) to create a regional nerve block. From October 1, 2019, it will be mandatory to use a local anaesthetic (at least) when disbudding or dehorning cattle of any age, according to the Animal Welfare (Care and Procedures) Regulations 2018. A person who fails to comply with this regulation can be fined up to \$3000 and a body corporate up to \$15,000, in the case of disbudding. In the case of dehorning, this fine increases to \$5000 and \$25,000 for an individual and body corporate respectively.

A local anaesthetic can be applied as a corneal nerve block, a ring block or a bleb. Whichever method is used, it is critical to ensure the animal has received sufficient anaesthesia before you begin disbudding. DairyNZ recommends you leave at least 15 minutes between injecting the local anaesthetic and performing the procedure. This allows enough time for the local anaesthetic to take effect. Another way to confirm effective anaesthesia is through the needle prick test: if the calf flinches when its skin around the horn bud is pricked with a needle, this tells you it needs more anaesthesia. Local anaesthetics are generally effective for two to three hours after being injected. Calves may



experience pain once the local anaesthetic wears off, mostly due to inflammation (Figure 1).

Post-operative pain prevention can be achieved by administering a non-steroid anti-inflammatory drug (NSAID); this reduces inflammatory pain. Giving calves both a local anaesthetic and a NSAID before disbudding or dehorning can eliminate their pain-related behavioural and physiological responses¹ (Figure 1).

- Please note:
- The analgesia protocol for your farm must be developed and approved by your farm veterinarian.
 - Lidocaine and NSAIDs can be administered only under veterinary supervision.
 - Sedatives (as opposed to local anaesthetics) can currently be administered only by veterinarians.

Meanwhile, sedating calves can make it easier to administer a local anaesthetic – but it will not eliminate the pain of disbudding. If you're using a sedative, it's still essential to use a local anaesthetic as well¹. Sedation comes with risks to the animal and handler (if they accidentally inject themselves), if veterinary instructions are not followed closely and if the animals are not monitored carefully before they become fully conscious.

In summary, a comprehensive pain mitigation strategy for disbudding calves could involve first sedating the calves so they don't struggle while receiving local anaesthetic; then giving a local anaesthetic and an NSAID to prevent the calves from feeling pain at disbudding and afterwards¹. New animal welfare regulations will make it mandatory to use local anaesthetic in New Zealand, but it is also worth considering use of an NSAID for the calves' longer-term comfort.

Future options for disbudding

Several novel methods of preventing horn growth are being

evaluated by AgResearch for use on dairy cattle, including cryosurgery and clove oil. (Note: it is currently illegal for farmers to administer clove oil.)

Cryosurgery involves freezing the horn bud cells with liquid nitrogen^{4,5} (Figure 2). The stress response appears to be similar to disbudding using cautery, but cryosurgery appears to cause less tissue damage and potentially a lesser inflammatory response^{4,5}.

Injecting clove oil under the horn bud causes local cellular necrosis of the horn bud cells^{6,7} (Figure 2). Eugenol, the active ingredient of clove oil, has analgesic properties and has been shown to prevent horn growth in calves⁶. In trials, calves injected with clove oil appeared to experience less pain initially and, during the 48-hour post-treatment period, appeared to experience no more pain than calves disbudded by cautery without pain relief⁷. Two clear benefits of clove oil are that it does not involve tissue removal and it poses no risk of thermal damage to the brain.

Given these methods may have better welfare outcomes, how effective are they at preventing horn growth? Cryosurgery, when administered for 15 seconds per horn bud, had a 47 percent success rate at preventing horn growth⁵. Clove oil successfully prevented horn growth in 87 percent of calves (unpublished data). Both these disbudding methods are in the 'proof of concept' phase but, with refinement, may become more effective at preventing horn growth.

Polled cattle

Horn growth is a genetically-heritable autosomal recessive trait, and polled (hornless) cattle result from an autosomal dominant pattern of inheritance⁹. The polled trait is common in beef cattle but rare in dairy breeds – yet there are polled dairy sires available in New Zealand. Selecting for polled dairy cattle would provide an alternative to routine disbudding and potentially be the ultimate long-term solution.

Figure 2: Calves being disbudded using cautery (A), cryosurgery (B) and clove oil (C)



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