Dehorning Depression?

Anyone who has dehorned a calf will tell you this is painful. Pain control for this procedure is now required in the new Code of Practice for Dairy Cattle. Pain during hot-iron dehorning can be controlled easily and inexpensively using a local nerve block like lidocaine.

Unfortunately, burn injuries can be painful for many hours after they occur, and long after the effects of lidocaine have worn off. Other researchers have shown pain-related behaviours in the hours after dehorning, like head shaking, head rubbing and ear flicking, and we know that this pain can be reduced using anti-inflammatory drugs like meloxicam. Some producers treat post-operative pain, but other producers do not treat for pain at all. To help producers and their veterinarians make better decisions about pain control protocols, UBC researchers set out to ask just how much does this post-operative pain really affect the calves.

Photo: *Dehorning is commonly done using a hot-iron.*

Years of research on humans have shown that our emotional state influences the way we think and interpret information. For example, depressed patients are more likely to anticipate negative future events and are less willing to take risks. They also interpret ambiguous events more negatively, classifying a glass as "half empty" rather than "half full".

Similarly, humans experiencing pain associated with diseases such as arthritis tend to choose pain-related meanings rather than neutral meanings of ambiguous sentences. For example, patients in pain are more likely to infer that "growth" refers to a tumor rather than to height when reading the sentence "The doctor examined the child's growth". These negative interpretations of ambiguous information are judgement biases.

To find out if calves experiencing pain from dehorning have the same pessimistic judgement biases seen in humans, they were first trained to perform a simple task. If a calf approached a computer screen in its pen when the screen was red it received a few sips of milk. However if the calf approached the white screen, no milk was given and instead the calf received a one minute "time-out" with no colour on the screen. In this way the calves quickly learned to only approach the screen when it was showing red.

Once trained, calves were tested with ambiguous colours: three different shades of pink (blends between red and white: dark pink, mid pink, and light pink). As expected, calves tended to approach the dark pink screen (like it was red), and avoided the light pink screen (like it was white); the mid pink shade was approached about half the time.
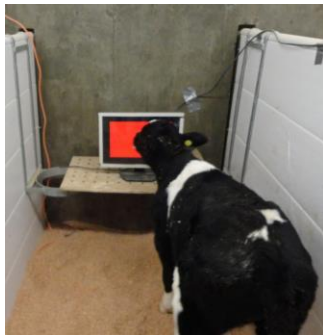
Check out this link to a short video of a trained calf in the judgement bias task:

http://tinyurl.com/km28fx9

Calves were then hot-iron dehorned (at 6 weeks of age) with lidocaine used to block the pain during dehorning (4 mL per bud). We then retested the calves with the ambiguous colours 6 and 22 hours after dehorning when we expected that they would still experience pain and that the lidocaine would have worn off.

After dehorning calves continued to approach the red and avoid the white screens, showing that they remembered their training and that they were still motivated to drink the milk reward. However, calves were much less likely to approach the ambiguous pink screens in the hours after dehorning (Figure 1).

These results indicate that, when experiencing pain in the hours after hot-iron dehorning, calves responded as if they were feeling unlucky – they treated the ambiguous pink screens as if these were more likely to signal a 'time-out' than a milk reward. This pessimistic judgement bias is similar to a depressed patient seeing the glass as "half empty".

The researchers concluded that these pessimistic responses indicate a negative emotional state in calves, similar to depression or anxiety in humans. What's more, this bias persisted for at least 22 hours after dehorning. Thus, *despite* receiving lidocaine to treat the immediate pain during the procedure, the post-operative pain occurring hours after dehorning has an emotional impact on the calves.

This research highlights the importance of considering the pain that follows a procedure like dehorning, and argues in favour of treating this post-operative pain using an anti-inflammatory drug. Your veterinarian can advise you on a specific treatment protocol appropriate for your farm.

More generally, this work shows how we can ask calves and cows how they 'feel' about the housing and management decisions we make. This research using judgment bias tasks provides a new scientific method to better understand and improve the welfare of cattle.
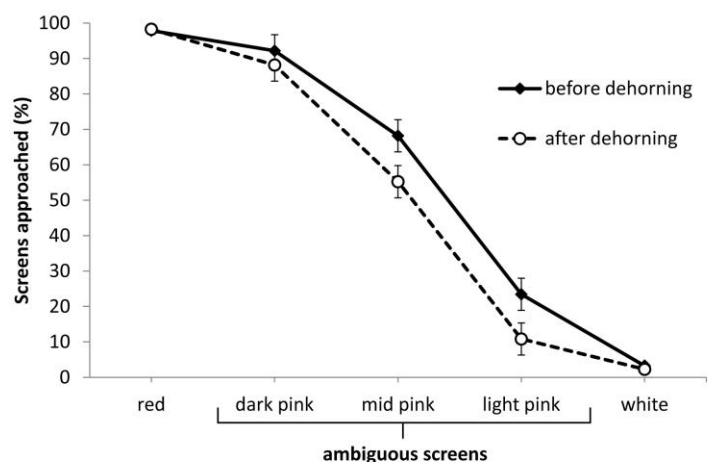
Figure 1: *Calf responses to screens before and after dehorning (6 h and 22 h responses averaged since there was no difference). Calves approached ambiguous pink screens less frequently after dehorning, indicating a pessimistic bias.*