Bovine hoof care – treating claw horn lesions in cows

Author : Sara Pedersen

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We have been treating cows with claw horn lesions for decades, using treatment protocols based more on what we think should be done and practical experience rather than scientific evaluation (Figure 1).

Figure 1. The most prevalent claw horn lesions are sole haemorrhage (A), sole ulcer (B) and white line disease (C).

The benefits of early identification of lame cows is well documented; however, treatment must also be effective to achieve optimal results.

To block or not to block?

Application of wooden or plastic blocks to the unaffected claw is common when treating lame cows and has been recommended for many years (Toussaint Raven et al, 1985). The aim is to improve healing through resting the affected claw and preventing further mechanical trauma. However, despite widespread use, data on their effectiveness is limited.

The first randomised clinical trial on the treatment of claw horn lesions was conducted by Pyman in 1997. It assessed the difference in cure rates between the application of a wooden block, rubber block or bandaging of the foot with copper sulphate. Recovery was defined as resolution of lameness six days after treatment.

Based on this criteria, 65.8% of cows treated with wooden blocks, 76.2% with rubber blocks and 32.3% with bandage recovered. However, no difference was found between treatments at 14 days when the follow-up period ended.
Figure 2. Blocks must be applied at the correct angle (90° or less to metatarsal) to ensure rest of the affected claw. (A) = incorrect and (B) = correct. The cow in (A) was still bearing weight on the diseased claw – the gauge indicates where the block should be.

Despite the common use of blocks, little scientific data exists evaluating how a block should be applied. However, two important concepts are the block must be positioned on the foot at the correct angle (Figure 2), so it is at a 90° angle or less to the metatarsal bone when viewed from the hock, and the block must be appropriately sized for the cow.

Poor placement can result in weight being transferred to the abaxial wall of the diseased hoof. The area of greatest wear is the axial wall of the toe (Higginson Cutler, 2012) thus, positioning the block at an angle of less than 90° ensures that as the block wears it is still able to prevent weight bearing by the affected claw.

Selecting the correct size of block is important and, in the majority of cases, more harm can be done by using a block that is too short rather than too long (Figure 3). If the block extends past the weight-bearing surface of the heel then this soft area of horn will be protected as the cow walks. If the block is short then more pressure will be placed on this area and the risk of block-induced lameness due to haemorrhage and sole fractures (heel ulcers) increased.

Figure 3. Length of block is important. It needs to protect the soft horn of the heel as a cow walks. A = incorrect and B = correct.
It has been hypothesised blocks may cause discomfort and this may deter farmers from using them widely; however, the application of blocks to sound cows has been shown to have no adverse effects on milk production, activity and lying behaviour (Higginson Cutler, 2012).

**Role of pain relief**

Lameness is painful and surveys have shown dairy farmers and cattle vets recognise it as such (Leach et al, 2010; Huxley and Whay, 2006). Despite this, there is an apparent lack of analgesic use when it comes to treating lameness, despite its increasing use in other areas such as clinical mastitis and disbudding.

There are two different types of pain: nociceptive (or physiologic) and pathologic; with the former being due to a noxious stimulus and the latter resulting from tissue or nerve damage, which increases the excitability of surrounding neurons (Anderson and Muir, 2005). In both types of pain, conditions known as allodynia and hyperalgesia can occur.

Allodynia is the production of a pain response to a stimulus that is normally not painful and hyperalgesia is an increased sensitivity to pain. Whay et al (1998) demonstrated the hyperalgesia effect through measuring mechanical nociceptive thresholds in lame and sound cows. Lame cows tolerated less pressure than sound cows when a blunt pin was pressed against the metatarsus and pneumatically increased at a constant rate.

Laven et al (2008) studied the duration of allodynia following identification and treatment for lameness and the influence of different treatment protocols. They concluded even after effective treatment of lameness, allodynia was still evident and that treatment with an NSAID (in this case, tolfenamic acid) had no long lasting effect on this.

This was in contrast to work that had previously shown a modest improvement in gait when lame cows were given a high dose of ketoprofen (3mg/kg; Flower et al, 2008); however, this could be explained by differences in management of cows in the study or mode of action of the NSAID.

**Combination treatment works best**

A published study by the University of Nottingham (Thomas et al, 2015) was designed to address some of the unanswered questions regarding which treatment is most beneficial when it comes to curing lameness, and is the most comprehensive and robust trial to date.

Cows on five commercial dairy farms were mobility scored fortnightly and those that had two consecutive “sound or non-lame” scores – 0 or 1 on the Agriculture and Horticulture Development Board (AHDB) Dairy 0-3 Scale – followed by a “lame” score (2 or 3) were recruited for the trial.

Cows with active digital dermatitis, severe hock lesions, a recent lameness treatment (120 days for
same foot, 90 days for other foot) or treatment with an NSAID in the previous 14 days were excluded, as were cows with lesions in both claws of the affected leg. Therefore, the study focused purely on cows with claw horn lesions affecting one claw of a single lame hindleg.

Enrolled cows were randomly subjected to one of four treatment groups:

- therapeutic trim only
- therapeutic trim plus application of block
- therapeutic trim plus NSAID (ketoprofen for three days)
- therapeutic trim plus block plus three days of NSAID

Cows were re-examined at 35 days post-treatment and evaluated for lameness (blocks were removed prior to scoring if still present) with treatment outcomes being defined as a sound cow (score 0) or non-lame cow (score 0 or 1).

### Table 1. The cure rates of different treatments applied to cows with claw horn lesions, 35 days post-treatment (Thomas et al, 2015)

<table>
<thead>
<tr>
<th>Treatment group</th>
<th>% cows sound at 35d (score 0)</th>
<th>% cows not lame at 35d (score 0 or 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Therapeutic trim</td>
<td>24.4% (11/45)</td>
<td>68.8% (31/45)</td>
</tr>
<tr>
<td>Therapeutic trim + block</td>
<td>35.9% (14/39)</td>
<td>71.8% (28/39)</td>
</tr>
<tr>
<td>Therapeutic trim + NSAID</td>
<td>28.6% (12/42)</td>
<td>76.2% (32/42)</td>
</tr>
<tr>
<td>Therapeutic trim + block + NSAID</td>
<td>56.1% (23/41)</td>
<td>85.3% (35/41)</td>
</tr>
</tbody>
</table>

The cure rates for the different treatment groups are shown in Table 1 with treatment with a therapeutic trim, block and NSAID having significantly higher cure rates in comparison to therapeutic trim only when the outcome assessed was a sound cow (score 0).

One of the reasons for the synergistic effect of treatment with both a block and NSAID in comparison to each treatment individually was hypothesised as being due to the NSAID having a direct effect on the inflamed corium, thus increasing its chance of healing. With the addition of a block providing rest, this gives the corium the greatest chance of recovery and producing new healthy horn.

While prevention of lameness cases must still remain the focus, it is unlikely lameness will be eliminated and the treatment of the individual lame cow will remain necessary. Early identification is critical if the effect of lameness on productivity is to be minimised; however, so too is effective treatment.
Although many unanswered questions still remain, research shows even when cows are identified at an early stage of lameness they benefit from not only block application, but the addition of pain relief too.

References