

Sole Ulcers

Summary

- Sole ulcers develop over a long period of time and similarly can take a long time to fully cure.
- The focus for control is on disease prevention and when cases do occur, prompt detection early and effective treatment are essential.
- Sole ulcers result from a period of stress, such as calving. This in turn causes the cow to produce poor quality horn which when it comes to the sole surface is easily damaged.
- Increasing lying times, improving cow comfort, good preventative foot trimming technique and monitoring body condition score are all key areas to target when trying to reduce the incidence of sole ulcers.

What is a Sole Ulcer?

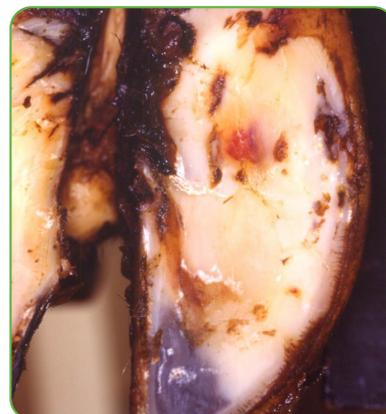
A sole ulcer occurs as a result of disrupted, poor quality sole horn production. This is commonly but not exclusively seen at 'the sole ulcer site' in the outer hind claws of dairy cows. The compromised sole horn is produced due to repeated damage to the cells within the corium (sensitive tissue or 'quick') that is situated underneath the sole horn.

When this poor quality horn comes into wear it is quickly damaged leading to exposure of the corium, associated inflammation and pain. Sole ulcers usually appear several months after calving and at first an area of sole haemorrhage may be seen.

Sole ulcer on the outer hind claw



Sole haemorrhage at the 'sole ulcer site', a pre-cursor of potential ulceration



Theories on Sole Haemorrhage and Ulcer Development

We do not have a full understanding about how sole ulcers form however research in the last 10 years has been game changing and links directly to how the disease can be controlled on farm. All theories lead ultimately to damage to the horn producing cells of the corium, associated inflammation and the production of poorer quality sole horn. The main theories include:

- **Changes in the laxity of hoof support structures around calving.** This is a consequence of normal hormonal changes around calving to enable the birth process. The secondary impacts on the foot lead to more compressive damage to the cells of the corium around calving and help explain why peaks in sole haemorrhage and ulceration risk are seen 2-3 months after calving.
- **Alterations to the digital cushion within the foot.** Within each claw there are three pads comprising the digital cushion which acts as a shock absorber to some of the forces within the claw experienced each time the foot is placed on the ground. The cushions are made up of fat tissue and connective tissue. If cows are particularly thin, or lose excessive amounts of condition around calving then they will also lose fat within the cushions. The shock absorbing effect is then reduced leading to more compressive damage to the corium.
- **Abnormal claw shape.** Principally overgrowth of the outer claw, flattening of the sole, extended toe length and loss of heel horn can lead to abnormal weight distribution within the foot. Again this leads to damage to the sole horn producing cells of the corium. This highlights why foot trimming and foot trimming technique is so important.
- **Poor lying times.** More time standing = more force on the internal structures of the foot and potential damage to the corium. An easy link to cow comfort, housing design, cow flow and daily management.
- The ongoing lifetime effects of claw horn disease and sole ulceration are thought to be as a result of changes to the structure of the pedal bone within the foot, particularly the walking surface of the bone. These are associated with inflammation within the foot, are irreversible and again increase the risk of corium damage.

Prevention

There are a number of factors which can be implemented on farm to help reduce the incidence of sole ulcers in the herd:

- **Reduce standing times and increase lying times.** The target lying time for dairy cows is 12 hours per day. To achieve this, particular attention should be paid to the time cows spend away from the cubicle area for milking as this influences how long they have left for eating, drinking, socialising and resting. Heat stress can increase standing times during the day as cows dissipate heat more easily when standing therefore heat stress management should be considered for all permanently housed cows during the summer.
- **Cow Comfort.** Good shed and cubicle design, mattress comfort and bedding will all encourage cows to lie for longer. Stocking density will also influence the availability of cubicles for cows to access. The standard recommendation is for 5% more cubicles than cows. Cow comfort is particularly important for transition and fresh cows to help manage the increased risks of corium damage around calving.
- **Routine Preventative Hoof Trimming.** This is essential to manage the impact of abnormal claw shape on weight distribution and the development of claw horn lesions. The Dutch-5 step method for foot trimming is recommended. <https://ahdb.org.uk/knowledge-library/trimming-cows-feet-the-five-step-dutch-method>. Requirements for preventative foot trimming will depend on specific herd factors related to breed type, housing, grazing and general management and should be discussed and agreed with your vet and foot trimmer. Foot trimming has the potential to do so much good, but also harm if cows feet are over trimmed or trimmed with poor technique. It is recommended that any farm staff that are routinely engaged with foot trimming are appropriately trained. Employed foot trimmers should be trained and accredited through the national foot trimming associations.

Increasing lying times & improving cow comfort will help to reduce the incidence of sole ulcers



- **Managing cow body condition, particularly around calving and early lactation.** Feeding strategies need to be optimised to avoid excessively thin cows and if there are underlying disease issues for poor body condition score, then they should be investigated and managed.
- **Heifers** should be trained to use cubicles prior to joining the milking herd. As they are unlikely to have their feet inspected or trimmed during the rearing period, their feet should be inspected and trimmed accordingly in early lactation.

Monitoring and Treatment

Prompt detection, early and effective treatment is central to any lameness control strategy.

To do this regular mobility scoring carried out by a ROMS (Register of Mobility Scorers) <https://roms.org.uk/> accredited scorer is needed to pick up potential cases very early. Quarterly scoring as required by many milk buyers is not enough for early detection and treatment of lame cows and ideally mobility scoring should be carried out every 2 weeks.

It is important that members of the farm team carrying out foot trimming have received suitable training and that foot trimmers employed by the farm are trained and accredited members of one of the national UK foot trimmer organisations.

Uncomplicated cases of sole haemorrhage and ulceration can be treated using the Dutch 5-Step hoof trimming method. In particular this will remove excessive horn from the sole ulcer site, ensure correct weight distribution within each claw and can help with weight distribution away from the affected claw, usually the outer on hind feet.

It is important to understand your limitations with foot trimming ability and when a case needs to be examined by your vet.

For all of the types of sole haemorrhage and ulceration described above a block should be applied to the healthy claw to aid with pain relief and recovery. In addition all cases should receive non-steroidal anti-inflammatory therapy prescribed by your veterinary surgeon.

All lameness cases should be reviewed following treatment to be sure that the expected recovery has been achieved and if not further veterinary advice should be sought.

All lameness cases should be recorded by cow number, date, affected hoof, type of lameness and treatment.

Consideration of the main causes of lameness for your herd, the relevant herd risk factors and control strategies are best achieved through the AHDB Dairy healthy feet programme and network of mobility mentors. <https://ahdb.org.uk/healthy-feet-programme>

Blocks have a key role to play in the treatment of sole ulcers



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