

AABP FACT SHEET

WHITE LINE DISEASE



Authored by the
**AABP LAMENESS
COMMITTEE**

White line disease collectively refers to a group of lesions affecting the junction between the sole and the wall of the claw. Lesions of the white line include hemorrhage, fissure, and abscessation, which represent different stages of the breakdown of the integrity of the white line (Figure 1).



Figure 1. Diffuse hemorrhage of the white line of the outer claw of a rear foot in association with sole hemorrhage in the typical site.

Pathogenesis

White line disease results in most cases from instability of the third phalanx within the claw horn capsule. There are two main theories currently proposed for this instability. Firstly, the vascular theory links changes in the vascular perfusion of the corium to the presence of vaso-active substances in the circulation, which may be derived from accumulations of histamine and/or endotoxin in

the rumen. Arterio-venous shunting of blood from the corium leads to lamellar hypoxia and a breakdown in the connection between the third phalanx and claw horn capsule. Secondly, the enzymatic theory suggests that increased instability is caused by the action of gelatinoproteases (including 'Hoofase' and certain metalloproteinases) which elongate the collagen within the sling of connective tissue which suspends the third phalanx within the claw.

Activation of these enzymes may be triggered by hormonal changes at calving time, and potentially through nutritional changes which result in overgrowth of *Streptococcus bovis* in the rumen, such as sub-acute ruminal acidosis (SARA). An exotoxin from this bacterium has been shown to activate metalloproteinases *in vitro*.

When the animal bears weight, the loosened third phalanx compresses the corium beneath it, leading to hypoxia and hemorrhage and weakening of the white line junction between the wall and the sole. The wall of the outer claw of the rear foot is the location of the greatest ground reaction force, both when the cow is standing and when walking – making the white line two thirds of the way back from the toe, the most susceptible location for disease (Figure 2). This area of the outer claw is often over-grown, which adds to the



Figure 2. White line fissure two thirds of the way back from the toe on the outer claw of the rear foot. There is also associated diffuse sole and white line hemorrhage.

load carried and contributes to lesion formation. Hemorrhage and weakening of the structure of the white line, together with ground trauma, may result in a fissure—a separation of the wall horn from the sole, and with it, impaction of stones and other material. If this impaction is not relieved, then sepsis and abscess formation may occur, which spreads along the lamellae,

Important Things to Know About White Line Disease

- Hemorrhage, fissure and abscessation of the junction between the sole and the wall of the claw are collectively referred to as white line disease.
- Lesions typically occur in the outer claw of the rear foot—two thirds of the way back from the toe.
- Fissure and abscessation of the white line must be treated by removal of all loose wall horn and transfer of weight to the healthy claw.
- Prevention requires attention to feeding management, regular hoof-trimming, and provision of comfortable stalls and non-slip walking surfaces.

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White Line Disease *continued*

where it may emerge at the coronary band (**Figure 3**). Failing that, it may track under the sole or into the deeper tissues of the claw and set up deep digital sepsis which may involve the distal interphalangeal joint.



Figure 3. White line abscess which has tracked proximally to the coronary band.

Note that fissures of the white line in the toe may result from another trigger factor. Excessive horn removal or wear, either because cows are walking long distances on rough concrete, or because of removal of too much sole at trimming, may lead to exposure of the corium at the white line in the toe region. This white line fissure may expand and become a toe ulcer.

Other Predisposing Factors

White line disease is one of the three most common foot lesions in dairy herds along with digital dermatitis (DD) and sole ulcer. It may be more common in free stall herds than in tie stall herds and in herds where there are slippery and / or traumatic walking surfaces. White line disease is also a common finding in beef bulls which may result from a combination of poor feeding management and excessive loading of the rear legs.

Treatment

Diffuse hemorrhage of the white line is suggestive of a cow that has recently calved or suffered a severe nutritional problem, in an environment in which she is struggling to maintain adequate rest. This animal should be transferred to a bedded pack area or pasture so that she can recover.

More localized deep hemorrhage, a fissure or uncomplicated abscess in the typical location of the outer claw of the rear foot should be treated after functional claw trimming. The wall around the defect should be removed sufficient to expose healthy horn around the borders of the lesion, and the heel trimmed level or lower than the heel height of the inner claw, without the sole becoming too thin (**Figure 4**). If the affected claw cannot be trimmed to transfer sufficient weight onto the unaffected claw, a hoof block should be applied to the sound claw. If the abscess has emerged



Figure 4. The loose horn of the wall has been removed around the lesion, which extended all of the way to the coronary band. A hoof block will be applied to the sound claw to transfer weight from the lesion site.

at the coronary band, the entire side wall should be removed back to healthy tissue. Check for signs of deep digital sepsis or under-running of the sole and treat appropriately.

Bandaging the lesion is unnecessary unless it appears to be infected with PDD, in which case a light wrap with some topical oxytetracycline should be sufficient.

After-care

Most mild cases can be returned to the stalls without additional care. It is helpful if the lame cow, affected with white line abscess or severe fissure, be provided with a comfortable place to lie down for a few days after treatment on an area of pasture or on a well managed bedded pack area. Where there is exposure of the corium, a single dose of a NSAID such as Flunixin meglumine may be beneficial to aid pain management.

Any cow that has been blocked should be re-examined after approximately 35 days for re-trimming, block removal and assessment. If the lesion has not fully healed, the animal should be re-trimmed and blocked again for a further 3-5 weeks.

Prevention

Transitioning of heifers into the mature herd gradually, in terms of introduction of new feeds and new environments, is very important. Feeding should be managed to minimize the risk of SARA, and flooring surfaces which are too slippery or traumatic should be improved by grooving or by the use of rubber. Hoof-balance should be corrected on a regular basis in order to avoid overloading of the outer claw of the rear feet. Addition of 20mg per day of biotin to the ration daily and trace elements such as zinc, have been shown to reduce the risk of white line disease in older cows.

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