Dairy Cattle Hoof Health

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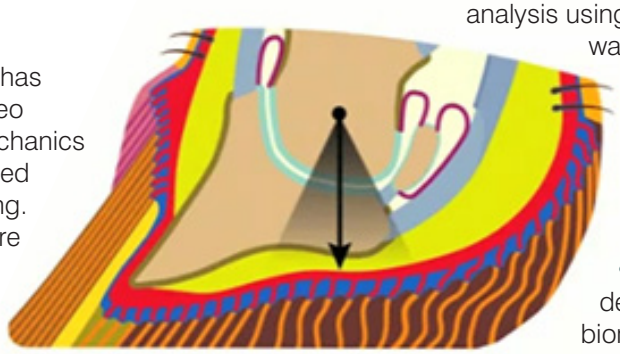
http://dairyhoofhealth.info

Bovine Hoof Anatomy

The University of Zurich, Switzerland has produced an excellent 21 minute video dealing with the anatomy and biomechanics of the bovine hoof along with a detailed description of functional claw trimming. Three short extracts from the video are posted at **dairyhoofhealth.info**:

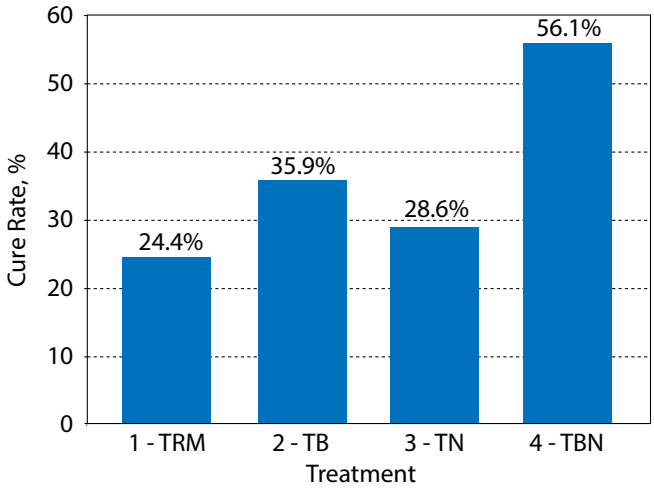
- '*Gait Analysis Reveals Source of Claw Lesions*' describes gait analysis using slow motion video revealing how walking on concrete causes trauma to the claw leading to bruising (sole hemorrhage), sole ulcers and white line lesions;
- '*Claw Trimming the Swiss Way*' demonstrates the Swiss method of functional claw trimming;
- '*The Anatomy of the Bovine Hoof*' describes the inner anatomy and biomechanics of the bovine hoof.



Effective Treatment of Claw Horn Lesions

A study in the United Kingdom evaluated 4 different treatments of claw horn lesions—primarily sole hemorrhages and/or ulcers and white line lesions. Cows on each of 5 farms were locomotion scored using the UK 0 - 3 system every 2 weeks; they were enrolled if they had 2 non-lame scores (0) followed by a lame score (1-3) and had a claw horn lesion on a single claw of a single hoof. Following a therapeutic trim, cows were randomly allocated to 1 of the 4 treatments described below.

Cows were re-examined 5-11 days after treatment. If a hoof block had been applied (TB or TBN) and it was no longer present, it was reapplied. If locomotion score had increased from that at the time of enrolment, the cow was re-treated. Animals in groups TB and TBN were re-examined for a second time 25-31 days after treatment. If the block was still present, it was manually removed. The efficacy of each treatment protocol was evaluated 35 days after initial treatment; a score of 0 indicated a cure.



Results, shown in the graph, suggest that lameness cure is maximized with non-steroidal anti-inflammatory (NSAID: ketoprofen) treatment in addition to the common practices of therapeutic trimming and elevation of the diseased claw using a block when cows are newly and predominantly mildly lame.

Code	Treatment	Description
1 - TRM	Therapeutic trim only	1. Therapeutic trim appropriate for the lesion
2 - TB	Therapeutic trim plus foot block	1. Therapeutic trim appropriate for the lesion 2. Application of a foot block to the unaffected claw
3 - TN	Therapeutic trim plus NSAID	1. Therapeutic trim applicable to the lesion 2. Administration of a 3-day course of ketoprofen by deep intramuscular injection at 3 mg of ketoprofen per kilogram of BW
4 - TBN	Therapeutic trim plus foot block plus NSAID	1. Therapeutic trim appropriate for the lesion 2. Application of a foot block to the unaffected claw 3. Administration of a 3-day course of ketoprofen by deep intramuscular injection at 3 mg of ketoprofen per kilogram of BW

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Vic Daniel's DD Risk Factors

Vic Daniel has been trimming dairy cattle hooves in southern Ontario for over 30 years. In that time, he has seen digital dermatitis (DD) become by far the most common hoof lesion in his clients' herds. Vic has kept detailed records of the claws he has trimmed—for the past 7 years using the Hoof Supervisor® lesion recording system.

The chart below summarizes what Vic considers the main risk factors for DD. One of the important factors that he identifies is interdigital cleft space (IDCS). At the 2011 International Conference on Lameness in Ruminants in New Zealand, Vic presented data that he had collected demonstrating that Holsteins with an IDCS of greater than 3.81 mm had a 5% infection risk for DD or interdigital dermatitis compared to a 39.0% risk for cows with an IDCS of less than 3.1 mm.

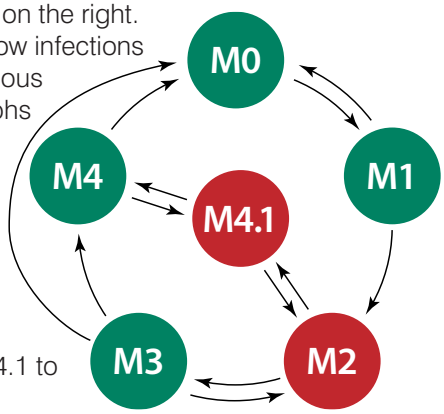
Cow and Herd Risk Factors for Digital Dermatitis

Changes in Risk Factors That Increase the Risk of Digital Dermatitis

Risk Level	Foot Conformation (Interdigital Cleft Space)	Stocking Density	Environmental System	Nutrition Protein Level	Cattle Hygiene	New Cattle Entry to Barn
	Narrowing of the interdigital space	Increasing cow density	Increased confinement & housing type	Increased dietary protein & ammonia	Increased body soiling	Addition of more cattle and from more sources
Low	Rank 3 Partial openness	90%	Yearly pasture	16%	Clean body, legs, feet and udder	Closed herd No live cattle introductions
Medium	Rank 2 Open = 3.7 mm	100%	Tie-stall housing	18%	Moderate soiling of legs and feet	Selected cattle from limited number of farms
High	Rank 1 Cleft is closed	130%	Free-stall housing with total confinement	20%	Severe soiling of legs, udder, feet and body	Purchase of many cattle from many sources

The Cycle of Digital Dermatitis Infections

At the 2016 Western Canadian Dairy Seminar, Dr. Dörte Döpfer from the University of Wisconsin described the dynamics of digital dermatitis infection as a cycle with 6 distinct stages as described in the table on the right. The diagram illustrates how infections progress through the various M-stages. The photographs below show examples of stages M1 to M4. An effective foot bathing strategy will prevent M4.1 lesions from re-developing into the M2 stage. A too-aggressive strategy may increase M4.1 to M2 transitions.



Stage	Description
M0	Clear skin; no sign of of existing or pre-existing lesion
M1	A small, round lesion with a clear border, less than 2 cm in diameter; surface is moist, rough, mottled red-grey with scattered bright red spots; cow will retract when lesion is pressed, indicating acute pain, likely causing her to limp
M2	Angry red-grey mottled lesion has grown larger than 2 cm; painful to the cow when pressed
M3	Post-treatment healing stage with a dry, brown scab on the surface; no reaction from cow when lesion is pressed
M4	Lesion has become chronic with raised growths on surface; no longer painful
M4.1	A chronic lesion with new M1 lesions beginning on surface