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## Wet Weather: Lameness and Mastitis

*Alvaro Garcia, Extension dairy specialist*

Early spring can be exceptionally wet because of rain and melting snow. Muddy conditions resulting from the wet weather constrain best management practices; animals, feed, and the environment can all be negatively affected. Under these conditions, two major ailments can affect dairy cows: 1) mastitis due to environmental bacteria and 2) lameness.

Cows with mastitis decrease production, have greater treatment costs, and can eventually be culled or die. Lameness cows incur higher production losses, lower fertility, and greater culling rates. Deaths due to lameness or injury increased 60% between 1996 and 2007, and lameness continues to be the second highest reason to cull in the U.S., right at 16% (NAHMS 2007). Furthermore, the Farm Animal Welfare Council (1997) considers lameness among the best welfare indicators for dairy cattle.

### ENVIRONMENT AND LAMENESS

Mud is one of the predisposing causes for cattle lameness. Wetness decreases hoof hardness and increases the incidence of claw lesions. Research has shown that nearly one-third of the total water absorbed by a hoof is during the first hour of exposure to high-moisture conditions, resulting in softer hooves (Borderas et al. 2004). Other management factors such as subclinical acidosis and its clinical manifestation, laminitis, may result from nutritional or even management errors.

Wet bedding reduced the time that cows spent lying by 5 hours per day and increased the time spent perching with just 2 feet in the stall (Fregonesi et al. 2007). Reduced amounts of bedding and/or replacing the bedding less also often leads to cows standing for longer periods of time. Factors that increase the time cows spend standing also increase the stress on the hooves.

Also among the determinant causes of lameness associated with wet conditions is the presence of infectious agents such as *Fusobacterium necrophorus* and *Bacteroides*

*melaninogenicus*, which cause foot rot and digital dermatitis (hairy heel warts), which is most likely caused by spirochetes (NAHMS 2007). Hairy heel warts is still one of the leading causes for lameness in the U.S., causing nearly 62 percent of lameness cases in bred heifers and 49 percent of lameness cases in cows.

### Footbaths

Keeping hooves as dry as possible should be a priority, but it's also a challenge for dairy producers during the spring season. The current approach is to find ways to decrease the incidence of injury and infectious challenge to the hoof. This can be accomplished by footbaths and hoof trimming. Footbaths are used to medicate the feet of cattle and aid in preventing lameness. Regrettably, the use of footbaths is not a common practice in the U.S., with approximately only 39 percent of the dairies using them (NAHMS 2007).

The most common medication added to footbaths is copper sulfate, followed by formaldehyde (formalin), and then oxytetracycline. Copper in footbaths should be added at 2.5 to 5 percent (62 gallons of water and 26 pounds of copper sulfate) (Desnoyers et al. 2009). Dairies that use copper sulfate in their footbaths should test soil to check for copper loading in cows and milk, because cows will frequently drink from the bath.

The solution in the footbaths should be replaced often and maintained free of organic matter, because organic matter inactivates the copper in the solution. Formalin is a solution of roughly 37% formaldehyde that can be hazardous to human health, causing irritation of eyes, nose, and throat, and burning the skin (these symptoms can also happen to cattle if not used at the right concentration). Formalin solution should be used at 4%, which can be made by mixing 1 gallon of 37% formalin with 10 gallons of water.

To get a better handle on foot health and develop a hoof-health management plan, a 5-point locomotion score

scale (table 1), with special emphasis on back posture, has been developed (Sprecher et al. 1997). This scoring system is based on observing cows as they are standing or walking, with special emphasis on the posture of the back. Additional observations include tracking (hind feet on fore-feet position), head bob (extent of movement and level of bobbing), and whether or not feet point in the direction of travel (O’Callaghan et al. 2003).

Locomotion scoring is an effective method for early detection of hoof disorders, monitoring lameness prevalence, comparing the incidence and severity of lameness between herds, and identifying cows that need hoof trimming. The observation must be performed on a flat surface that provides good traction. One should examine the cows with a score of 2 or 3 and trim the hooves accordingly to prevent more serious problems. Care must be taken to score the cows always in the same location and in level terrain. One possibility is to score cows as they either enter or leave the parlor.

### Trimming

Hoof trimming helps identify hoof disorders and maintains proper hoof health. When hoofs are not trimmed

regularly they can grow unevenly, which results in weight-bearing changes that can damage the underlying tissues. Eighty percent of the dairies in the U.S. hoof trim their cows, and most of the trimming is conducted by a professional hoof-trimmer. How often a hoof trimmer is needed usually depends on the number of cows to be trimmed.






### ENVIRONMENTAL BACTERIA AND MASTITIS

In the cow’s environment (e.g., bedding, soil, manure, etc.) are countless bacteria that, when given the right conditions, will invade the udder and cause mastitis. As the bacteria are almost impossible to eradicate completely, one has to learn to reduce their effects by improving cleanliness of both the cows and their surroundings.

The coliform group is represented by *E. coli*, *Klebsiella* spp, and *Enterobacter*, which originate in manure and soil, and the environmental streps: *uberis* and *dysgalactiae* (table 2). This last group is in both the environment and the udder and can thus be transmitted from infected to clean cows through faulty milking practices.

For environmental bacteria to grow, they need an organic substrate (i.e., manure) and high moisture. If cows

**Table 1.** Locomotion scoring guide

Score	Description	Back posture	Observation	
1	Normal	Leveled	Stands and walks with leveled back; normal gait	
2	Slightly lame	Leveled or arched	Stands with leveled back but arches it while walking; normal gait	
3	Moderately lame	Arched	Arched back standing and walking; gait with short strides	
4	Lame	Arched	Arched back always evident; deliberate steps one at a time; favors one or more legs	
5	Severely lame	Walks almost on three legs	Shows inability or is extremely reluctant to walk	

Adapted from Sprecher et al. 1997 and Berry, S.L. DVM, MPVM; Univ. of CA Davis, and Zinpro® Corporation, 1997. In Hulsen, J. Cow Signals.

**Table 2.** Environmental bacteria sources and control

Type	Source of infection	Spread by	Management to improve
Non-ag Strep	Environment	Environment to cow by: wet, dirty lots; milking wet cows; poor cow prep; milking machine problems (reverse flow at teat end); wet, dirty bedding	Improve barn and lot sanitation; milk clean, dry cows; avoid air leaks and liner slips; change bedding frequently
Coliforms	Environment	Same as above	Improve barn and lot sanitation; milk clean, dry cows
Staph species	Inhabitants of skin, some bedding	Poor teat dip coverage; poor cow prep; old bedding	Teat dipping; adequate cow prep; more-frequent bedding changes

are allowed to rest on humid, soiled bedding, or if they are allowed to wade through mud or contaminated water, these bacteria can potentially enter through the teat canal. Water running down the udder towards the teat end will always carry debris and bacteria. When teats are not properly disinfected with teat dip and dried thoroughly, drops of this contaminated water can enter the teat canal. This can be worsened if the inflations of the milking machine do not adjust properly during milking. Air that gets between the teat skin and the liner during the pulsation sequence can project contaminated drops at great speeds through the teat sphincter.

Following a strict and sound milking routine is critical to minimize the chances of contaminating the mammary gland. Although the first instinct when cows arrive covered with mud is to wash the udders and remove the dirt, it is oftentimes better to just “dry clean” them. Concentrate on cleaning the teats themselves and not the whole udder. If there is dirt, sand, or bedding, it is better to brush the teats with an individual towel. By not disturbing debris present on the udder, we decrease the chances of water and environmental bacteria traveling by gravity to the teat ends.

First and foremost, the use of nitrile gloves should be given high priority. Gloves need to be maintained reasonably clean during the milking procedure. They do little good at protecting the cow from bacterial contamination if they are covered with manure. Regrettably, there’s still a lot of progress to be made in this area, as nearly 45 percent of the farms in the U.S. do not use gloves. These farms account for 23 percent of the cows in the country (NAHMS2007).

### Forestripping

Forestripping (three squirts per teat) is important because it accomplishes several tasks: 1) Forestripping stimulates milk let down, 2) helps detect abnormal milk, and 3) removes the most highly contaminated milk from the tank. In the U.S., the percentage of dairies that forestrip all cows increased from 44.5 percent in 2002 to 58.9 percent in 2007, and the percentage of dairies that did not strip any cows was almost cut in half (NAHMS 2007).

### Pre-dipping

It is difficult to rank steps of the milking procedure by importance in decreasing mastitis incidence, but if one were to rank the steps, teat dipping would probably be No. 1. It is important to use teat dips that have been approved by the FDA with a demonstrated bactericidal effect. Iodine compounds continue to be the most common product used in the U.S., at around 60% of the dairies, followed by chlorhexidine, at roughly 12%. Regardless of the product used, it is important to achieve coverage of the entire teat barrel and allow at least 30 seconds between applying the dip and drying.

### Drying

Successful drying of the teats also follows certain rules, the No. 1 being single-use towels or “one towel, one cow.” Over half of the U.S. dairies use single-use paper towels, and 22 percent use a single cloth towel per cow, with only 12 percent of the dairies still allowing the teats to air-dry (NAHMS 2007). The type of towel seems to be a matter of preference for any given farm. Cloth towels work very well if they are clean, dry, and not worn out (avoid “see-through towels” and check for rough consistency). At a minimum, hot water or hypochlorite should be used to wash towels. If there’s a problem with the drying process, the addition of hypochlorite is warranted. Reusable drying cloth towels that are not properly cleaned may be a source of infection. Even when these towels are initially clean, the sequence in which the teats are dried may result in inadvertently cross-contaminating them. If teats closest to the milker are cleaned first, those teats may be accidentally contaminated while trying to reach the back teats.

### Post-milking

Once the unit is detached, cows should be post-dipped immediately. The reason for this is that the sphincter of the teat canal remains open for a while, and it is easy for bacteria to penetrate the udder. As with predipping, iodine compounds are also the most common compounds in use in the U.S., at almost 68 percent of the operations and chlorhexidine is used at 13 percent of the operations. In

order to reduce the risks of infection, it is important to offer fresh feed right after milking; by doing so, cows remain standing for a while after milking, and the chances for bacteria penetrating through the dilated teat sphincter decrease.

### Infections

Cows that are infected with coliform bacteria can show clinical signs and progress to an acute form that can lead to the death of the animal. These cases have sudden onset, with swollen and hot quarters and yellowish, watery milk that contains clots and flakes. Severe cases occur in early lactation, particularly around calving.

Infections with environmental Streptococci, Klebsiella, and Enterobacter occur more frequently early in the dry period. On the other hand, E. coli infections tend to occur immediately before and after calving. It is thus important for both far-off and close-up dry cows to be kept in lots with dry, clean bedding.

Several udder health management strategies are recommended for the dry period. These include dry-cow antibiotic therapy, teat sealant for dry cows, environmental management, nutrition, drying off method, and vaccination programs. Antibiotic therapy at dry-off helps prevent infections contracted early in the dry period. Vaccination programs have shown effectiveness against infections by E. coli around calving. Management practices, though, such as maintaining a clean and dry environment at all times, are without doubt among the most cost-effective practices when dealing with environmental mastitis.

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