

OPTIMIZING YOUR FOOTBATH PROTOCOL by Dr. Laura Solano

Prevention of digital dermatitis (DD) requires strong internal and external biosecurity practices, hygiene, early detection and treatment of active lesions, and footbathing. Correct footbath use is key to controlling this disease in your herd, although it is not a magic bullet! Monitor cows' hind feet to assess trends of DD stages and adjust your protocol accordingly. An attainable goal is that **less than 5%** of cows are infected with active lesions (Figure 1, 2). Here are the basic principles for an effective footbathing strategy:

1. How Effective Is Your Current Footbath?

- Signs of an **INEFFECTIVE** footbath:
 Many cows have acute/active lesions (Fig. 1, 2) and/or chronic proliferative, hyperkeratotic lesions (Fig. 3).

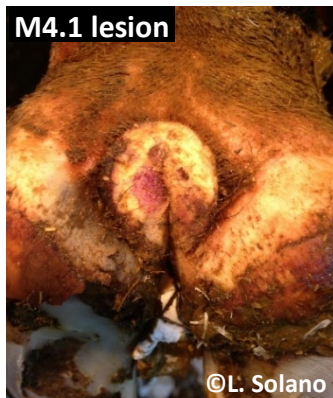


Figure 1. Active, M2 lesion

Figure 2. Active, M4.1 lesion

Figure 3. Chronic, filamentous (hairy warts) or mass proliferations

Figure 4. Chronic, hyperkeratotic (thickened skin) proliferation

- Signs of an **EFFECTIVE** footbath:
 5% of cows or less have active lesions (Fig. 1, 2). The chronic lesions you see are overall less proliferative (i.e., less mass-like/hairy; Fig. 5). Transitioning from an 'ineffective' to a more effective footbath protocol is characterized by a decrease in number of M2 lesions and a change in the appearance of chronic lesions (i.e., lesions 'clear' proliferations, looks like scabs falling off; Fig. 6).



Figure 5. M4 stage, less proliferative

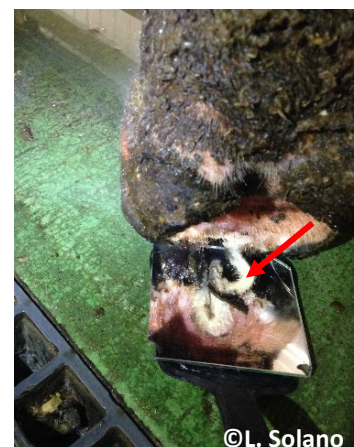


Figure 6. M4 stage, scab falling off – less proliferation- reflects healing and sign of success

2. What Makes A Good Footbath Protocol?

- **FREQUENCY OF USE:** footbaths work better when used WEEKLY
The number of times per week they should be used depends on the farm's DD prevalence and hygiene. There is no rule of thumb, but as a guideline:
 - In an average Canadian farm with around 20% DD prevalence (considering all DD stages), 4 times per week¹ is acceptable. If prevalence is low (less than 5%) frequency can be reduced to 2 times per week.
 - Increase frequency to 5-7 times per week if DD prevalence is high or if there is an outbreak. Assess levels of infection after 4-6 weeks of use and adjust frequency. Keep in mind that overuse of chemicals may be an economic and environmental issue, and can potentially damaging the foot skin.
¹"times per week" refers to the number of times each cow should pass through a footbath with an antibacterial chemical, preferably at intervals spread over the week. The use of cleaning agents like soap/1% bleach/salt/water is acceptable (although there is not much evidence of effectiveness) but does NOT replace the frequency at which antibacterial chemicals should be used.
- **CONSISTENT ROUTINE:** think of DD prevention in the same way than you think of mastitis prevention and teat dipping. At the chosen frequency, footbathing needs to be done REGULARLY to be effective.
- **REPLACEMENT OF SOLUTION:** approximately every 200 cow passes or after 24 h (if fewer than 200 cows have passed through the footbath) or if the depth of the solution is insufficient to immerse the foot up to the coronary band.
- **PRODUCT CONCENTRATION:** the preparation of solutions must accurately and consistently achieve the desired concentration every single time! Make sure you follow the product's label directions. Desired concentrations of common products are:
 - Formalin: 2% to 5%
 - Zinc sulfate: 5% to 10%
 - Peracetic acid: 1%
 - Thymol: 1%
 - Copper sulfate: 2% to 5%; 3% if using acidified copper maintaining a pH≈4
5% concentration is most acceptable for copper sulfate. 2% can be used on farms with very low DD. 10% can be used in the case of an outbreaks/peak of active lesions.
- **MANAGE THE pH OF THE FOOBATH:** The antibacterial effectiveness of products like zinc sulfate and copper sulfate depends on them being in ionized form. A pH of the footbath solution in the range of 3.5 to 5.0 results in more complete ionization, greater effectiveness and reduced quantity of chemical required. Before mixing the solution, measure the pH of the farm's water so you have an idea of how much acidification is required to bring the pH level into the desirable range.

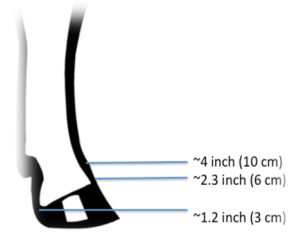
The footbath's pH level should remain between 3.5 and 5.0 throughout the use period. A pH greater than 5.5 results in inefficient use of copper; a pH lower than 3.5 is too acidic and can cause skin burns and more chronic (proliferative; Figure 3, 4) DD issues. Try different acidifiers and quantities: acidified copper sulfate; commercial acidifiers or sodium bisulfate (dry acid used in pools; add 2-4 tablespoons at a time until reaching desired pH). Note the amount of product needed and add the same amount to future footbaths. Bicarbonate (from feed companies) can be used as a buffer to stabilize pH. Measure pH at the beginning and at the end of footbath use. If pH is above 5.5, the footbath is no longer effective and must be changed.

- **CALCULATE FOOTBATH CONCENTRATION**

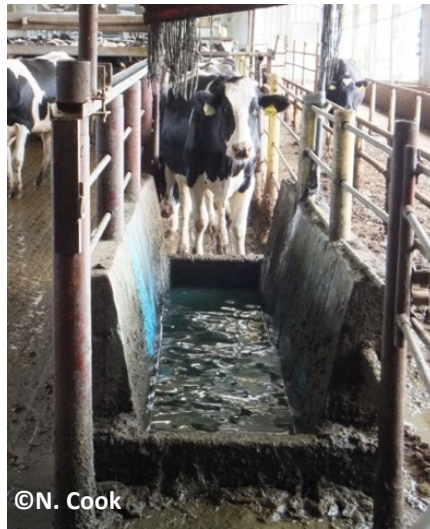
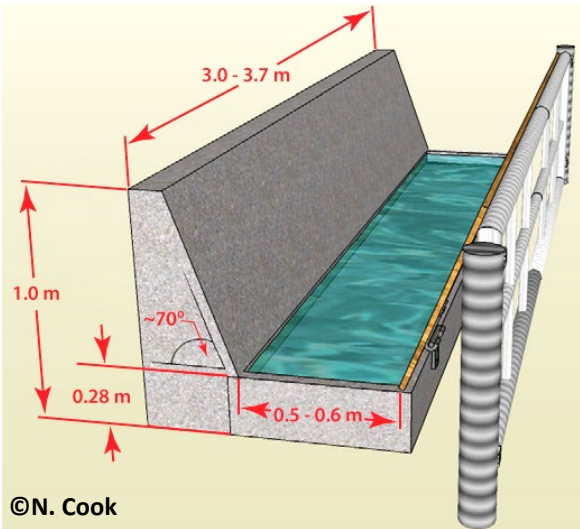
- Footbath volume: Length (cm) x width (cm) x depth of liquid (cm) ÷ 1000 = Litres (L)
Example: 300 cm x 50 cm x 15 cm ÷ 1000 = 225 L
- Determine how many kg of dry products to add to achieve desired concentration:
Footbath volume x Percent of solution desired
Example: 225 L x 0.05 (5% solution) = 11.25 kg of copper sulfate
- For liquid products: for every 100 L of total solution in footbath add 2 L of product for a 2% solution;
add 5 L of product for a 5% solution

3. What Makes A Good Footbath Design?

- Length: 10-12 ft (3-3.7 m) to ensure that rear feet are immersed at least twice
- Width: 20-24 in (50-60 cm) to minimize product required
- Step-in height: 10 in (25 cm) to retain more solution
- Fluid depth: 4-6 in (10-15cm) to cover the coronary band



Examples of Well-Designed Footbaths:



4. Tips For Optimizing Footbath Management

- Wash cows' feet with a medium-high pressure hose before they enter the footbath. This will remove caked-on dirt and manure and expose DD bacteria to air which reduces their survival. There is scientific evidence that hosing the feet off in the parlour can help to clinically cure DD lesions, even without topical treatment. On the contrary, there is no evidence to support the effectiveness of prewash footbaths (i.e., baths filled with water placed before the footbath containing antibacterial chemical) in cleaning cows' feet or reducing contamination (defecation) into the treatment bath.
- Location: lame or not, cows usually don't like going through footbaths. Therefore, place the footbath as far as possible from the milking parlour or robot to allow for good cow flow. In robot facilities, my preferred location for the footbath is in a remote crossover so it is not associated with milking. Location of the footbath in a crossover allows for good footbath design, where cows can be slowly driven through the bath, does not interfere with visits to the robot and prevents poor cow flow (cows not wanting to pass through footbath). However, passing cows through a footbath requires labour and may disturb the herd's daily routine, resulting in more cows in the fetch pen. If labour is a challenge, or if you are unlikely to successfully follow a consistent footbath routine, then locating the footbath after a sort gate at the exit of the robot may be a better option for you.
- Set-up: make sure that the footbath is easy to drain and clean
- Try to run dry cows and breeding heifers through a footbath - at minimum, the close-up group