

Regimes for foot bathing

By Nick Bell

Objectives of foot bathing

- Treat established infections (digital dermatitis and foul)
- Wash off and kill surface bacteria (disinfect)
- Wash off slurry from the feet (clean)
- Harden the claws
- Harden the skin around the claws

Disadvantages of foot bathing

- Added hassle/ extra job
- Expense
- Use of harmful chemicals (harmful to cow, humans and environment)

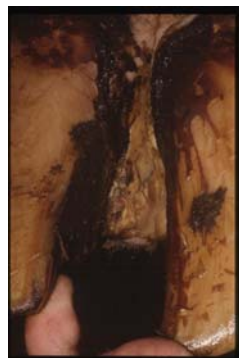
Four signs that foot bathing could be improved



Growths between the claws



Rotten toes



Cases of foul

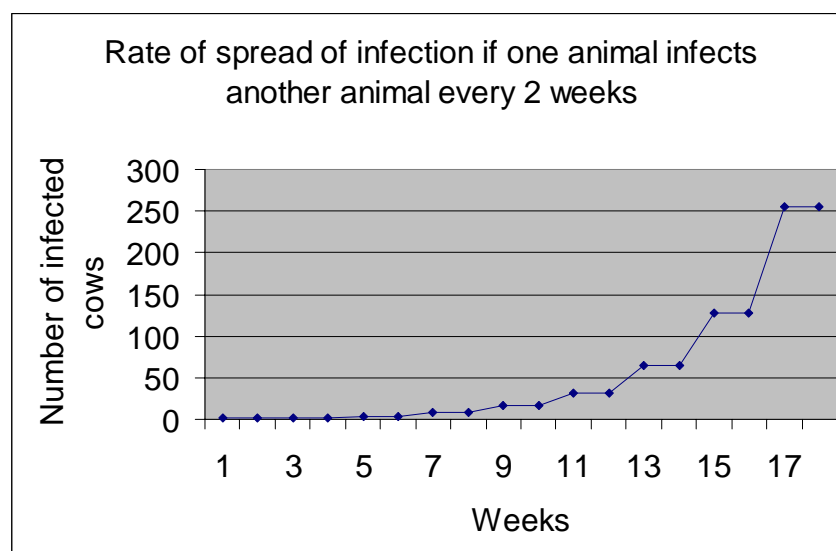


Severe heel erosion, severe digital dermatitis and severe sole ulcers that become deep infections

3 effective principles of control for digital dermatitis

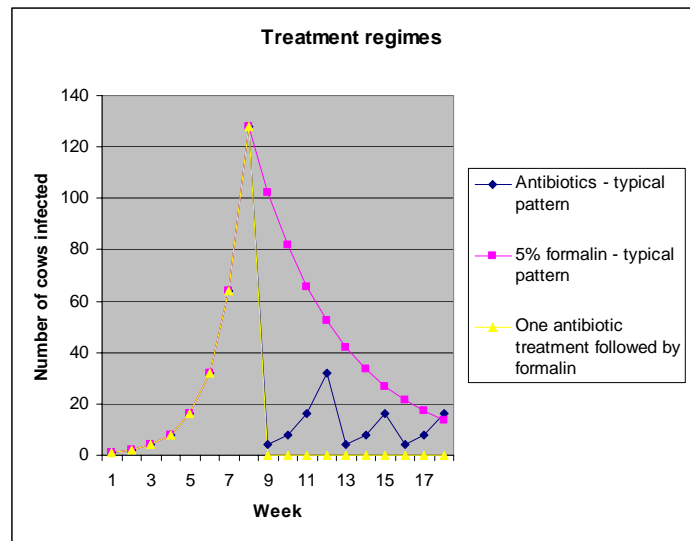
1. Treat raw lesions to prevent infection of more animals
2. Disinfect feet daily to wash off new infections
3. Treat dry cows and youngstock before they enter the milking herd

Digital dermatitis spread – close to exponential if untreated?



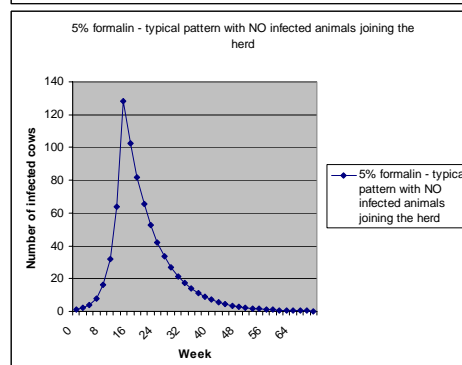
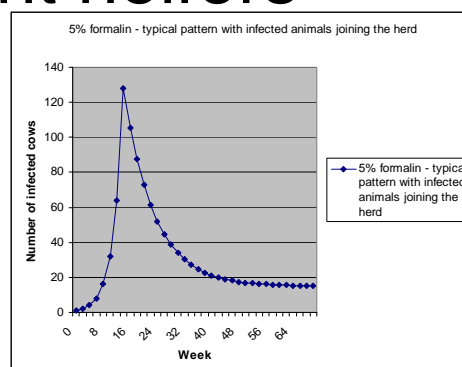
Antibiotic and/or formalin

- Treatment with antibiotics alone every 4-6 weeks through the winter (BLUE) – saw tooth pattern due to constant flare-up
- Daily treatment with 5% formalin (PINK)– gradual fall to very low levels
- One antibiotic treatment followed by daily formalin (YELLOW) – levels quick to fall and remain very low



Effect of infected dry cows and replacement heifers

- If 3 infected dry cows/heifers enter the herd each week then a constant level of infection persists despite using formalin
- Therefore, for good control of digital dermatitis, dry cows and heifers should be regularly foot bathed too



Different foot bathing products

Trialled with proven effectiveness

- Antibiotics
- Formalin 5%
- Copper sulphate 5%
- Zinc sulphate 5%
- Organic acids (variety of products)

No foot bathing trials:

- Hypochlorite
- Salt water
- Warm water – high risk of spreading foot and udder infection if used without a disinfectant in a foot bath
- Lime
- Proprietary disinfectant e.g. FAM 30, Virkon
- Glutaraldehyde
- Combination products

Comparison of effectiveness

Agent	Cure rate	Disinfection	Cleaning	Harden claws or skin
Antibiotics	✓✓✓	✓✓✓	✓	✗
Formalin 5%	✓✓	✓✓✓	✓	✓✓✓
Copper sulphate 5%	✓✓	✓✓✓	✓	✗
Zinc sulphate 5%	✓✓	✓✓✓	✓	✗
Hypochlorite 1%	✓	✓✓✓	✓✓✓	✗
Organic acids*	✓	✓✓✓	✓ To ✓✓	✗
Hosing with water	✗	(✓)	✓✓	✗

*Several commercial products available with added surfactants to improve cleaning

Antibiotics e.g. lincospectin

- Pros
 - Excellent cure rates, excellent to damp down rampant infection
 - Not irritant to cows feet (kindest to cows)
- Cons
 - Toxic if consumed by cows (fatal)
 - Withdrawal period for foot bath: 7 day milk, 28 day meat
 - High antibiotic dependency
 - Potential for antibiotic resistance
 - Reactive, not preventative (all the cost of the treatment and the disease)
- Possible regimes (*recommended)
 - Before starting routine disinfection (e.g. with formalin)
 - Foot bath every 4-6 weeks through the winter
 - Foot bath strategically (if flare up or before anticipated flare-up e.g. at autumn housing)
 - Blanket spray feet of whole herd
 - *Spot treat as lesions spotted* - "blue spray" is licensed and has no withdrawal period
 - *Treat all stale cows at around drying off*

Formalin (38% formaldehyde)

- Pros – best for the first cows through the foot bath
 - Cheap
 - Disinfectant above 2%
 - Partial cure rate at 5% (most people use it at this rate)
 - Hardens claws and skin around claws
- Cons
 - Painful on raw lesions. Deliberately walking cows with raw sores through formalin is cruel. This can
 - Add to cow stress (infected cows may be reluctant to leave the parlour)
 - Result in some cows keeping one foot out the bath. Hence you need a good foot bath design and occasionally treat lesions that aren't clearing with formalin foot bathing alone (either spot treatments or herd treatments with antibiotics or stronger formalin)
 - Carcinogenic (causes cancer - may be banned shortly as a result)
 - Fumes highly irritant to eyes, nose and mouth. Some people lose their sense of smell
 - Thought to make claw horn brittle if used too much at a strong rate
 - Evaporates in very hot weather
 - Less activity when very cold, but warms sufficiently after a few seconds on the feet
- Several possible regimes (following pages)

Daily formalin disinfectant regime

- Start the regime with an antibiotic foot bath, strong copper sulphate or spot treatment of cows with visible lesions
- Use at 3-4% every milking (6-8 litres per 200 litres of foot bath)
- Replace every 200 cows for a 200 litre bath or every 48 hours (whichever soonest)
- Combine with other treatments to achieve a better cure rate

5% formalin regime

- Use as previous but
 - More fumes
 - Can use 2-5 days per week to good effect
 - Use more frequently when cows are under challenge (immunity, conditions under foot)
 - Less treatment needed than with 3-4%

10% formalin

- Highly irritant and painful on raw lesions therefore
 - Do not use on cows with known sole ulcers or raw lesions
 - Use in well ventilated area
 - Handle carefully
 - Only use on 1-2 days per week
 - Useful in very large herds when the last cow may only walk through a solution 75% as strong as the first

Rising formalin for treatment – for use instead of antibiotic foot baths (modified from advice by R Blowey)

Week	Action	Formalin foot bath concentration
Start	Spot treat as many cows as possible with known foot sores and then run the herd through strong copper sulphate (5-10%)	-
1	Formalin foot bath on 3 consecutive days each week Watch cows at feed barrier for any cows that are shifting weight between hind feet after foot bathing. Wash then treat the feet of these cows with antibiotics	2%
2		4%
3		6%
4		8%
5		10%
6		5%

Copper sulphate/ acidified copper sulphate

- Pros – good for the last cow through
 - Less irritant and dangerous
 - Claw horn does not become brittle
 - Disinfects at 2% (4kg in 200L) but most people find 5% (10kg per 200L) works best
 - For larger herds, make up at 10% copper sulphate (20kg in 200 litre bath). Whatever is removed or bound to slurry will be replaced by crystals in the bottom. The last cow will receive a strong solution.
- Cons
 - Not as potent as 5-10% formalin
 - More expensive than formalin
 - Difficult to dissolve 5% concentration in cold water (warm water helps). First cows through may not receive a strong solution.
 - Copper build-up on the land is a major concern
 - Corrodes galvanised metal work
- Possible regimes
 - 2% acts as a disinfectant (daily regime)
 - 5-10% has partial cure (2-3 days per week)
 - Acidification of solution (e.g. with dilute FAM 30 disinfectant or organic acids) can help effectiveness
 - Mixing formalin and copper sulphate may improve effectiveness

Zinc sulphate

- Similar to copper sulphate

Organic acids e.g. Kovex, Hoofsure, 1% peracetic acid

- Pros – best for safety
 - Not toxic to cows, humans or land
 - Some commercial products contain agents to help clean the feet and soften slurry crusts (Provita hoofsure endurance)
 - One commercially available foam agent containing peracetic acid
 - Useful for treating cows as they stand prior to milking
 - Repels flies
- Cons
 - More expensive
 - Less curative action
 - Acid erodes concrete (rubber mats are needed)
 - Foam can be a problem on steep sloping collecting yards
- Possible regimes
 - Daily foot disinfection in combination with other methods of treatment



Hypochlorite (straight) / hypochlorite parlour washings

- Pros
 - Cheap
 - Cleans feet well
 - Hypochlorite worked as well as antibiotic when sprayed onto feet at 1% (2 litres hypochlorite in 200 litres of bath)
- Cons
 - No trials using hypochlorite in foot bath
 - Hypochlorite may accumulate on the land
 - Fumes can deter some cows
 - Parlour washings are now weaker concentrations than a few years ago
 - it may be wise to add extra hypochlorite to circulation fluid
- Possible regimes
 - Use in conjunction with a chemical of known effectiveness
 - Can add extra hypochlorite to parlour washings

Salt

- Pros
 - Cheap disinfectant
 - Not toxic
- Cons
 - No trials of effectiveness
 - Palatable – encourages cows to drink out of foot bath, which is dangerous!

Other commercial products

- Klingon Blue – a sticky form of copper sulphate.
- Kilco super hoof – combination of copper sulphate, zinc sulphate and organic acids with wetting agents
- Hoofsure endurance – organic acids with wetting agents
- Kovex foam – organic acid foam
- FAM30 – iodine-based disinfectant

Alternatives to foot bathing

- Hosing off feet in the parlour – time consuming, uses large volumes of water, cows disturbed unless hosed regularly, cows dung in parlour
- Knap sac spraying antibiotics – risk of antibiotic failure due to spraying the udder, but more economical than foot baths. Interdigital infection less responsive
- Spot treatment with aerosol spray of antibiotic – only the obvious cases are spotted and treated

Grazing period

- Mid to late summer is the ideal time to hit the problem with foot bathing, and herds that continue bathing through the summer have been shown to have less digital dermatitis
 - Feet are cleaned by grass aiding penetration of agent
 - Conditions are drier, reducing dilution of agent
 - Less chance of re-infection in yards
 - Cow immune response may be better
 - Formalin can harden the feet for track walking
 - Locomotion more closely observed

Recommended agents

- Cure: antibiotics (consult your vet)
- Part cure:
 - 5-10% formalin (but cruel for cows with open sores so treat some or whole herd with formalin or copper sulphate first)
 - 5-10% copper sulphate
 - 5-10% zinc sulphate
- Clean and disinfect:
 - organic acid foot baths
 - 2% hypochlorite
 - Pasture
 - Straw yards
 - 2-10% formalin, copper sulphate or zinc sulphate (2% is bottom of effective range – strength needed for last cow through)

Foot bathing protocol (for high yield, high intensity system)

- **Start:**
 - Treat any known cases (antibiotic spray, copper gel or bandage with an effective treatment) then foot bath with better cure rates
 - Antibiotic foot bath (consult Graeme as he is the only person who can advise you as you are his client)
 - OR Antibiotic spray (knap sac only practical solution for your herd)
 - OR 10% copper sulphate followed by rising formalin regime (seek vet advice on this and consult notes on the regime)
- **Followed by**
 - Daily foot disinfection (you can rotate with formalin, copper sulphate and zinc sulphate)
 - Formalin (4-6% if 3-5 days, 3-4% if twice a day but then 5-10% at least once a week)
 - Copper sulphate (5-10% if 3 days per week, 2% if once or twice daily with 5-10% at least once a week)

Foot washing on days when no foot bath with formalin, copper sulphate or zinc sulphate

 - 2% hypochlorite/ other effective disinfectant
- **Monitoring**
 - As soon as any raw/painful lesions are detected (seen in parlour or during lameness treatments or found by claw trimmer) then go back to the start. It may be that you need to go back to the start every 3-4 months or at times of higher stress.
- **Infected groups of youngstock and dry cows**
 - 5% copper sulphate/ formalin once a week
- **Please note** that putting cows through formalin with raw lesions causes pain and therefore is cruel and liable to cause cow stress. Plus cows with raw lesions avoid putting feet into the formalin and so do not receive treatment as required.

Rotation

- Many people find rotation of chemicals works well
 - Week 1: 5% Copper sulphate
 - Week 2: 5% Formalin
 - Week 3: 5% Zinc sulphate

Combinations

- Generally it is safer not to mix chemicals, including parlour washings with other chemicals. The exceptions may be:
 - Formalin and copper sulphate (they seem to work better together)
 - Copper sulphate and mild acid (e.g. dilute FAM 30)
 - Hypochlorite in “hypochlorite parlour washings”

Surfactants

- Surfactants can be added (included in some commercial products)
- Washing up liquid may work just as well



Regimes for dry cows and youngstock

- Treat animals as early as possible and before turning out to grass
 - Antibiotics
 - 5-10% copper sulphate or formalin (watching for signs of discomfort after bathing so these can be treated immediately)
- If on straw yards then:
 - Once a week with 5% formalin or 5-10% copper sulphate is usually sufficient
- If on cubicles, especially with automatic scrapers then:
 - 2-3x per week may be needed

Replenishment rates

- Replace foot baths according to advice from your advisor
 - Pre-wash will preserve life of solutions as most dung enters this bath. Pre-wash baths need emptying and cleaning after every use and may be cleaner if running water supplied through the bath
 - Regular (daily) bathing will reduce dunging
 - Strong solutions will work for longer but increase the side-effects
 - Generally look to replace after 1 cow has passed through the bath for every litre in the foot bath i.e. every 200 cows for most single width 3m long baths
 - Replace formalin after 48hours if not before
 - For large herds with lameness problems, it can pay to replace solutions mid-way through milking so the lame cows receive the clean solutions

Prevention better than cure

- Prevent new bugs entering the herd
 - Biosecurity protocols
 - Policy for purchased animals
 - Foot dips for visitors
- Reduce slurry/mud/pooled water depth
 - Increased frequency of scraping
 - Improve scraping
 - Reduce stocking rates of yards
 - Remove stale slurry from edges of yards or around feeders
 - Remove pools of slurry or water
 - Improve yard design/function
- Reduce duration of exposure to slurry or mud
 - Cows out to pasture
 - Cows turned out to scraped yards

Best practice for treating raw lesions

- Clean the slurry and crust off
- Dry the foot
- Apply generous amounts of antibiotic or copper sulphate crystals/gel
- Repeat the treatment for 3 days
- Bandage the chronic cases
- Be hygienic so you don't spread infection between cows

Summary

- Control infection in the whole herd
 - Milkers
 - Dry cows
 - Youngstock
- Clean and disinfect feet regularly (ideally every milking)
- Treat feet
 - Partial cure with some chemicals
 - Better cure with antibiotics