

## ALTERNATIVES TO COPPER SULFATE FOOT BATHS

DG - 831



### ALTERNATIVES TO COPPER SULFATE FOOT BATHS

## FOOT BATH OBJECTIVES

- Disinfect Feet for the Prevention of Infectious Claw Lesions Such as
  - Digital dermatitis
  - Foot rot
  - Interdigital dermatitis
  - Heel horn erosion
- Some Solutions Harden Claw Horn and Skin (Copper Sulfate, Formalin)



## CAUSES OF INFECTIOUS DISEASES

- Introducing Cattle From an Infected Herd
- Lack of Hygiene, Hygiene, Hygiene!!
- Stress
- Poor Nutrition
- Lack of Claw Maintenance Programs
- Automatic Alley Scrapers
- Improper Use of Foot Baths



## ALTERNATIVES TO COPPER SULFATE FOOT BATHS

### EFFICACY OF FOOT BATH SOLUTIONS

- Antimicrobial Activity
- Impact of Soil Load on Antimicrobial Activity
  - Chlorine
    - broad spectrum antimicrobial agent
    - organic matter reacts with free chlorine ion, resulting in loss of antimicrobial activity



Picture courtesy J.K. Shearer, U of Florida



ALTERNATIVES TO COPPER SULFATE FOOT BATHS

## COPPER SULFATE FOOT BATHS

- 5 to 10% Copper Sulfate
- Antibacterial and Hardening Agent<sup>a</sup>, Less Effective Than Formalin
- Relatively Inexpensive
- Goes Into Solution Somewhat Easily



Picture courtesy J.K. Shearer, U of Florida

<sup>a</sup> Kloosterman, 1997. Claw Care, p. 123 in Lameness in Cattle, 3<sup>rd</sup> Edition. P. Greenough, ed. W.B. Saunders Co., Philadelphia, PA



ALTERNATIVES TO COPPER SULFATE FOOT BATHS

## COPPER SULFATE FOOT BATHS

- Appears to Effectively Control Infectious Claw Lesions
- British Research, 2% Solution, Reduced Mean Claw Lesion Scores by 71.9% after 3 Wk<sup>a</sup>
- Swedish Research, 7% Solution Decreased Odds of Digital Dermatitis by 10X, and Heel-Horn Erosion by 4X after 16 Wk<sup>b</sup>
- Acidifiers May Increase Efficacy of Copper Sulfate, Allowing Lower Concentrations in Foot Baths



<sup>a</sup> Laven and Hunt, 2002. Vet. Rec. 151:114  
<sup>b</sup> Bergsten et al., 2006. Proc. 14<sup>th</sup> Intl. Symp. Lameness in Ruminants, Colonia, Uruguay. p.61



## COPPER SULFATE FOOT BATHS

### ■ Disposal is a Concern

- 50 gallon bath, 5%  $\text{CuSO}_4$  solution, used 4X/wk, changed every 200 cow passes, 21.7 lb  $\text{CuSO}_4$  disposed per cow/year
- Potential issues include crop phytotoxicity and EPA guidelines on cumulative loading capacity of soils for heavy metals



## COPPER SULFATE FOOT BATHS

### ■ Copper Disposal Limits

- EPA 503 standard for agricultural land
  - lifetime limit 1339 lbs/acre
  - annual limit 66 lbs/acre (@ 5.4 lbs copper/cow, 12 cows/acre)
- New York, lifetime limit, 75 lbs/acre
- Illinois, lifetime limit, 250 lbs/acre



### ■ Most Soil Copper Tightly Bound to Soil, Remaining Available For Plant Uptake

### ■ Crop Tolerance of Copper Variable; Legumes, Such as Alfalfa, Appear to Be Less Tolerant of Copper Than Grasses



ALTERNATIVES TO COPPER SULFATE FOOT BATHS

## EFFECT OF MANURE SLURRY, FORMALDEHYDE AND COPPER SULFATE ON CLAW HORN<sup>a</sup>

### ■ Manure Slurry

- After 14 d, heel horn was penetrated to a depth two to three times deeper than control horn; insult from manure slurry increases with contact time; effect most pronounced on poor quality horn
- After 14 d, no effect on good quality wall horn; poor quality wall horn, cracks and fissures increased in size and depth



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<sup>a</sup> Kempson et al., 1998. Proc. 10<sup>th</sup> Intl. Symp. Lameness in Ruminants, Lucerne, Switzerland, p. 216



ALTERNATIVES TO COPPER SULFATE FOOT BATHS

## EFFECT OF MANURE SLURRY, FORMALDEHYDE AND COPPER SULFATE ON CLAW HORN<sup>a</sup>

### ■ 5% Copper Sulfate

- After 24 h, full penetration of horn tubules in heel and sole
- After 24 h, penetrated intertubular horn 3 to 4 mm in heel, and 2 mm in sole
- After 4 d, fully penetrated the heel and sole horn; Wall horn penetrated 3 mm

### ■ 2% Formaldehyde

- After 4 d, microcracks formed in the claw wall at a depth of 2 mm
- Maximum number of cracks seen at 48 h



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<sup>a</sup> Kempson et al., 1998. Proc. 10<sup>th</sup> Intl. Symp. Lameness in Ruminants, Lucerne, Switzerland, p. 216





ALTERNATIVES TO COPPER SULFATE FOOT BATHS

## ALTERNATIVES TO COPPER SULFATE

### FORMALDEHYDE

- 3 to 5% Solution, Used 3X/wk
- Antibacterial and Hardening Agent
- Advantages
  - Tends to be the least expensive foot bath solution
  - Bacteria do not develop resistance
  - If diluted, will become inactive and not create an environmental hazard
  - Highly soluble in water
  - Minimal effect on permeability of the claw horn
  - Antibacterial activity (2.2% solution) retained up to 330 cow passes<sup>a</sup>



Photo courtesy of Larry Laughren

<sup>a</sup> Holzhauser et al., 2004. Proc. 13<sup>th</sup> Intl. Symp. Lameness in Ruminants, Maribor, Slovenia, p. 21



ALTERNATIVES TO COPPER SULFATE FOOT BATHS

## ALTERNATIVES TO COPPER SULFATE

### FORMALDEHYDE

- Shown to reduce incidence and severity of claw lesions<sup>a</sup>
  - 5% solution, 4X/wk for 8 months reduced incidence of interdigital lesions
  - 5% solution, 4X/wk for 2 years using a split foot bath months reduced incidence of heel erosion, decreased sole moisture content and reduced severity of sole hemorrhages



Debra LaPorte, W.H. Miner Agricultural Institute

<sup>a</sup> Arkins et al., 1986. Vet Rec. 118:580



ALTERNATIVES TO COPPER SULFATE FOOT BATHS

## ALTERNATIVES TO COPPER SULFATE

### FORMALDEHYDE

■ Disadvantages

- Suspected carcinogen
- Not effective below 50°F
- Keep children away from foot baths
- Not suitable for open lesions
- Must use in well-ventilated areas and wear eye protection
- Toxic if consumed, do not let animals drink from foot baths
- Will kill vegetation if foot bath solution is always dumped in one location
- If solution strength incorrect, splashes of overly concentrated solution will harm skin of cow foot and teats



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ALTERNATIVES TO COPPER SULFATE FOOT BATHS

## ALTERNATIVES TO COPPER SULFATE

### ZINC SULFATE

- 5 to 20% Solution
- Antibacterial Activity; Hardening Agent?
- Reports from Field, Controls Infectious Claw Lesions When Used at 10 to 20%; Controlled Research Lacking
- Relatively Inexpensive
- Does Not Readily Go Into Solution
- Zinc is Commonly Applied to Corn
  - Application varies depending upon soil Zn concentration and application method (band, 0 to 2 lb/acre; broadcast, 0 to 10 lb/acre)
  - 10% zinc sulfate foot bath<sup>a</sup> results in 17.6 lb Zn disposed per cow/year



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<sup>a</sup> 50 gallon bath used 4X/wk, changed every 200 cow passes



## ALTERNATIVES TO COPPER SULFATE

### ■ Several Sources of Soluble Zinc Have Been Introduced

- Hoof-Zink, PediCuRx Prevent Z, Rotational Zinc
- Limited research
- Field study with Hoof Zink (5% solution) showed a reduction in digital dermatitis; response appeared to be similar to that observed with a 5% copper sulfate solution



## ALTERNATIVES TO COPPER SULFATE

### ANTIBIOTICS

### ■ 0.1% Tetracycline or Oxytetracycline or 0.01% Lincomycin Solution

- NOT RECOMMENDED
- Very costly
- Extra label use
- Potential for bacteria to develop resistance
- Efficacy diminishes quickly as soil load in foot bath increases
- Most efficacious when mixed with distilled water





ALTERNATIVES TO COPPER SULFATE FOOT BATHS

## ALTERNATIVES TO COPPER SULFATE FOOT BATHS

Product	Active Ingredients	Instructions	Potential Reduction in Copper/Zinc Disposal <sup>a</sup>	Research
Healthy Foot <sup>®</sup> low pH copper solution (SSI Corporation)	Cu 0.52% Zn 0.19%	0.5 gal per 50 gal H <sub>2</sub> O + 5 to 7 lb CuSO <sub>4</sub> or ZnSO <sub>4</sub> Use daily for 5 d Change every 150 cows	66.0% reduction in copper disposal	Not available on foot bath application
Rotational Zinc <sup>®</sup> (SSI Corporation)	Zn 1.56%	0.5 gal per 49.5 gal H <sub>2</sub> O + 5 to 7 lb ZnSO <sub>4</sub> Change every 150 cows Use in rotation with other products	74.8% reduction in zinc disposal	Not available on foot bath application
HoofPro+ <sup>®</sup> acidified ionized copper solution (SSI Corporation)	Cu 0.79%	0.5 gal with 49.5 gal H <sub>2</sub> O + 5 to 7 lb CuSO <sub>4</sub> Change every 150 cows Use 4 to 6 milkings/wk	65.5% reduction in copper disposal	Not available on foot bath application

<sup>a</sup> Assumes that a 8 ft X 3 ft foot bath filled with 5 in of solution are changed every 150 cow passes;  
Compared to a 5% copper sulfate or a 5% zinc sulfate foot bath solution



ALTERNATIVES TO COPPER SULFATE FOOT BATHS

## ALTERNATIVES TO COPPER SULFATE FOOT BATHS

Product	Active Ingredient	Instructions	Potential Reduction in Copper/Zinc Disposal <sup>a</sup>	Research
Hoof Zink <sup>®</sup> (GARCO)	Zn 28%	1.32 gal with 50 gal H <sub>2</sub> O	23% reduction in zinc disposal	Yes, but not peer-reviewed
Double Action <sup>®</sup> (WestAgro, Inc.)	Quaternary ammonium compound	1 gal with 49 gal H <sub>2</sub> O Change every 200 cows <u>Lesion prevalence</u> High – 2X/d for 7 d Medium – 2X/d for 5 d Low – 2X/d for 3 d  Most commonly used only 1X/d	100% reduction in copper and zinc disposal	Yes, but not peer-reviewed

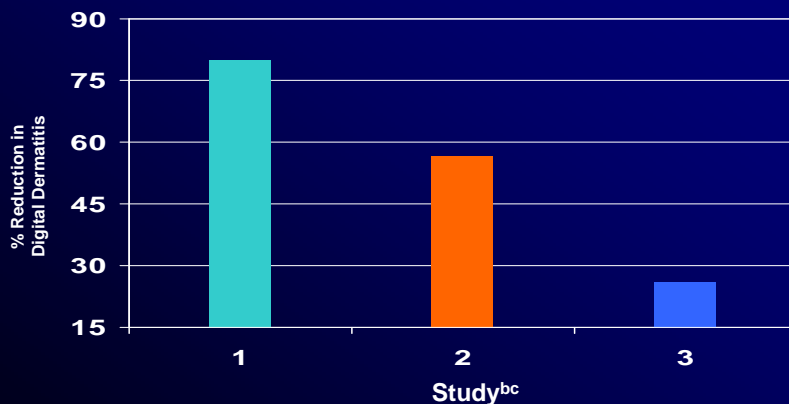
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<sup>a</sup> Assumes that a 8 ft X 3 ft foot bath filled with 5 in of solution are changed every 150 cow passes;  
Compared to a 5% copper sulfate or a 5% zinc sulfate foot bath solution



ALTERNATIVES TO COPPER SULFATE FOOT BATHS

## EFFECT OF DOUBLE ACTION® FOOT BATH SOLUTION ON FOOT LESIONS<sup>a</sup>

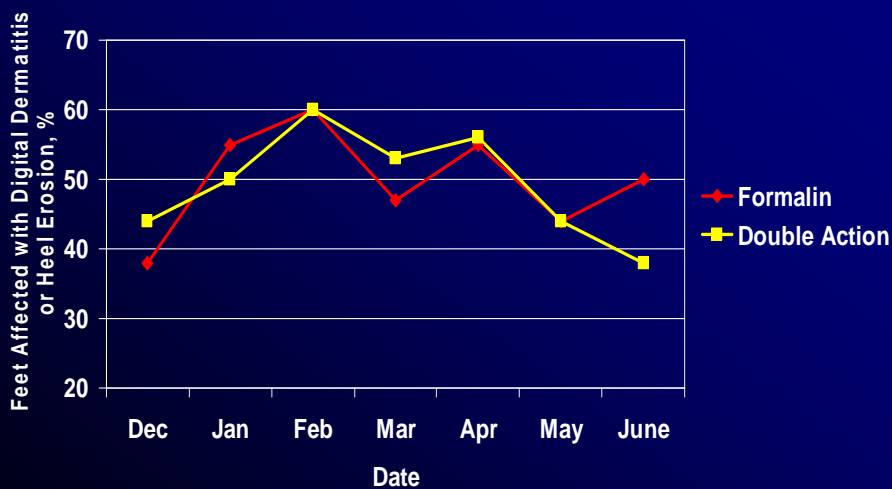


<sup>a</sup> Studies appear to be before and after studies  
<sup>b</sup> Studies 1 and 2, Seymour et al., 2004, Proc. 12<sup>th</sup> Intl. Symp. Lameness in Ruminants, Orlando, FL, p. 374; Exposure to 5% solution, 3X/wk for 12 months, pretrial digital dermatitis incidence 15% (Study 1) or 6X/wk for 3 months, pretrial digital dermatitis incidence 23% (Study 2)  
<sup>c</sup> Study 3, Janowicz et al., 2004, Proc. 13<sup>th</sup> Intl. Symp. Lameness in Ruminants, Maribor, Slovenia, p. 28; Exposure to 5% solution, 5X/wk for 12 weeks, pretrial digital dermatitis incidence 5%



ALTERNATIVES TO COPPER SULFATE FOOT BATHS

## USE OF SPLIT FOOT BATHS TO DETERMINE SOLUTION EFFICACY



<sup>a</sup> 5% formalin footbath was compared with a 2% Double Action footbath; 1X/d, 7 d/wk; Janowicz et al., 2006, Proc. 14<sup>th</sup> Intl. Symp. Lameness in Ruminants, Colonia, Uruguay, p. 59



ALTERNATIVES TO COPPER SULFATE FOOT BATHS

## ALTERNATIVES TO COPPER SULFATE FOOT BATHS

Product	Active Ingredient	Instructions	Potential Reduction in Copper/Zinc Disposal <sup>a</sup>	Research
PediCuRx™ Trifusion (WestfaliaSurge)	~9% Cu-quaternary ammonium-peroxide complex	0.5 gal with 49.5 gal H <sub>2</sub> O + 12 lb CuSO <sub>4</sub> or ZnSO <sub>4</sub> Change every 150-250 cows, depending on soil load	36 and 43% reduction in Cu and Zn disposal	Yes, but not peer-reviewed
PediCuRx™ Complete (WestfaliaSurge)	~18% Cu-quaternary ammonium-peroxide complex	1 gal with 49 gal H <sub>2</sub> O Change every 150-250 cows, depending on soil load Undiluted product can also be applied topically	71% reduction in Zn or Cu disposal	Yes, but not peer-reviewed

<sup>a</sup> Assumes that a 8 ft X 3 ft foot bath filled with 5 in of solution are changed every 150 cow passes; Compared to a 5% copper sulfate or a 5% zinc sulfate foot bath solution



ALTERNATIVES TO COPPER SULFATE FOOT BATHS

## ALTERNATIVES TO COPPER SULFATE FOOT BATHS

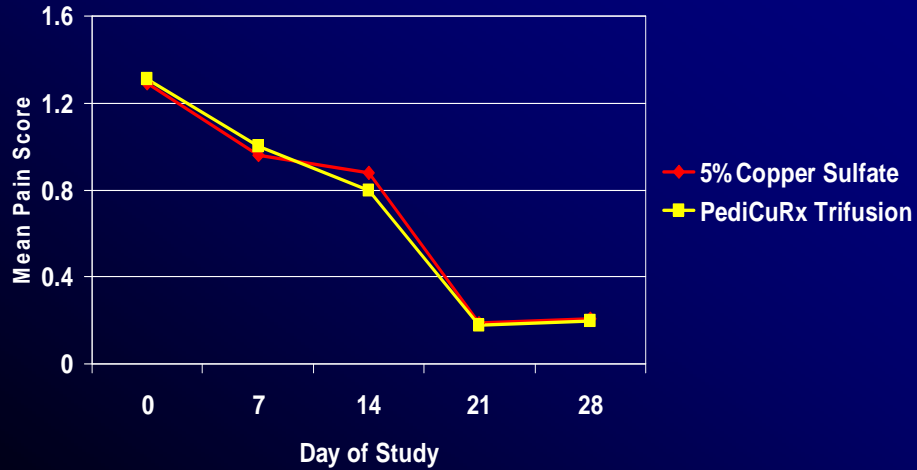
Product	Active Ingredient	Instructions	Potential Reduction in Copper/Zinc Disposal <sup>a</sup>	Research
PediCuRx™ Prevent A (WestfaliaSurge)	Quaternary ammonium compound	1 gal with 49 gal H <sub>2</sub> O Use in rotation with Prevent C and Z, change every 150-250 cows, depending on soil load	100% reduction in Zn or Cu disposal	No
PediCuRx™ Prevent C low pH copper solution (WestfaliaSurge)	Cu ~20%	1 gal with 49 gal H <sub>2</sub> O Use in rotation with Prevent A and Z, change every 150-250 cows, depending on soil load	63% reduction in Cu disposal	No
PediCuRx™ Prevent Z low pH zinc solution (WestfaliaSurge)	Zn ~20%	1 gal with 49 gal H <sub>2</sub> O Use in rotation with Prevent A and C, change every 150-250 cows, depending on soil load	72% reduction in Zn disposal	No

<sup>a</sup> Assumes that a 8 ft X 3 ft foot bath filled with 5 in of solution are changed every 150 cow passes; Compared to a 5% copper sulfate or a 5% zinc sulfate foot bath solution



ALTERNATIVES TO COPPER SULFATE FOOT BATHS

USE OF SPLIT FOOT BATHS TO DETERMINE SOLUTION EFFICACY ON TWO COMMERCIAL DAIRIES<sup>a</sup>



<sup>a</sup> Mean pain score: 0 = no pain, 1 = moderate pain, 2 = severe pain; PediCuRx Trifusion footbath also contained 2.5% copper sulfate; Footbaths used 1X/d, 5 d/wk, changed every 200 cow passes; Gradle et al., 2006, NMC 45<sup>th</sup> Annual Meeting Proc., Tampa, FL, p. 260



ALTERNATIVES TO COPPER SULFATE FOOT BATHS

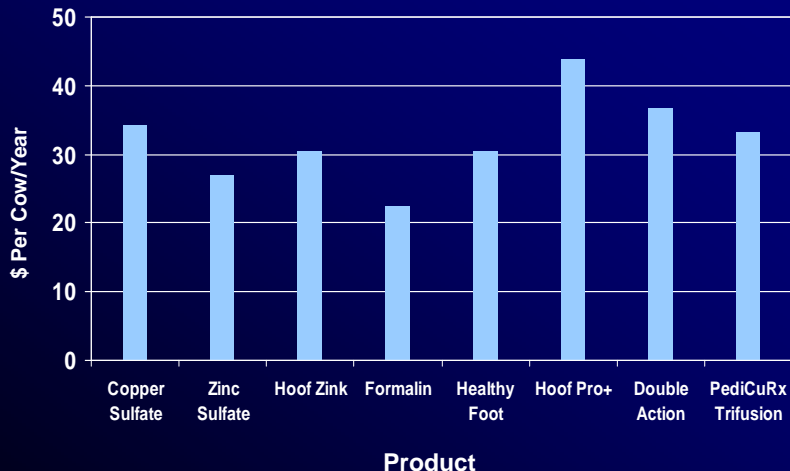
COSTS OF RUNNING A FOOT BATH

- Chemical Costs
- Foot Bath Equipment
- Labor for Recharging Non Automated Foot Baths
- Disposal of Foot Bath Solution
  - 50 gallon prebath, 50 gallon treatment foot bath used 4X/wk, changed every 200 cows passes runs about \$1 per cow per year
  - Additional manure storage



## ALTERNATIVES TO COPPER SULFATE FOOT BATHS

### CHEMICAL COST OF FOOT BATHS<sup>a</sup>



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<sup>a</sup> Calculations based upon a 50 gallon foot bath, used 5X/wk: 5% copper sulfate solution (200 cow passes); 5% zinc sulfate solution (200 cow passes), 3% formalin solution (200 cow passes), Hoof Zinc<sup>®</sup> (150 cow passes); Healthy Foot<sup>®</sup> (150 cow passes), HoofPro+<sup>®</sup> (150 cow passes), Double Action<sup>®</sup> (150 cow passes), PediCuRx<sup>®</sup> Trifusion (200 cow passes), Commercial products mixed at label directions



## ALTERNATIVES TO COPPER SULFATE FOOT BATHS

### IMPROVING FOOT BATH EFFICACY

- **Locate Foot Bath in Area Regularly Traveled by Cattle**
- **Proper Size, Minimum 8 ft Long, 3 ft Wide, 6 in Deep**
- **Solution Should be 4 to 6 in Deep**
- **Consider a Prebath With Water**
- **There Should be at Least 6 to 8 ft Separating Pre- and Treatment Baths**
  - **Allows cows to complete defecation prior to entering treatment bath**
  - **Minimize dilution of treatment bath solution**



Photo courtesy of Larry Laughren

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## IMPROVING FOOT BATH EFFICACY

- **Change Foot Bath Solution at Routine Intervals**
  - Every 150 to 200 cow passes
  - Under dirty conditions, change solution more frequently
  - Larger baths, less often
- **If Group Size Less Than 150 to 200 Cows, Rotate Times When Solution is Changed So Cows in Each Group Have Access to Fresh Solution**



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## IMPROVING FOOT BATH EFFICACY

- **Feet Should be as Clean as Possible (Must See Wall) to Maximize Contact of Foot Bath Solution With Skin and Horn Tissue**
  - Adding cleaning agents to prebath may be beneficial
  - If prebath is not available, consider using a soap solution for 2 to 3 d to clean feet and then use treatment foot bath for 2 to 3 d;  
In addition, some soaps contain antibacterial agents



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## IMPROVING FOOT BATH EFFICACY

- Cows Should Have Access to a Clean Area Immediately After Passing Through a Foot Bath
- Feet Should be Routinely Trimmed (2 to 3X/Year) by a Trained Hoof Trimmer to Ensure That Horn Overgrowth is Not Preventing Foot Bath Solutions from Contacting the Interdigital Skin



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## COW HYGIENE SCORES

Score 1	Score 2	Score 3	Score 4
			
Clean, little or no manure contamination of the lower limb	Slightly dirty, where the lower limb is lightly splashed with manure	Moderately dirty, where there are distinct plaques of manure on the foot, progressing up the limb	Very dirty, where there are confluent plaques of caked on manure on the foot and higher up the lower limb

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Nigel Cook, University of Wisconsin-Madison Veterinary School



ALTERNATIVES TO COPPER SULFATE FOOT BATHS

## COW HYGIENE SCORES AND FREQUENCY OF FOOT BATH USE

Proportion of Cows With Hygiene Scores of 3 and 4	Suggested Foot Bath Frequency
< 25	As required
25 to 30	2 d/wk
51 to 75	5 d/wk
> 75	7 d/wk

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Nigel Cook, University of Wisconsin-Madison Veterinary School



ALTERNATIVES TO COPPER SULFATE FOOT BATHS

## SPRAYING – ALTERNATIVE TO FOOT BATHS FOR CONTROLLING DIGITAL DERMATITIS

	Product	
	Terramycin 343 (Pfizer)	Lincomix, Soluble Powder (Pfizer)
Mixing Directions	1 packet (102.4 g) in 1 gal of distilled H <sub>2</sub> O	1 packet in 2 qt of distilled H <sub>2</sub> O
Application Directions	Use as a topical spray at the rate of 10 to 20 cc/foot; Apply to heels and between toes plus on visible lesions <sup>a</sup>	Use as a topical spray at the rate of 10 to 20 cc per foot; Apply to heels and between toes plus on visible lesions <sup>a</sup>
Treatment Regimen	<p><b>Wk 1</b> Treat all feet of all cows once daily for 5 to 7 consecutive d</p> <p><b>Wk 2 and Beyond</b> Continue daily topical treatment of all cows with visible lesions only</p>	<p><b>Wk 1</b> Treat all feet of all cows once daily for 5 to 7 consecutive d</p> <p><b>Wk 2 and Beyond</b> Continue daily topical treatment of all cows with visible lesions only</p>

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<sup>a</sup> This is an extra label use of these products; Consult your local veterinarian for proper labeling and further instructions



## CONCERNS WITH SPRAYING

■ Advantages

- Reduced copper content of animal waste
- Reduced solution usage

■ Disadvantages

- More labor intensive
- Debris on feet needs to be removed to facilitate contact of treatment solution with skin
- Inconsistent application of treatment solution to interdigital space on all four legs
- With antibiotic solutions (off-label use), overspray can result in antibiotic contaminated milk; Recommend spraying outside the parlor

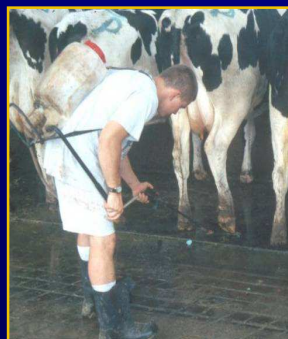


Photo courtesy J.K. Shearer, U of Florida

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## RESPONSES TO NON-ANTIBIOTIC SPRAYS

Product	Response
Victory®	Study 1 <sup>a</sup> : Response similar to oxytetracycline, reduced number of visible lesions, reduced proportion of cows with pain scores > 0
	Study 2 <sup>b</sup> : Response better with revised formula than oxytetracycline with regards to pain scores and cows showing pain; High rates of digital dermatitis recurrence with original formulation
HoofPro+®	Study 1 <sup>a</sup> : Response similar to water
	Study 2 <sup>c</sup> : Response similar to oxytetracycline, reduced lameness scores
Oxy-Step®	Study 1 <sup>a</sup> : Response similar to water

<sup>a</sup> Hernandez et al., 1999. J. Am. Vet. Med. Assoc. 214:688; Treatments given 1X/d for 5d, off 2 d, then 1X/d for 3 additional days

<sup>b</sup> Shearer and Hernandez, 2000. J. Dairy Sci. 83:741; Treatments given 1X/d for 5d, off 2 d, then 1X/d for 3 additional days

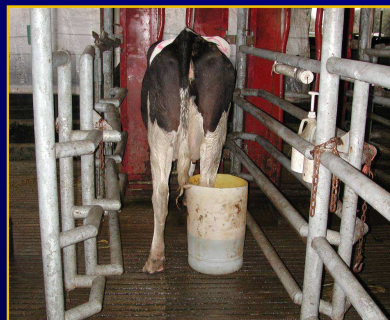
<sup>c</sup> Britt et al., 1996. J. Am. Vet. Med. Assoc. 209:1134; Treatments applied for 3 weeks, 3X/d

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## STAND IN FOOT BATHS

- Used to Focus Treatment on Chronically Affected Cows
- Can Reduce Frequency of Foot Bath Usage for Rest of Herd
- Can Concentrate Treatment Solution on a Smaller Group of Cows, Reducing Solution Costs
- Can be More Labor Intensive Than Walk Through Foot Bath



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## BROOKSCO DAIRY



- Calvin Started Dairying With Doyle Weltzbarker 7 Years Ago, Milking 790 Cows
- Quitman, Georgia, Where in the Summer, it is Very Humid and Night Temperatures May Stay Above 85° F





## THE BROOKSCO DAIRY STORY



■ Several Years Ago, When BrookSCO Dairy Had Grown to 1800 Cows With Purchased Heifers, Rolling Herd Average for Milk was 19,000 lb, Cull Rate Was 42%

■ A Locomotion Scoring Exercise, Fall 2001, Showed BrookSCO Dairy That Lameness Was Higher Than Desired and Very Costly



### TYPICAL LOCOMOTION SCORES AT BROOKSCO DAIRY PRIOR TO IMPLEMENTING INTENSIVE PROGRAM TO REDUCE LAMENESS



## CORRECTIVE ACTION PLAN AT BROOKSCO DAIRY

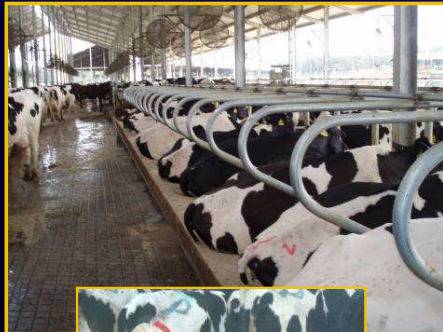
DATE	GROUP#	COW	PROBLEM CLAW	BLOCK	WRAP	RECHECK	OFF BST
7-24	SP	40517	LT	#-8	X		
	3	40534	SF	3-4	Can't		
	SP	40542	LT	1-8			
	SP	40554	LT	1-8			
	SP	40546	wL1	5	X		
	SP	40240	wL1	1	X		
	7	5910	wL3	5	X		no
	7	5910	SF	8	X		no
	7	1722	wL2	5	X		no
	7	241	SP	8	X		yes
	8	7640	wL2	3	X		yes
	8	30724	wL2	5	X		no
7-25	1	40173	vb	5	X		no
7-25	2	21061	vb	6	X		no



- Sent An Employee To Master Hoof Care Program; Started Examining Feet 2X/year and Examine Any Lamé Cows Within 24 Hours of Noticing the Cow is Lamé
- Have 2 Trim Tables To Examine Cows
- All Claw Lesions Recorded and Tracked
- Primary Causes of Lameness Were Digital Dermatitis, Thin Soles, Sole Ulcers and White Line Lesions



## CORRECTIVE ACTION PLAN AT BROOKSCO DAIRY



- Locomotion Score Cows Monthly, to Monitor Lameness Prevalence
- Digital Dermatitis
  - Implemented intensive foot bath program, 3 to 5% formaldehyde footbaths, 3 d/wk
  - Placed cows in headlocks and spray cows' feet with antibiotic solution
  - More frequent cleaning of pens
  - Today, digital dermatitis is rare
  - Continue foot baths, if outbreak does occur, they start spraying cows with antibiotics



## CORRECTIVE ACTION PLAN AT BROOKSCO DAIRY



- Reduced Thin Soles
  - Added rubber mats to alleys and in front of feed bunks
  - Any new concrete is grooved after the concrete hardens
- Reduced Sole Ulcers/White Line Lesions
  - Stocking density, 115 to 120% in summer, 128% in cooler months; lameness increases if stocks over 130%
  - Fans and sprinklers installed throughout the barn; shade and cooling added to the holding area



## THE BROOKSCO DAIRY STORY



- Reduced Sole Ulcers/White Line Lesions
  - Trimmed 2X/year to minimize overgrown feet
  - Rubber belting placed where cows make sharp turns
  - Erected free stall barns, eliminating most of the feeding barns, dry lots and cooling ponds
    - cows in feeding barns, ate less frequently and tended to slug feed
    - In feeding barns, cows walked long distances





## CORRECTIVE ACTION PLAN AT BROOKSCO DAIRY

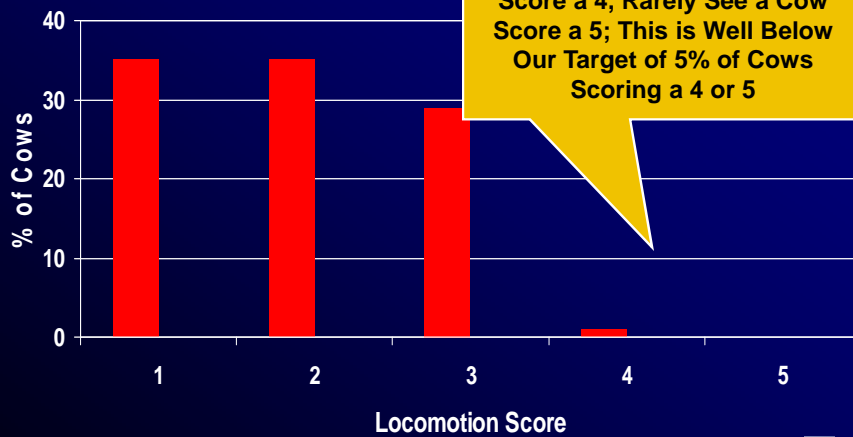


### ■ After Implementing Changes:

- Culling dropped from 42% to 23%
- Rolling Herd Average For Milk Increased to 25,000 lb
- Herd size has grown to 2400 cows
- Calculated that reduced culling for lameness resulted in an improvement in profitability of almost \$100,000



## TYPICAL LOCOMOTION SCORES AT BROOKSCO DAIRY TODAY AFTER IMPLEMENTING INTENSIVE PROGRAM TO REDUCE LAMENESS



## CONCLUSIONS

- Records Are Needed to Determine if Foot Bath Use is Warranted; Which Lesions Are Most Prevalent, Infectious vs Noninfectious Lesions
- While There Are Currently Several Alternatives to Copper Sulfate Foot Bath Solutions Being Marketed, Research and Field Experiences With These Products Are Limited
- If Producers Opt to Continue to Use Copper Sulfate Foot Baths, Changing Frequency Can be Reduced if Manure Contamination is Reduced; Quick Test Needs to be Developed to Determine When Antimicrobial Activity is Lost
- Spraying is an Alternative to Foot Baths for Controlling Infectious Lesions Such as Digital Dermatitis, but There Are Disadvantages
- More Foot Bath Research is Needed