

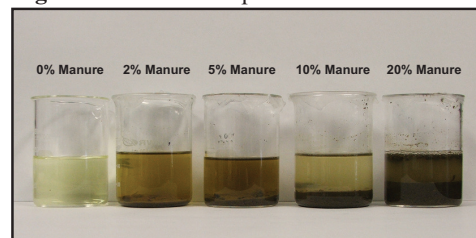
In-Vitro Efficacy of Hoofcare Products

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Introduction

- Hoofbaths for controlling hoof disease can easily become contaminated with manure.
- Field and lab data show an average manure accumulation rate of 20% (w/v) after 200 cow passes.^{1,2}
- Sanitizing agents used in hoofbath formulations should be broad spectrum and resist inactivation at high soil loads.
- This study evaluated the in-vitro antimicrobial efficacy of hoofcare products using a modified international standard test, by the addition of manure as a soiling agent. This modification was added as a means of providing a better representation of the in-use challenges that effective hoofcare products must overcome.

Figure 1: 4Hooves exposed to manure



Materials & Methods

- Test Method: Modified EN 1656⁴
 - Exposure Time: 30 seconds
 - Exposure Temperature: 10°C
 - Test products: See Table 1
- Microorganisms (1.5 - 9.3 x 10⁷ CFU/ml)
 - Staphylococcus aureus* ATCC 6538
 - Pseudomonas aeruginosa* ATCC 154
 - Escherichia coli* ATCC 11229
 - Enterococcus hirae* ATCC 10541
- Modifications
 - Cell counts performed by most probable number (MPN) technique
 - Alternative interfering substance to those defined by EN 1656, i.e. 20% manure (w/v)

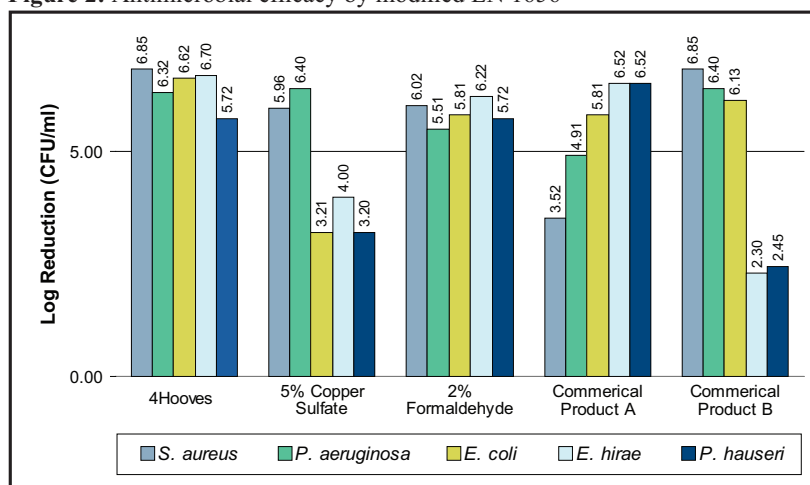
Table 1: Test products*

Product	Active Compound	Test Conc.**
4Hooves	Quaternary Ammonium Blend	1%
CuSO ₄	Copper Sulfate	5%
Formaldehyde	Formaldehyde (37%)	2%
Commercial Product A	Formic Acid, Acetic Acid	1%
Commercial Product B	Quaternary Ammonium Compound, Gluteraldehyde, Copper Sulfate	5%

** Test concentration was selected as per label's recommended use concentrations

Results & Conclusions

Figure 2: Antimicrobial efficacy by modified EN 1656



- Only one of the commercial products tested, DeLaval 4Hooves, and Formaldehyde passed the EN 1656 requirement of 5-log reduction - LR - (99.999% reduction) against all test microorganisms after 1 min exposure at 10°C in the presence of 20% (w/v) manure. However, the practicality of its use is questioned based on its toxicology profile. (Figure 2).
- Conversely, efficacy from 2 competitor commercial products and copper sulfate was below the EN 1656 requirement of 5LR for several of the microorganisms under study (Figure 2).
- Although standard methods are necessary for both product development and registration, modification of those standards that better approximate use conditions are important indicators of results in the field.

* **Neutralizers:** Quaternary ammonium compounds (30g/L Tween 80; 30g/L Saponin; 30g/L Tryptic Soy Broth; 1g/L Cysteine; 1g/L Histidine); All other compounds: D/E neutralizing broth (5g/L Enzymatic Digest of Casein; 5g/L Polysorbate 80; 2.5g/L Yeast Extract; 10g/L Dextrose; 1g/L Sodium Thioglycollate; 6g/L Sodium Thiosulfate; 2.5g/L Sodium Bisulfite; 7g/L Lecithin; 0.02g/L Bromocresol Purple) Trial period = 3 months

References:
1. Janowicz P, Bathina H, and Hemling TC. 2006. A Laboratory Model to Simulate the Frequency of Solution Change in Walk Through Footbaths. XXIV World Buiatrics Congress, 15-19 October 2006, Nice, France.
2. Buchalova M, Lindell K, Skender A, and Lopez-Benavides MG. 2011. Germicidal efficacy in use of hoofbath products. Lameness in Ruminants, Feb 28 - Mar 3, 2011, Rotorua, New Zealand.
3. EN 1656. 2009. E. Norm class S31. Chemical disinfectants and antiseptics - Quantitative suspension test for the evaluation of bactericidal activity of chemical disinfectants and antiseptics used in the veterinary area - Test method and requirements (phase 2, step 1). EUROPEAN COMMITTEE FOR STANDARDIZATION. ICS 71.100.35