

# Germicidal Efficacy-In-Use of Hoofbath Products

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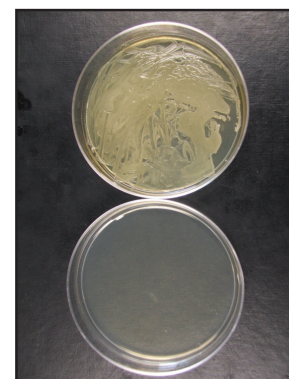
## Background

- ◆ Hoofbaths are commonly used for prevention of digital dermatitis.
- ◆ Manure and urine deposited by cows as they walk through the hoofbath could compromise the efficacy of active components present in sanitizers.
- ◆ Although quaternary ammonium salts are considered excellent germicides, they are susceptible to organic inactivation when used in hoofbath solutions. Therefore, formulations based on this active should account for this limitation and address the issue accordingly.
- ◆ Interference of germicidal effect by manure is expected to be a function of both manure concentration and contact time. The higher the concentration and the longer the contact time, the greater the likelihood of interference.
- ◆ Two in-vitro tests were developed to evaluate the efficacy of hoofbath actives under manure challenge. Outcomes from the studies have been used to make field recommendations of product usage.



## Materials & Methods

- ◆ Products tested: DeLaval 4Hooves (1%) and DeLaval Double Action (2%)
- ◆ Assumptions for the tests were based on farm observations, resulting in:
  - 200 cows passing through a hoofbath in 3h
  - Manure content after 200 cows was 20%
- ◆ Test Method A (Bacterial challenge from manure):
  - Sanitizing solutions were prepared with tap water (100 ppm CaCO<sub>3</sub>).
  - Fresh manure from the field with authentic fecal bacteria used in the study.
  - In-vitro simulations of farm conditions are shown in Table 1.
  - Aliquots from specified times were plated and incubated at 37°C/48h.
- ◆ Test Method B (known concentration of bacteria):
  - Sterile filtered aliquots from Method A were tested by modified EN1040 specifications.
  - Aliquots were inoculated with *Staphylococcus aureus* and *Escherichia coli*.
  - After 5min contact time samples were neutralized, plated and incubated at 37°C/48h.



## Results & Conclusions

- ◆ Both 4Hooves and Double Action showed excellent residual germicidal efficacy, when exposed to various levels of manure challenge (up to 20%), and no bacterial growth was observed after an incubation period of 48h.
- ◆ Method A shows that there is no progressive reduction of germicidal effect over time or increasing manure challenge.
- ◆ Method B shows that a strong germicidal effect exists against added challenge organisms, even after exposure to manure challenge.

**Table 1:** Efficacy of in-use solutions under increasing manure depositions

Method	Contact Time w/Manure (min.)	30	60	90	120	150	180
	Manure in Solution (%w/v)	3.3	6.6	9.9	13.2	16.5	19.8
A	4Hooves (1%)	No bacterial growth observed.					
	Double Action™ (2%)	No bacterial growth observed.					
B	4Hooves (1%) <i>S. aureus</i>	>7.4*	>7.4	>7.4	>7.4	>7.4	>7.4
	4Hooves (1%) <i>E. coli</i>	>7.4	>7.4	>7.4	>7.4	>7.4	>7.4

\* Log reduction observed from initial inoculum of 10<sup>7</sup> CFU/ml

- ◆ The germicidal efficacy of quats present in 4Hooves and Double Action formulas was not compromised by a 20% manure load or equivalent to 200 cow passes.
- ◆ The germicidal effect is not compromised by either 20% manure or 180 minute contact time.
- ◆ Field recommendations for product usage should take into account the inevitable soiling of the hoofbath due to manure deposition. Timely refreshing of hoofbath solutions will ensure adequate germicidal activity is maintained.