Comparison of Hoof Bath Solutions for the Prevention and Control of Digital Dermatitis in Dairy Cows

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Introduction

- Digital dermatitis (DD) is a widespread and costly disease in dairy herds and hoof baths are commonly used to prevent DD.
- Many chemicals (CuSO₄, formalin) used in footbaths can be hazardous to human health and the environment.
- A solution comprising thymol, THYMOX, is a safer biocide with antimicrobial activity.

Thymol mode of action: Induces instability in microorganisms’ membrane, causing cell content leakage and death.

• In vitro: THYMOX inhibited the growth and killed treponemes isolated from DD (Table 1)

Table 1. In vitro efficacy on Treponema

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<thead>
<tr>
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<th>THYMOX</th>
<th>CuSO₄</th>
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<tbody>
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<td>Working concentration in hoof baths</td>
<td>1%</td>
<td>5%</td>
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<tr>
<td>MIC at Minimal exposure time with 20% manure</td>
<td>0.004 %</td>
<td>0.019 %</td>
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Hypothesis: THYMOX will be effective in controlling DD in endemically affected cows housed in free stall barns.

Methods

1. Compare THYMOX and CuSO₄ in different farms
   Hoof baths 3 X / week, Weeks 0 to 12

   Four dairy farms enrolled (650 cattle)
   - Farm 1: CuSO₄ 5%
   - Farms 2, 3 and 4: THYMOX 1%

2. Compare THYMOX and CuSO₄ in the same farm
   Hoof baths 3 X / week, Weeks 12 to 24

   Farm 1 switched to THYMOX at Week 12: limit farm variability

   Farm 1: THYMOX 1%

Hooves evaluated for lesions¹ at weeks 0, 6, 12, 18 and 24
- M0: Healthy epidermis
- M1: DD lesion, early stage
- M2: Active lesion, ulcerative stage
- M3: Healing lesion, transitory stage
- M4: Chronic lesion, reservoir for new active lesions

Table 1. Long-term observations on the dynamics of bovine digital dermatitis lesions on a California dairy after topical treatment with lincomycin HCl. Vet J. 193:654-658.

Results

The number of transitions between the M-stages were counted and transformed into a probability matrix able to predict the relative frequencies of the M-stages after prolonged periods of time (Figure 1).

1. Performance of THYMOX and CuSO₄ in different farms. Significant differences:
   - Less M1 and M2 lesions predicted in Farm 1 (CuSO₄)
   - More healing M3 lesions predicted in Farm 1 (CuSO₄)
   - Less chronic M4 lesions predicted in Farm 4 (THYMOX)
   - More healthy hooves M0 predicted in Farm 4 (THYMOX)

2. Performance of THYMOX and CuSO₄ in the same farm (Figure 2).
   - Weeks 0 – 12: CuSO₄ Hoof baths:
     - Decrease of M1-M2 lesions
     - Increase of chronic M4 lesions
   - Weeks 12 – 24: THYMOX Hoof baths:
     - Low levels of M1-M2 maintained
     - Decrease of chronic M4 lesions
     - Increase of healthy hooves (M0)

Discussion

- Chronic lesions: Long-term reservoirs of DD active lesions.
- Increased chronic lesions: problem under the impact of risk factors such as bad hygiene.
- THYMOX associated with the prediction of less chronic lesions
- THYMOX associated with the prediction of more healthy hooves

It is strongly advised to take these long-term effects into account when adopting new hoof bath agents. Early detection and prompt topical treatment of active M2 lesions are essential for the success of a hoof bathing strategy.