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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. Hoof baths are commonly used to prevent DD and many products have been used as hoof bath solutions. Among them are copper sulfate (CuSO4) and formalin that upon exposure can be hazardous to human health and the environment. There is a need to find and test new chemicals that are less toxic than CuSO4 and formalin. A solution comprising thymol, Thymox, is a safer biocide with antimicrobial activity. In vitro studies showed that the Thymox inhibited the growth and killed treponemes isolated from DD at concentrations lower than the working concentration of 1% in hoof baths (Table 1). We hypothesized that the Thymox will be effective in controlling DD in endemically affected cows housed in free stall barns.

Table 1. In vitro efficacy on Treponema

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<tr>
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<th>THYMOX</th>
<th>CuSO4</th>
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<tr>
<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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Results

The multi-states model showed that CuSO4 on farm 1 was associated with significantly less M2 lesions compared to all three farms on Thymox, at the same time significantly less healing stages M3 were to be expected on the Thymox farms. The number of normal legs without signs of DD was significantly lower on farm 2 and higher on farm 4, while early M1 stages were significantly higher on farms 2 and 4 compared to farm 1. The number of M4 stage was significantly lower on farm 4 only when compared to farm 1 (Figure 1).

![Figure 1. Long-term prediction of M stages for each farm.](image)

Discussion

Chronic lesions are the long-term reservoirs of DD and the precursors of active lesions. Increased chronic lesions become a problem under the impact of risk factors such as bad hygiene. It is extremely common that products result in more chronic lesions compared to CuSO4, which was not observed with Thymox. In this study, the Thymox product was associated with the prediction of equal or less chronic lesions, and in one farm, significantly more normal legs. This work is an example of a long-term study that yields results able to show effects of the hoof bath solutions on DD. It is strongly advised to take these long-term effects into account when adopting new hoof bath agents. Finally, early detection and prompt topical treatment of active M2 lesions are essential for the success of a hoof bathing strategy.

Reference


External contributions

This project was reviewed by Agriculture and Agri-Food Canada to benefit from a contribution agreement via the Agricultural Innovation Program (AIP).

The protocol of this research project was evaluated by University of Montreal’s ethic committee who gave their approval to conduct this project on cattle.

The in vitro experiments done to demonstrate the efficacy of THYMOX against digital dermatitis pathogens were conducted by Dr Dörte Döpfer at University of Wisconsin-Madison.

The statistical analysis of the data was done by Dr Dörte Döpfer at University of Wisconsin-Madison.

André Desrochers, DMV from University of Montreal and Dr Cédric Frenette Dussault from University of Sherbrooke gave strong advice for the experimental design and the data analysis.

All the cow observations were done by Antoine Bourgeois DMV from Clinique Vétérinaire de Sherbrooke.

Acknowledgment

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