Curative effect of topical treatment of digital dermatitis with a gel containing activated copper and zinc chelate

M. Holzhauer, C. J. Bartels, M. H. van Barneveld, C. Vulders, T. J. G. M. Lam

Context
Digital dermatitis (DD) is found in housed Holstein-Friesian dairy cows worldwide, and causes economic damage and animal welfare problems. It is the most important infectious cause of lameness in dairy cows. The ulcerative stage of DD is particularly painful. Rapid and effective treatment of the ulcerative stage of DD is important in order to prevent transmission of the disease within a herd.

Although there have been calls worldwide for a reduction in the use of antibiotics in veterinary medicine, the most effective therapeutic treatment for DD is still the use of antibiotics. The quantities of antibiotics used in topical treatments for DD are limited, but an alternative would be welcome.

In this study, the therapeutic effect of a water-based gel containing activated copper and zinc chelate, Intra Hoof-fit gel (Intracare) (IHF gel), on ulcerative DD lesions was evaluated in comparison with a chlortetracycline spray (CTC-spray; Eurovet) (CTC).

Main conclusion
The topical use of IHF gel under a bandage on day 0 and additional applications at day 3 and day 7 (without a bandage) was effective for the treatment of the ulcerative stage of DD in dairy cows. This treatment was significantly more effective than three consecutive days of topical treatment with CTC.

Approach
The trial was designed as a case-control study in which the treatment of ulcerative DD lesions with IHF gel was compared with treatment with CTC as a positive control.

In total, 205 hindfeet (divided over five herds and 172 cows) were treated, 103 with IHF gel and 102 with CTC. The lesions were dry cleaned, macroscopically classified and recorded at day 0, day 7, day 21 and day 28. Classification of DD was performed according to a standardised scoring system comprising five stages: M0 Normal digital skin where DD was absent, M1 Early stage lesion (0 to 2 cm) that is not painful, M2 Classical ulcerative stage, with a diameter of at least 2 cm, that is often painful to the touch, M3 Healing stage when the lesion is covered by a scab, M4 Chronic stage characterised by dyskeratosis and not painful.

On day 0, the first M2 lesion found in a herd was assigned to treatment group A or group B by flipping a coin. Subsequent lesions were alternately assigned to group A or B. In group A, 5 g of IHF was applied to the lesion with a brush. The lesion was then covered with cotton wool, which was held in place by an elastic bandage. On day 3 and day 7, approximately 5 g of IHF was again applied by use of a brush, but a bandage was not applied. In group B, CTC was applied by spraying twice for three seconds from a distance of 15 to 20 cm, with 30 seconds between the two sprays. This treatment was repeated on day 1 and day 2.

All scores, recordings and treatments were performed in a trimming chute by the same veterinarian. In 18 dairy cows (23 hindfeet, nine assigned to IHF treatment and 14 to CTC treatment) the protocol could not be fully completed for various reasons.

All hindlegs with DD lesions involved in the study were photographed on day 0 and day 28 for objective evaluation afterwards.

Results
The overall cure rate of M2 stage DD lesions treated with IHF was 0.92 (56 of 88; 95 per cent confidence interval [CI] 0.84 to 0.96); the cure rate with CTC treatment was 0.58 (51 of 88; 95 per cent CI 0.47 to 0.68). There was a significant difference between the cure rate of the two treatments (P<0.01), indicated by a risk ratio (RR) of 1.58 (95 per cent CI 1.31 to 1.91).

Interpretation
The RR per herd was more than 1 for IHF over CTC in four of the five herds, and the difference was statistically significant in three of the herds (Table 1). In herd 4, the cure rate was 0.90 for IHF and 1.00 for CTC.

Significance of findings
In this study, the topical use of IHF gel applied for the treatment of painful ulcerative DD lesions was shown to be a very good alternative to a currently widely used antibiotic formulation. This finding may contribute to further reduction of the use of antibiotics in veterinary medicine and to the profession’s goal of reducing the use of antibiotics where possible.

Table 1: Estimation of the overall cure rate achieved by two different treatments at day 28 after the start of treatment of M2 digital dermatitis lesions in dairy cattle in five herds, for individual herds and overall

<table>
<thead>
<tr>
<th>Herd</th>
<th>Number treated</th>
<th>Number cured</th>
<th>Cure rate</th>
<th>Number treated</th>
<th>Number cured</th>
<th>Cure rate</th>
<th>Difference in cure rate between treatments (risk ratio)</th>
<th>P (Fisher’s exact test)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>16</td>
<td>7</td>
<td>0.44</td>
<td>23</td>
<td>23</td>
<td>1.00</td>
<td>2.7</td>
<td>0.01</td>
</tr>
<tr>
<td>2</td>
<td>30</td>
<td>18</td>
<td>0.60</td>
<td>29</td>
<td>25</td>
<td>0.86</td>
<td>1.4</td>
<td>0.04</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>3</td>
<td>0.75</td>
<td>6</td>
<td>6</td>
<td>1.00</td>
<td>1.3</td>
<td>0.4</td>
</tr>
<tr>
<td>4</td>
<td>10</td>
<td>10</td>
<td>1.00</td>
<td>10</td>
<td>9</td>
<td>0.90</td>
<td>0.9</td>
<td>1.00</td>
</tr>
<tr>
<td>5</td>
<td>28</td>
<td>13</td>
<td>0.46</td>
<td>26</td>
<td>23</td>
<td>0.88</td>
<td>1.9</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Total</td>
<td>88</td>
<td>51</td>
<td>0.58</td>
<td>94</td>
<td>86</td>
<td>0.92</td>
<td>1.6</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

* “Cured” is defined as all transitions from painful stage M2 lesions to stage M0, M1, M3 or M4.
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