A field study on the treatment of non-healing white line disease with Intra Repiderma

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1 Non-healing white line disease

White Line Disease (WLD) in dairy cattle is characterized by separation of the outer claw wall (**Fig. 1.1**). The disease typically starts with physical damage of the horn, followed by infection of the underlying corium by opportunistic bacteria. When a WLD lesion becomes infected with pathogenic bacteria, e.g. treponemes that are associated with bovine digital dermatitis (BDD), the lesion may transform into a non-healing (nhWLD) variant.[1] (nh)WLD causes serious lameness, resulting in reduced animal welfare and less milk production.

Figure 1.1 Bottom of a claw with a typical example of a small white line disease lesion (blue circle). Source: http://dairyhoofhealth.info/

Standard treatment of WLD consists of proper hoof trimming in combination with application of a block on the partner claw to relief pressure. For nhWLD, this approach appears to be insufficient. It has been demonstrated that digital dermatitis can be treated effectively with Intra Repiderma, a non-antibiotic gel or aerosol spray containing chelated copper and zinc, for which no Maximum Residue Level is applicable and thus no withdrawal period.[2,3] Copper is bactericidal and stimulates the formation of new blood vessels, which is an important feature of the wound healing process. Zinc supports the natural regenerative capacity of the skin and stimulates the growth of epithelial cells that form the top layer of the skin. The originally inorganic molecules Cu^{2+} and Zn^{2+} are covered (chelated) with an organic layer that provides unique properties. The goal of this practical field study was to evaluate the potential curative effects of Intra Repiderma on cases of nhWLD.

2 Experimental set-up

On a 266 dairy cow farm, animals were selected that had received standard treatment for WLD 46 to 21 days before the start of the field study. Hoofs were inspected and lesions were scored as:

0 closed
1 small
2 moderate
3 severe

All cases of nhWLD were randomly divided in standard hoof trimming including a block (n=9), or standard treatment in combination with Intra Repiderma and a bandage (n=9). On day 3, 7, and 28 all hoofs were inspected again, lesion severity was scored, and, if necessary, the Intra Repiderma was applied again.

Figure 2.1. Cows on the dairy farm (left) and lesion sprayed with Intra Repiderma (right).

3 Intra Repiderma treatment significantly improves healing

On day 3, the average score after standard treatment had improved 0.2 points (from 2.3 on day 0 to 2.1 on day 3), the score after Intra Repiderma treatment had improved 0.5 points (from 2.6 on day 0 to 2.1 on day 3) (**Table 3.1**).

On day 7, the improvement was 0.9 points for standard treatment (from 2.1 on day 3 to 1.2 on day 7) and 0.8 points for Intra Repiderma treatment (from 2.1 on day 3 to 1.3 on day 7), respectively. In the Intra Repiderma-treated group, one severe lesion (score 3) had even changed into completely healed horn (score 0) within 7 days. Such dramatic change was not observed in the standard treated group.

On day 28, the average score after standard treatment worsened again with 0.1 points (from 1.2 on day 7 to 1.3 on day 28), while the score after Intra Repiderma treatment had improved another 0.7 points (from 1.3 on day 7 to 0.6 on day 28). Now two of the severe lesions (starting score 3) had even changed into completely healed horn (score 0).

Overall, standard treatment relapsed after a 1.1 point improvement on day 7 to a 1.0 point improvement on day 28 (from 2.3 to 1.3), while Intra Repiderma treatment resulted in a consistent improvement of in total 2.0 points on day 28 (from 2.6 to 0.6). This difference in improvement between treatment groups was statistically significant (p=0.016).

Table 3.1: Average nhWLD score on the days of inspection.

	Standard treatment (n=9)	Intra Repiderma treatment (n=9)
Day 0	2.3 (1 – 3)	2.6 (2 – 3)
Day 3	2.1 (0 – 3)	2.1 (1 – 3)
Day 7	1.2 (0 – 3)	1.3 (0 – 3)
Day 28	1.3 (0 – 3)	0.6 (0 – 2)
Improvement	1.0 (0 – 2)	2.0* (1 – 3)

*p<0.05

On day 28, three of the standard treated lesions still had a characteristic smell, which typically reflects the presence of pathogenic bacteria. This smell was not noticed for the Intra Repiderma treated lesions. In addition, some of the standard treated lesions were still painful upon palpation, which was not observed for Repiderma treated lesions. Intra Repiderma effectively penetrated the underlying tissue, since the horn still had a green color on day 28, which is 21 days after the last treatment. No adverse treatment effects were observed.

The exact number of animals that had a specific score improvement on day 28 is visualized in **Fig. 3.1**. This figure shows that after standard treatment, three animals did not improve in lesion score at all, three animals improved 1 point, and three animals improved 2 points. After spray treatment, all animals improved in lesion score; two animals improved 1 point, five animals improved 2 points, and two animals improved even 3 points.

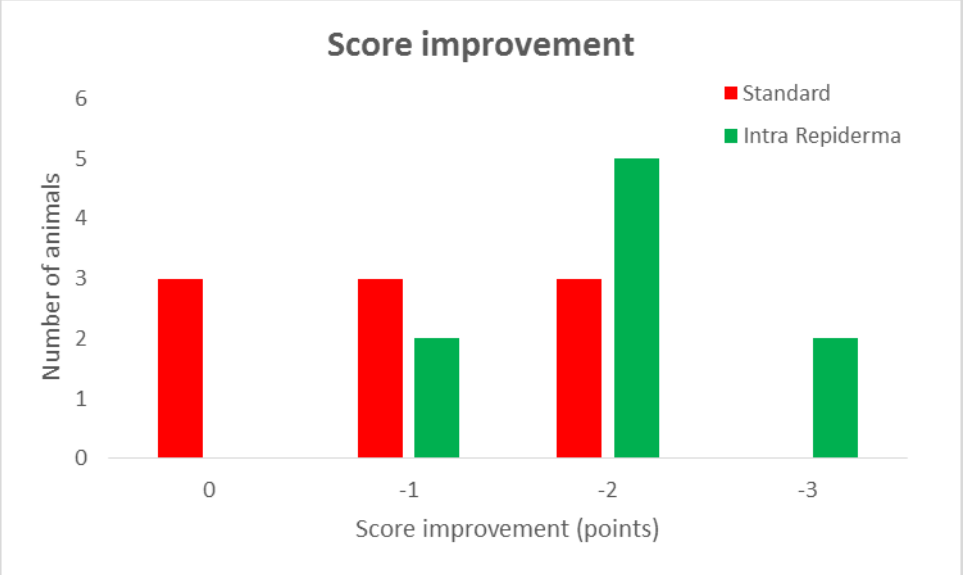

Figure 3.1 Score improvement (0, -1, -2 or -3) on day 28 after standard and Intra Repiderma treatment.

Another interesting observation is the development of the most severe lesions (score 3) in time (**Figs. 3.2 and 3.3**). Both treatment groups started with five of these severe lesions. After standard treatment, all animals started with an improvement in lesion score, but for three animals this was followed by an increase (worsening) in lesion score in time, indicating disease relapse.

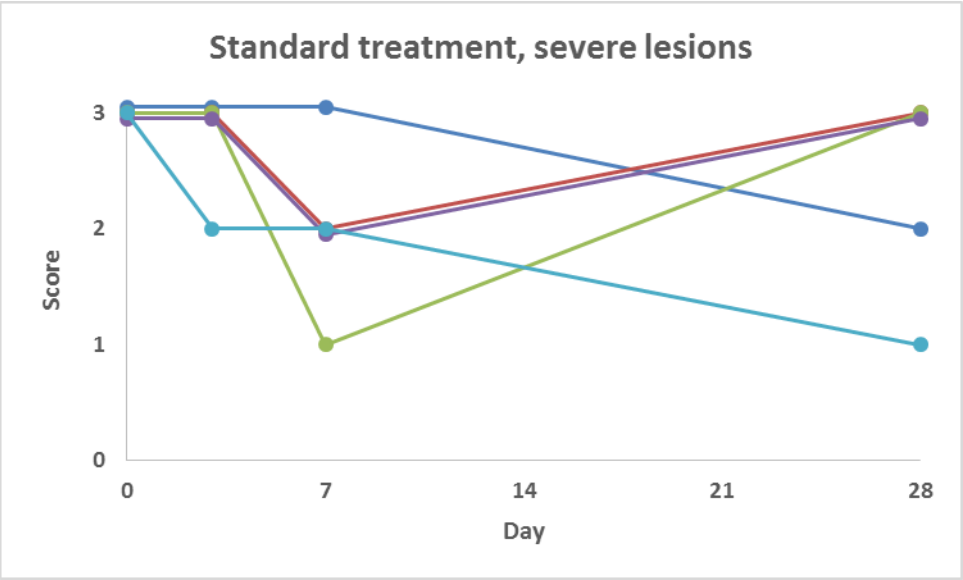

Figure 3.2 Development of the severe lesions (score 3 on day 0) that received standard treatment.

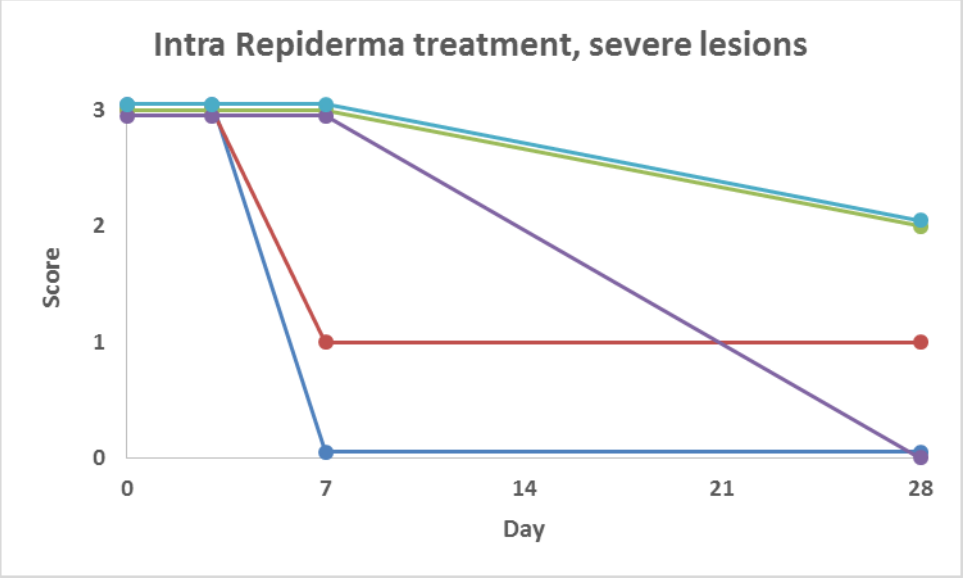

Figure 3.3 Development of the severe lesions (score 3 on day 0) that received Intra Repiderma treatment.

These results indicate that for an effective treatment of nhWLD, just hoof trimming and application of a block is not sufficient. This standard treatment may result in a short-term pressure relief and thereby improvement in lesion score, but on the long term, the lesion score is getting worse again. When combined with Intra Repiderma treatment, this relapse was not observed, probably because the healing process is accelerated by the bactericidal copper and regeneration stimulating zinc.

4 Conclusion

Proper hoof trimming and pressure relief by application of a block appears in practice to be insufficient for the permanent treatment of nhWLD. Therefore, we hypothesized that treatment requires the application of a spray containing chelated copper to eliminate pathogenic bacteria, and chelated zinc to stimulate corium healing. This study demonstrates that standard treatment indeed showed disease relapse, while Intra Repiderma treatment resulted in a significant improvement in lesion score and even complete healing of non-healing white line disease lesions.

5 Acknowledgments

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6 References

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