

**TRIAL REPORT:**

**THYMOX FOOTBATH 2P,  
ST-ALBANS, VT**

**TRANSITION PROTOCOL**

PROJECT :	THYMOX FOOTBATH 2P FIELD TEST	ORGANIZATION :	St-Albans Coop
MARKET :	Agricultural	DOC NUMBER :	SAC-1
SEGMENT :	Dairy	DATE :	2016-07-19
SUBJECT :	THYMOX FOOTBATH field test report		

## SUMMARY

THYMOX FOOTBATH 2P was tested for 12 weeks in a free-stall famr in St-Albans, VT for its efficacy as a replacement of copper sulfate in footbaths for the control and prevention of dairy cattle hoof infections, more specifically digital dermatitis (DD).

The farm followed a TRANSITION protocol where THYMOX FOOTBATH 2P was introduced gradually, while copper sulfate was gradually discarded.

During the trial, pictures of hooves were taken at two week intervals. From the pictures, Dr Dörte Döpfer (UW-Madison) made the evaluation of the hoof health status, and scored digital dermatitis lesions when they were present. Dr Döpfer also commented the global health status of the hooves for each time point.

At the end of the test, we conclude that the dairy cattle group under study has a stable hoof health status regarding infectious diseases, more specifically digital dermatitis (DD), and that the copper sulfate footbath was successfully replaced by THYMOX FOOTBATH 2P.

## FIELD TEST PROTOCOL

For 12weeks, The St-Albans farm tested THYMOX FOOTBATH 2P, following the TRANSITION protocol developed by Laboratoire M2, where copper sulfate (CuSO4) was gradually replaced by THYMOX FOOTBATH 2P. The schedule of footbaths was the following. The test began March 31st 2016.

Weeks 1-4

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
AM		CuSO4		THYMOX		CuSO4	
PM		CuSO4		THYMOX		CuSO4	

Weeks 5-8

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
AM		CuSO4		THYMOX		THYMOX	
PM		CuSO4		THYMOX		THYMOX	

Weeks 9-12

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
AM		THYMOX		THYMOX		THYMOX	
PM		THYMOX		THYMOX		THYMOX	

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At approximately 2 week intervals, the THYMOX team went to the farm to take pictures of the hooves of around 100 cattle. Prior to taking the pictures, the hooves were cleaned with water in the milking parlor.

The pictures were then sent to Dr Dörte Döpfer at the University of Wisconsin. Dr Döpfer specializes in hoof infectious diseases and she could diagnose lesions on hooves, and more specifically score the lesions of digital dermatitis, from the pictures. The different stages of digital dermatitis are described as the following:

The 5 M-stages represent stages during the course of DD (Greenough et al 2008, Döpfer et al 2004, Döpfer et al. 1997). Here, the 'M' stands for 'Mortellaro'.

M0	Normal digital skin without signs of DD, some authors have encountered difficulties finding an example for intact bovine digital skin without signs of any claw diseases, but young animals, such as calves and pre-partum heifers are candidates for being negative for claw diseases.
M1	Early, small circumscribed red to grey epithelial defect of less than 2 cm in diameter that precedes the acute stages of DD (M2). In addition, M1 stages can appear between acute episodes of DD lesions or within the margins of a chronic M4 lesion as an intermediate stage.
M2	Acute, active ulcerative (bright red) or granulomatous (red-gray) digital skin alteration, >2 cm in diameter, commonly found along the coronary band in addition to around the dew claws, in wall cracks and occasionally as a sole defect.
M3	Healing stage within 1 to 2 days after topical therapy, where the acute DD lesion has covered itself with a firm scab-like material
M4	Late chronic lesions that may be dyskeratotic (mostly thickened epithelium) or proliferative or both. The proliferations may be filamentous, scab-like or mass proliferations.
M5 (M4.1)	Chronic lesion with small M1 lesion within. M4.1 are lesions in the process of regressing to active and painful M2 lesions, if nothing is done.

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M0: Healthy

M1: Early

M2: Ulcerative

M3: Healing

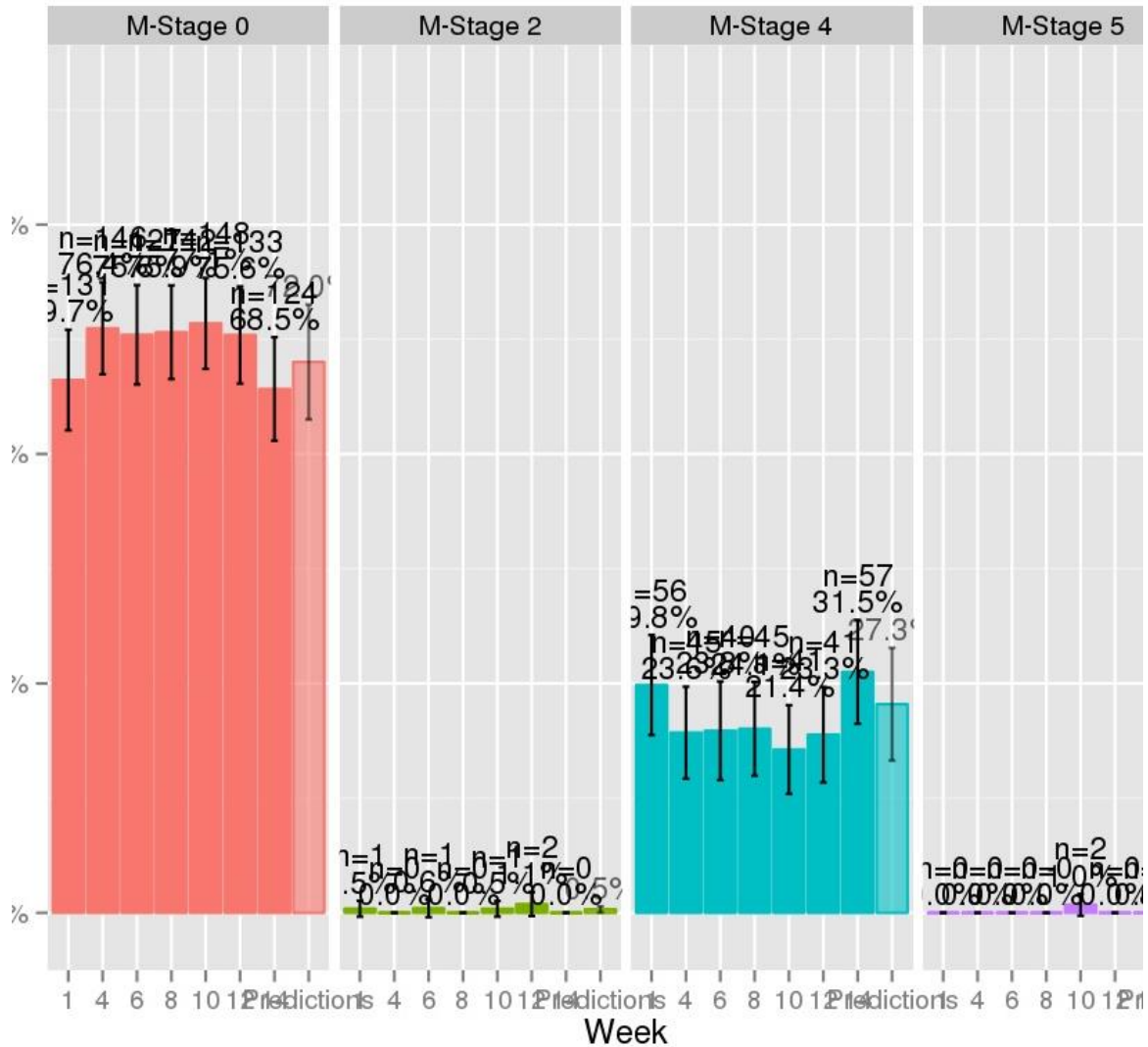
M4: Chronic

The digital dermatitis scores given by Dr Döpfer were then submitted to the DD check Application. This application, (available on the Apple store) analyzes the evolution of lesions, and lays out a graph that can predict if the situation is getting better, or worse, regarding DD. From the pictures, Dr Döpfer can also make recommendations and comment the situation.

## RESULTS

**Figure 1.** Digital dermatitis evolution during the field test period, and long term predictions as calculated by the algorithm of the “DD check Application”. Since no M1 and M3 lesions were scored during the trial, these do not appear on the graphic. The relative frequencies of each M-Stage are also found in **Table 1**.

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**Table 1.** Proportion (%) of cattle in each DD M-Stage over time and predicted future proportions.

M-Stage	Weeks							
	1	4	6	8	10	12	14	Predictions
0	69.68	76.44	75.60	75.94	77.08	75.57	68.51	72.04
2	0.53	0.00	0.00	0.00	0.52	1.14	0.00	0.46
4	29.79	23.56	23.81	24.06	21.35	23.30	31.49	27.28
5	0.00	0.00	0.00	0.00	1.04	0.00	0.00	0.23

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- Overtime, between 68 and 77% of the hooves observed were scored as having no lesions of Digital dermatitis (M0). One role of the footbath is to prevent these healthy hooves to develop DD lesions. The remaining cattle had lesions of DD of the M2, M4 or M5 stages.
- As shown on Figure 1 and Table 1, the proportion of cattle with M2 lesions was very low all along the trial (< 2%). M2 lesions are the ones that are painful and that can lead to lameness. When detected, M2 lesions should be treated topically promptly, because footbaths typically do not cure those. Since the M2 lesions are in very low proportions, we can say that this herd has a very low prevalence of Digital Dermatitis.
- The highest type of DD lesion observed on the hooves was the M4 chronic lesion (21 – 31%). These lesions are the result of an incomplete cure of M2 lesions, where the pathogens are deeply encysted in the hoof skin. It is very common to find high proportion of cattle with chronic lesions. These lesions are not painful and do not cause lameness. Nevertheless, the M4 chronic lesions have to be controlled, because under pressure, they can revert into M2 painful lesions. In this trial, there was no significant increase in M2 lesions, meaning the M4 chronic lesions were well controlled. It is the role of the footbath to prevent these chronic lesions to regress into M2 active lesions.
- Only one case of M5 lesion was observed, it is the transitory stage when a chronic lesion is starting to revert. This is considered as a punctual event, but it should be topically treated when observed.

In Summary, there was no outbreak of M2 active lesions during the trial, meaning the healthy hooves were prevented from developing lesions, and that the chronic lesions were well controlled. Since it is the role of the footbath to prevent and control hoof infections, like digital dermatitis, it is concluded that the change in footbath products (from CuSO4 to THYMOX FOOTBATH 2P) during the trial did not compromise the prevention and control of these infections.

From these results, the dairy cattle owner can expect to get control over, and prevent hoof infections with THYMOX FOOTBATH 2P and obtain results similar to what was obtained with Copper Sulfate, which is the gold standard in the industry.

## COMMENTS FROM THE EXPERT

All along the trial, Dr Döpfer, in addition to scoring the hooves, made the following comments on hoof health. Dr Döpfer was not informed of the footbath routine so she was not influenced by the products used in footbaths.



**Dr. Dörte Döpfer**, DVM, PhD, Associate Professor, U. Wisconsin, School of Veterinary Medicine. World renown in field of epidemiology of digital dermatitis, with a large body of published research, including best practices to prevent and control digital dermatitis (heel warts) in cattle and publications on best-practice for hoof bathing in order to prevent and control digital dermatitis in cattle.

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<b>Week 0</b> 2016-03-31	<i>"The heels are low, the feet are happy in general, there are a few M4 chronic lesions, most of them are hyperkeratotic, fewer are proliferative, and skin flaps* were observed"</i>
<b>Week 2</b> 2016-04-20	<i>"Low heels; heel horn erosion** is observed; many skin flaps are falling off; M4 chronic lesions still observed; seems like a contained situation; some skin maceration*** observed in interdigital pouch"</i>
<b>Week 4</b> 2016-05-06	<i>"I am finding more heel bulbs with either flaps that have been induced through mechanical injury or heel bulbs that have very rugged looks due to past injuries. Therefore, check the walking surfaces: are those very irregular and uneven? Low heels; HHE is observed; Many flaps falling off, good sign! It means that the proliferative lesions are not progressing, but the extra skin materials are being shed from the skin surface; Many Happy feet!"</i>
<b>Week 6</b> 2016-05-19	<i>"I see many mechanical injuries to the horn on the heel bulbs. These cows are running over some abrasive uneven surface? Many low heels since the beginning and throughout the weeks; These cows may be grinding there claws somehow while walking or running; The proliferative lesions seem contained; Flaps are falling off; The DD situation seems very well contained."</i>
<b>Week 8</b> 2016-06-02	<i>"This group of cows is very vulnerable to introduction of more DD due to the mechanical injuries on the hooves. Many low heels; A few hyperkeratotic and proliferative lesions, but they shed their superficial skin layers in flaps instead of growing into large proliferations; This is a good sign regarding prevention and control of DD."</i>
<b>Week 10</b> 2016-06-14	<i>"There is one cow that I would take out of the stall: cow 4878, she has had repeated lesions and needs treatment, after treatment, a proliferative lesion remains that flairs up into M2; she is a reservoir of infection for the herd." "Some M4 with hyperkeratosis, few proliferations, no major changes appear to have happened since Wk 8"</i>
<b>Week 12</b> 2016-06-28	<i>"Cow 4878 was not in the wk 12 group, I'd like to have followed up on her. She has become worse during the 10 weeks of observations. She is a typical type III cow that cannot be controlled using a sustainable chemical footbath agent like Thymox. Consider removing this cow from the herd for the sake of preventing DD."</i>



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***Overall, this group of cows looks to be doing quite well regarding endemic DD. If the detection of M2 lesions is efficient in the milking parlor, this group can continue as is. I observed many of the hyperkeratotic and proliferative lesions shed flaps of tissue, which is a good sign.***

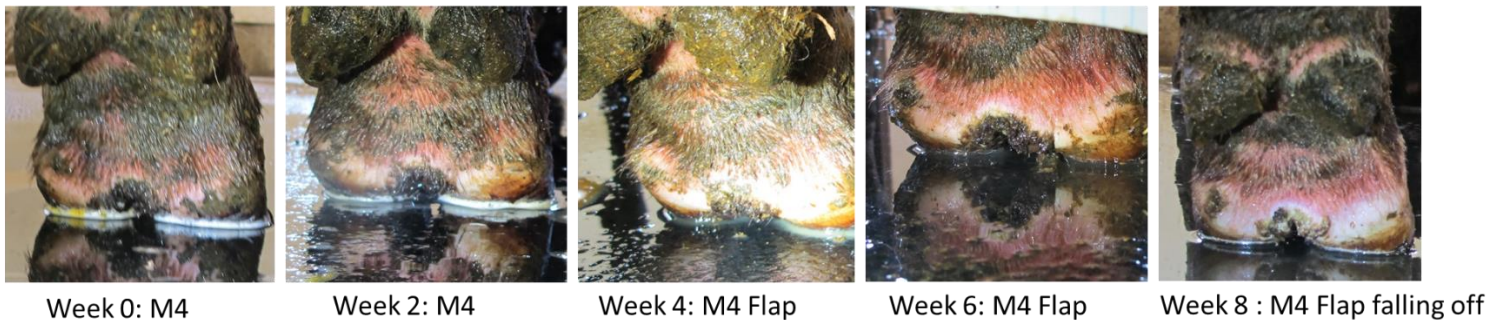
\* Dr Döpfer describes as “flaps” the scab like material that can cover DD lesions in the healing process of the skin. Flaps are a good sign and typically fall off with healthy skin underneath. You can see this phenomenon in Figure 2, which is the evolution of the chronic lesion into a skin flap that finally falls off.

\*\* Heel horn erosion (HHE) is another infectious hoof disease. The horn appears black and destroyed, and in severe cases will lead to lameness. The primary cause for HHE is humidity and prolonged contact with manure and slurry. Footbaths will help, but hygiene improvement, and less humidity is the key.

\*\* Skin maceration is observed when the hooves are in prolonged contact with manure and slurry. This is considered as a risk factor for digital dermatitis.

**Figure 2.** Evolution of a chronic lesion developing a skin flap that will end up to fall out.

Cow 5537 R



## CONCLUSION

Very low prevalence of digital dermatitis was maintained for all the duration of the trial. No outbreak in hoof infections was observed. Chronic DD lesions were controlled.

THYMOX FOOTBATH 2P successfully replaced copper sulfate for the control and prevention of hoof infections in this trial.

All along the trial, skin flaps, meaning healing skin, was observed. This is a good sign.



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It is still strongly advised to detect and treat promptly occasional lesions and manage risk factors. In addition to the footbaths, these measures are essential for the control and prevention of hoof infections. For example, in this trial, maceration of skin and skin injuries were observed. This can increase the chances for infectious outbreaks, even with a good foot bathing strategy.

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