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Fall 2018 Cramer's Lab Foot Health Update

Welcome to the first edition of Foot Health Update. In an attempt to improve how we communicate with the many people who either participate, sponsor or use our research we are starting a semi-annual update newsletter. We hope you enjoy our first one and would appreciate your feedback. You can also find a video version of this letter at http://www.youtube.com/c/GerardCramerdairycowfootdoc

Risk of Milk Residues after Topical Tetracycline Treatment of Digital Dermatitis

In both the US and Canada, tetracycline is the "go-to treatment" for digital dermatitis (DD), the most common foot lesion affecting dairy cattle. The use of tetracycline in this manner in lactating cattle is extra-label and requires a veterinarian prescription. However, there is little information that can assist veterinarians with specific recommendations on dosage or milk withdrawal time. Recently (July 2017), to promote food safety, a pilot program was launched in the USA to test bulk tank milk for the tetracycline family of drugs. Legal limits in Canada and US are different but rapid antibiotic residue tests that are used as screening tests can detect as little as 10 to 30 parts per billion (ppb), which is far below the legal limits of 100 ppb in Canada and 300 ppb in the US.

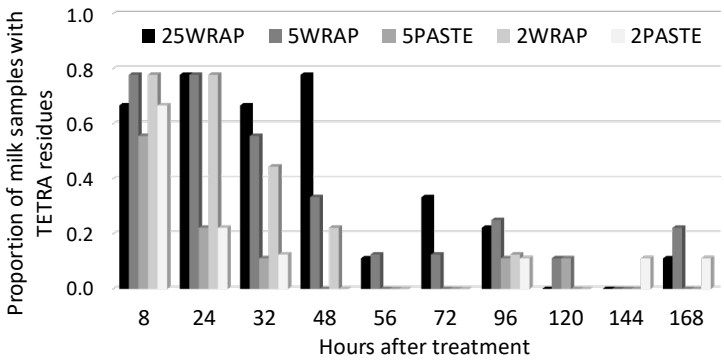
With these concerns in mind, our research group studied the impact of topical application of tetracycline on tetracycline levels in milk. Tetracycline was applied as either a paste or under a wrap at doses of 2, 5, and 25 grams (g) per foot on 50 cows with active DD lesions on 2 feet. Following treatment, samples were collected from milk, teat skin (from all treatment groups) and blood (from 25 g group only) every 8-24 hours (h) for up to 7 days.

To our surprise, tetracycline was present in milk, teat skin and blood at varying concentrations depending on time of sampling, method of application and dose. At 8 h after treatment, 69% of milk samples had tetracycline (see graph), 16% of which had high concentrations (120 to 244 ppb). The 25 g treatment group had the longest estimated withdrawal interval, the highest observed concentrations (210-244 ppb) of tetracycline present in milk and the longest consecutive period of detection (from 8-72 h) among all treatment groups.

Withdrawal intervals for individual cows for the different dosages ranged from 0-70 hours if using a limit of 100 ppb. Tetracycline was found on at least one occasion on the teat skin of every cow sampled, which confirms an association between topical tetracycline treatment for DD and contamination of the teat. In addition, 22% of blood samples had detectable tetracycline levels, and the majority (63%) occurred at 8 h post-treatment.

Based on our results, we recommend that, after extra-label use of topical tetracycline for DD treatment, a conservative treatment protocol be developed in conjunction with your veterinarian. The protocols should include gentle cleaning that does not cause additional damage to the DD lesion, using the lowest effective dose of tetracycline (2 g/lesion for maximum of 2 lesions per cow) and, when deemed appropriate, testing of the milk from individual cows or the bulk tank with a commercial screening test for tetracycline.

This study was funded by OMAFRA, Dairy Farmers of Ontario and Vetoquinol.



Did you know?

You will likely notice that in this newsletter we do not use the word claw or claws and you may wonder why. The reason is that according to the English language naming standards of the international veterinary anatomists, the use of the word 'claw' should be reserved to describe the last digit of a carnivore's foot. Therefore in cows, sheep, goats, pigs and horses the proper words to use are hoof and hooves. It is likely that differences in translations from Latin to other languages and back to English has resulted in the combined use of claw and hoof.

The Effect of Hoof Trimming Technique on Lameness

There are several different hoof trimming (HT) techniques and adaptations of these techniques used worldwide. An adaptation of the functional HT method, the most common technique used in North America, involves increased modeling to the weight bearing hoof (outer hoof on back feet, inner hoof on front feet) to prevent excess pressure on the common sole ulcer site. However, there is little scientific evidence for the effectiveness of any HT techniques and adaptations in preventing lameness. Recently we completed a study that compared the effects of the functional HT (LIT) method to an adaptation with increased modeling of the weight bearing hoof (BIG) on the development of a hoof horn lesion or a lameness event at mid-lactation.

To do this, we visited 3 farms biweekly for 1 year and included 1,562 cows in the study. Cows were trimmed at dry-off, and only those without a hoof horn lesion (white line disease, sole ulcer or thin sole) were enrolled in the study and randomly assigned to be trimmed with a LIT (42mm) or BIG (18mm) model (Figure 3). In addition, cows were scored for locomotion before the dry-off trim and followed thereafter until they were trimmed again at mid-lactation (100-165 DIM).

Overall, several things stood out from this study. First, relatively few cows (12%) developed lesions over the course of the study. Second, there was no evidence of a difference between the 2 trimming methods when assessing results across all cows. Interestingly there appears to be an age related effect as first-lactation cows had half the risk of being identified as lame in their next lactation after being trimmed with the BIG model. Similarly, first lactation cows were about a third less likely to have a hoof horn lesion if trimmed with the BIG model. There was no evidence of a difference in the risk of lameness or the development of hoof lesions between BIG or LIT on cows in second or later lactations.

Functional HT method
Big Model (18 mm)

Adapted HT method
Little Model (42 mm)

Our results suggest that trimming 100 first lactation cows with increased modeling of the weight bearing hoof will result in approximately 5 fewer cows with hoof horn lesions than if they were trimmed with the LIT model. We have several theories about why we had different findings in older cows and we will be exploring some of these factors in future research.

This study was funded by the AABP-HTA hoof health research grant through the AABP foundation and the U of MN Population Systems signature program.

Other projects we are working on

We are currently working on or have completed projects on the following

- ✓ how common antibiotic resistance and methicillin resistant *Staph. aureus* are in nasal swabs from hoof trimmers;
- ✓ evaluating the relationship between ketosis and lameness;
- ✓ determining the relationship between lameness and reproduction, and;
- ✓ a project on creating teams of hoof trimmers, veterinarians and nutritionist to work on foot health on farm.

There are several other projects planned so stay tuned for updates on some of these projects in the next newsletter.

Our foot health team

We would not be able to complete our research without our team of amazing individuals and our funding sponsors. Team members are listed below; funding sponsor logos are shown in the page footer.

Current team members:

Gerard Cramer (team leader), Erin Wynands, Zelmar Rodriguez, Bobwealth Omontese, Laura Solano, Mary Liebenstein, Luciano Caixeta, Whitney Knauer, Marcia Endres, Rafael Bisinotto

Previous team members:

Grant Stoddard, Angel Garcia Muñoz, Roger Bellet, Almudena Molinero, David Moe

Summer veterinary studens:

Michelle Scherping, Kayla Klehr, Janna Sorg, Brian Stampfl, Elizabeth Spronk, Megan Thompson, Jordan Sanford, Emma Bak, Isaac Secor, Anna Peterson, Annamarie Nees, Thomas Winders

Our funding sponsors