

Dynamics of Digital Dermatitis Infection Spread in a Large Freestall Housed Wisconsin Dairy Herd

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Abstract

Routine herd trimming and lameness records were used to predict acute digital dermatitis (DD) lesions in a cohort of 1969 dairy heifers followed during a total of 3296 lactation cycles on a Wisconsin dairy farm. Using Poisson regression models, it was shown that youngstock that had DD lesions prior to the first calving were prone to develop DD lesions again during their productive lives in addition to developing recurrent DD lesions per lactation.

Introduction

Digital dermatitis is one of the most important infectious claw diseases in cattle. The topical treatment of acute DD lesions is considered to be effective because the acute ulcerative stages of DD disappear within a few days. The problem in managing affected herds is the recurrence rate of DD lesions that may occur seasonally and pose a challenge to herd managers because of the intensive labor necessary to manage such outbreaks. Early detection and treatment of acute DD lesions is supposed to increase the probability of cure. The aim of this study was to show that routine herd trimming and lameness records can be used to characterize and identify selected risk factors for DD.

Materials and Methods

'Lame' and 'Trim' events were recorded over a four year period in a 1400 Holstein cow free stall housed dairy herd in Wisconsin, USA. Trim recruitment was based on a time in the lactation cycle; pre-partum heifers, 90-150 days in milk and at dry-off. Lame recruitment was based on use of locomotion scoring to identify new cases of lameness within a week of onset by deliberately walking pens to identify cows for treatment. Lesion type and limb affected were recorded in DairyComp305 for each event. Data were available for a cohort of 1969 heifers calving on or after April 1, 2004 and include to date, 3293 lactation cycles. Complete lifetimes were available for 721 cows, and data continues to accumulate for the remainder of the cohort until they leave the herd. Cows in the study were distributed over 12 different pens including dry cow pens. A Poisson regression model and a log link were used to explore the effect of lactation number (lactation number 1, 2 and >2), days in milk (categories 1-60 DIM, 61-120 DIM, 121-240 DIM and >240 DIM), 4 seasons and previous history of DD lesions in predicting DD lesions later during lactation. The hierarchy in the data was corrected for using fixed effects for pen number and the number of repeated DD lesions per lactation in Proc Genmod of SAS 9.1. A multinomial regression model including a logit link was used to estimate the effects of the same nominal class variables as above in predicting the three

categories of DD course, where type one cows never developed DD lesions during a lactation, type 2 cows would do so once during a lactation and type 3 cows would be recorded with more than one DD lesion during a given lactation. Effects were estimated at a confidence level of $\alpha=5\%$.

Results

Using a Poisson regression model to predict DD lesions in the 3485 trimmed and lame records, DD lesions were found more frequently in first lactation heifers during early (DIM: 1-60) and post-peak (DIM: 120- 240) lactation, more so during the Winter (Dec – Feb) and Summer (Jun – Aug) months and more frequently in heifers that had experienced DD lesions prior to first calving. In addition, the multinomial regression model showed that lactation numbers 1 and 2 were prone to develop more DD lesions and more recurrent DD lesions per lactation compared to cows with higher lactation numbers. The cows with DIM 1 to 60 and 61 to 120 were less frequently associated with recurrent DD lesions during a lactation cycle while there was an indication that the single DD lesion per lactation cycle was found more often between DIM 121 to 240 ($P<0.1$). More recurrent lesions of DD per lactation were recorded during the Winter months (Dec to Feb). Whenever a DD lesion had been recorded before the first calving, those heifers were prone to become type 2 (single DD lesion per lactation) and type 3 (recurrent DD lesions per lactation) cows later on during their productive lives.

Discussion and Conclusions

The outcomes of the study should draw the dairy manager's attention to preventing DD lesions even before a heifer enters the lactating herd. The reason for this increased attention is that those cows with DD lesions recorded before the first calving are prone to develop recurrent DD lesions during the following lactations resulting in chronically infected cows that may transmit DD to other herdmates. We conclude that in treating acute DD lesions it is important the notice that 'not all cows are equal' with regard to their DD life history and prospect for curing from DD.