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Analysis of foot health records from 17 confinement dairies

J. M. DeFrain,[1] M. T. Socha, and D. J. Tomlinson
Zinpro Corporation, Eden Prairie, MN 55344

ABSTRACT

Foot health records are useful in monitoring the degree of lameness within dairy herds and, perhaps more importantly, providing insight into the underlying factors causing lameness. A database containing the incidence of foot lesions on large confinement dairy operations is largely unavailable but could prove useful to demonstrate the importance of collecting and analyzing foot lesion data to reduce lameness. Our objective was to merge foot lesion records from several dairy herds and establish a database to demonstrate how to use such data to better understand when and why foot lesions occur as an important means to manage lameness in dairy herds. The database consisted of 12 mo of records from 17 dairies (14 freestall, 1 combination dirt lot and freestall, 2 dirt lot) representing 58,155 cows from herds ranging in size from 631 to 9,355 animals in 9 states from the United States and 2 herds located in the Southern Hemisphere. Data were partitioned and analyzed as 2 separate data sets: (1) herds recording only lame events (cows lame when examined; n = 8), and (2) herds recording both lame and routine trim events (n = 9). Data were analyzed using PROC FREQ (SAS Institute Inc., Cary, NC) and significance was determined using Chi-square. White line disease, sole ulcer, toe ulcer, digital dermatitis, and foot rot comprised 93 and 40% (excluding routine trim with no lesion, 55%) of lesions for herds recording only lame events and those recording lame and trim events, respectively. Ratio of infectious to noninfectious lesions decreased with increasing lactation number in both data sets. Digital dermatitis and foot rot were greatest in the first 60 d in milk and differed across lactation number. Noninfectious lesions were greatest following summer heat stress, whereas infectious lesions were greatest during the coolest quarter of the year. In conclusion, analysis of the foot health data from these dairies demonstrates that (1) infectious lesions of the foot skin and soft tissues predominate in early lactation and during cooler months of the year, and (2) noninfectious lesions predominate during the 3 mo following summer heat stress and their distribution follows a typical lactation curve.
Key words: lameness, foot lesion, claw

INTRODUCTION

Efforts to reduce lameness in dairy cattle remain a priority as the industry strives to enhance animal well-being. When cows are assessed using locomotion scoring, the number of lame cows at any one time on intensively managed dairies can range from 20 to 25% (Cook, 2003; Espejo et al., 2006). Kelton et al. (1998) used data from 39 publications over a 23-yr period and reported a median lactation incidence of 7%, with a range of 1.8 to 30%. All of these reports utilized locomotion scoring to quantify the prevalence of lameness.

Locomotion scoring has been globally adopted to determine the prevalence and severity of lameness. Perhaps more importantly, Bicalho et al. (2007) demonstrated that locomotion scoring is a useful tool to identify cows with painful lesions within the dairy herd. In general, the dairy industry has improved upon the identification and treatment of lame animals. The dairy claw lesion identification guide released by the International Lameness Committee (Greenough, 2008) is one of the newer tools available for assistance in identifying claw lesions. More accurate diagnosis and recording of foot lesions in the dairy industry will provide the data necessary to determine the major foot lesions expressed in dairy cattle so that we can further our understanding of causative factors of the major foot lesions affecting herd performance. This was most recently demonstrated using data collected over 2.5 yr from a 2,100-cow dairy in the southeastern United States (Sanders et al., 2009). However, reports available on the frequency of foot lesions expressed in dairy cattle are largely derived from noncommercial herds and quite limited in cow numbers.

Our objective was to merge foot lesion records from several large dairy herds to better understand when and why foot lesions occur and use these data to demonstrate to producers how accurate recording of foot lesions can be used to decrease lameness in their dairy herds.

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[1]Corresponding author: jdefrain@zinpro.com

MATERIALS AND METHODS

Foot lesion data (49,664 events) from 17 dairies (14 freestall, 1 freestall with dirt lot access, 2 dirt lot) were collected from on-farm dairy herd management software. Data were collected once per dairy as a single file that included foot events of cows within the active cow file from the previous 12 mo such that each month of the year was represented only once per dairy. Data files were collected between July 2007 and April 2010, merged into one database, and used for analysis. Herd characteristics of dairies used to create the database are shown in Table 1. Data originated from approximately 58,155 Holstein cows [16,403 events from lactation 1 (**L1**), 14,449 events from lactation 2 (**L2**), and 18,812 events from lactation >2 (**L>2**)] from herds ranging in size from 631 to 9,355 cows in 9 states in the United States and 2 herds located in the Southern Hemisphere. Milking occurred 2 or 3 times daily in milking parlors.

All participating dairies were involved in a previous project (DeFrain et al., 2009) associated with troubleshooting lameness. Approximately 3 mo before initiating data collection, foot trimming technique was evaluated and advised according to the method of E. Toussaint-Raven (Toussaint-Raven et al., 1985). In addition, foot trimming personnel were trained on lesion identification and provided a dairy claw lesion identification poster as a reference guide, a poster developed by the International Lameness Committee (Greenough, 2008). This poster uses color photos of the various lesions along with typical claw zones affected by each lesion type. Each lesion on the poster has a 1-letter abbreviation code that was recorded by farm workers (31,244 events) and contract hoof trimmers (18,420 events) and entered into the herd management software by dairy office personnel.

With the exception of events in which no lesion was found (30.4%), 51.6% of foot lesions reported were lesions shown on the dairy claw lesion identification poster. Nonstandard foot lesions recorded that were not identified on the poster included abscess (7.2%), laminitis (2.0%), and block (1.3%). To standardize the foot lesion diagnosis before analysis of the database, it was necessary to visit the dairies recording these nonstandardized foot lesions so that feet could be visually inspected and the proper lesion diagnosis retrospectively included in the final database. In addition to examining these nonstandardized lesion types on live cows, hoof trimmers were asked to assign percentages to the claw zones depicted on the dairy claw lesion identification poster. The claw zones affected were then translated to lesion type and respective averages of these percentages were determined and randomly reassigned accordingly: abscess was assigned 50% white line disease, 45% sole ulcer, and 5% toe ulcer; laminitis was assigned 34% white line disease, 33% sole ulcer, and 33% sole hemorrhage; ulcer was assigned 95% sole ulcer and 5% toe ulcer; and block was assigned 50% white line disease, 45% sole ulcer and 5% toe ulcer. In addition, 1,158 events (2.3% of all events recorded) were not included in the final data set because insufficient information was available to determine the type of lesion present.

The final database (Table 2) was partitioned and analyzed as 2 subsets of data: (1) herds recording only lame events (cows lame when examined; n = 8; 15,019 and 5,841 events from employees and contract hoof trimmers, respectively), and (2) herds recording both lame and routine trim events (n = 9; 12,164 and 15,482 events from employees and contract hoof trimmers, respectively). Counts were determined for each foot lesion within each subset of data. The PROC FREQ procedure (version 9.2; SAS Institute, 2008) was used

Table 1. Herd characteristics of dairies

Dairy ID	Facility type	Milking + dry cows, no.	Events, no.
1	Freestall	5,306	3,547
2	Dirtlot	9,355	3,021
3	Freestall	2,036	1,698
4	Freestall	2,062	3,109
5	Freestall	4,960	7,630
6	Freestall with dirtlot access	3,736	2,993
7	Freestall	5,533	1,773
8	Dirtlot	1,455	604
9	Freestall	1,041	968
10	Freestall	631	806
11	Freestall	1,862	4,331
12	Freestall	1,928	3,396
13	Freestall	2,485	3,497
14	Freestall	3,228	1,725
15	Freestall	2,436	2,922
16	Freestall	931	586
17	Freestall	9,170	7,058