J. Dairy Sci. 97:310–318
http://dx.doi.org/10.3168/jds.2013-7186

Prevalence and risk factors for udder cleft dermatitis in dairy cattle

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ABSTRACT

Udder cleft dermatitis (UCD) is a skin lesion in dairy cattle mostly located at the anterior junction between the udder and the abdominal wall or between the front quarters. Relatively little is known about causative factors for UCD, and few studies have investigated prevalence and risk factors of UCD. Therefore, the aim of this study was to investigate the prevalence of UCD in a random sample of dairy herds with freestalls and milking parlors in a county of Sweden. Thirty dairy herds participated in the study. Each herd was visited once at milking, when every third cow was investigated for presence of UCD. Associations between UCD and milk production, breed, parity, days in milk, claw health, and udder health on the herd and cow levels were also investigated. In addition, a case-control study was performed in 6 herds with a high prevalence of UCD to investigate associations between udder conformation or mange and UCD. Udder cleft dermatitis was found in 18.4% of the 1,084 cows included in the study. The within-herd cow prevalence varied between zero and 39%, with an average of 18.5%. Risk factors for UCD at the herd level were a high proportion of Swedish Red cows and a high production level. At the cow level, breed, parity, and production level were identified as risk factors. The highest risk of having UCD was found in high-producing Swedish Red cows that had calved at least 3 times. Veterinary-treated clinical mastitis was associated with UCD, but cow composite somatic cell count was not. A strong anterior udder attachment was a protective factor, but signs of mange had no association with UCD. The primary cause of UCD is still unclear, and more research is needed to identify the best ways to prevent the development of this animal welfare problem.

Key words: dairy cow, udder cleft dermatitis, mastitis, risk factor

INTRODUCTION

Udder cleft dermatitis (**UCD**) is a skin lesion located at the anterior junction between the udder and the abdominal wall or between the front quarters of the udder (Beattie and Taylor, 2000; Warnick et al., 2002; Hansen and Nissen, 2010). The lesions vary in appearance and size, but thickened skin, crusts, pus, and wounds that easily bleed are common findings. Udder cleft dermatitis can be difficult to detect due to its anatomical position and the fact that affected cows seldom show general signs of disease.

Few studies on UCD prevalence have been published, and most have included only one or a few herds, mainly categorized as problem herds (Beattie and Taylor, 2000; Warnick et al., 2002; Evans et al., 2010; Hansen and Nissen, 2010). The within-herd prevalence in those studies varied between 0 and 22%. In a recent Dutch study, however, 20 herds were included, of which 3 had no UCD, whereas the within-herd prevalence in the other herds varied between 2.5 and 13% (Amersfort et al., 2012).

The etiology of UCD is unclear, but several factors, such as udder conformation (Beattie and Taylor, 2000; Hansen and Nissen, 2010, Amersfort et al., 2012), udder edema (Beattie and Taylor, 2000), and mange (Allenstein, 1991, Warnick et al., 2002), have been suggested to play a role. Cow factors such as parity and DIM have also been associated with UCD (Beattie and Taylor, 2000; Warnick et al., 2002; Hansen and Nissen, 2010). An association between UCD and mastitis has been suggested, but this was not supported by Warnick et al. (2002). Moreover, a link between UCD and digital dermatitis was suggested in some studies (Boyer and Singleton, 1998; Stamm et al., 2009), whereas other studies have shown a weak link (Beattie and Taylor, 2000), no link (Hansen and Nissen, 2010), or a lower risk for UCD (Warnick et al., 2002) in cows with digital dermatitis compared with cows without digital dermatitis.

Cases of UCD have also been observed in Swedish dairy cows (Persson Waller, 2003), but the prevalence of the disease is unknown. Thus, the aim of this study was to investigate the prevalence of UCD in a random sample of freestall dairy herds within a region of Sweden, and to identify important risk factors for UCD.

Received June 26, 2013.
Accepted October 2, 2013.
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MATERIALS AND METHODS

Two studies were performed. In the first study, the prevalence of UCD and associations between presence of UCD and several herd- and cow-level risk factors were evaluated in 30 herds in the county of Östergötland, Sweden. The second study was a case-control study in 6 herds with a high prevalence of UCD in the first study. Both studies were performed from September to November 2012. All herd visits were conducted by the second author.

Prevalence and Risk Factors in Dairy Herds

For practical reasons, only herds in the county of Östergötland were included in the studies. Other herd inclusion criteria were affiliation with the official milk recording scheme, freestall housing, herd size of 50 to 500 cows, and milking parlor. The latter criterion was chosen to facilitate investigation of the udders at milking. According to data from the Swedish Dairy Association, 40 dairy herds fit the criteria. A letter with information about the project was send to those herds in August 2012, and they were contacted via telephone. Eleven farms were omitted, 3 because of introduction of automatic milking system, 1 had ceased to produce milk, and 7 declined to participate in the study. One herd, wrongly reported to have a tiestall system, was later included in the study, resulting in a total of 30 herds participating in the study.

Each herd was visited once in connection with milking, and every third cow entering the milking parlor was inspected visually for signs of UCD using a hand-held mirror. The skin of the anterior junction between the udder and the abdominal wall and between the front quarters of the udder was also palpated. New disposable gloves were used when investigating each cow. Depending on the findings, cows were classified as having no UCD (no visual or palpable skin damages), mild UCD (hyperkeratosis, small papulae/pustulae, small crusts, or serum transudation), or severe UCD (pus, deep skin wounds, or proliferations with or without findings of mild UCD).

Herd and Cow Data. Herd and cow data on monthly milk recordings (daily milk production, cow composite milk SCC), registrations of veterinary-treated cases of diseases, and claw trimming were collected from the official milk recording scheme and from the animal disease recording system for the period May 2012 to October 2012. Information on breed, parity, calving dates, genetic merit, and culling, when applicable, was also collected from the same source. At the herd visits, a questionnaire was used to collect information on farmer awareness of UCD, treatments of UCD, and type of bedding material used for lactating cows.

Statistics. In each herd, the UCD prevalence among lactating cows was calculated. The mean prevalence for all herds was also calculated. Associations between the dependent variable, number of UCD cases per herd, and the independent variables (herd factors) were investigated using univariable and multivariable Poisson regression models. Herd factors studied were number of cows per year (mean number of cows during the previous 12 mo), milk production per cow and year (mean production during the previous 12 mo), herd SCC (geometric mean SCC during the previous 6 mo), incidence veterinary-treated cases of clinical mastitis (**VTCM**; number of registered cases during the previous 6 mo per herd/number of cows at risk per herd), proportion of different breeds in the herd (during the previous 12 mo), prevalence of digital dermatitis (registered and reported by professional hoof trimmers during the latest 6 mo before the visit), and bedding material used in the herd. As none of the continuous herd factors were linearly related to the outcome variable, they were all categorized using percentiles.

Information from the official milk recording scheme was also used to evaluate associations between cow factors and presence of UCD, as well as grade of UCD, on a cow level. The cow factors were DIM, parity, breed, milk production (kg of milk), and SCC at the test milking ±15 d from the visit, and having a registered case of VTCM within ±30 d of the visit. The continuous explanatory variables were assessed if they were linearly related to the outcome; and if not, they were either categorized using percentiles as cut-offs or transformed using the natural logarithm, Box-Cox transformation, or fractional polynomial regression. Associations between UCD or grade of UCD and cow factors were analyzed using univariable and multivariable mixed logistic regression models with herd as random factor.

All statistical analyses were performed using Stata (release 11.2; StataCorp LP, College Station, TX). For the multivariable models, collinearity between the independent variables was assessed pair-wise by calculation of Spearman rank correlations. If there was proof of collinearity ($r \leq 0.70$), the variable with lowest P-value in the univariable analysis was selected. Herds or cows with missing data for a variable were not included when that variable was in the model. Moreover, in all the multivariable models, biologically plausible 2-way interactions between the main effects were tested.

The model fit of the multivariable analyses was tested using Hosmer-Lemeshow goodness-of-fit test, and by visual examination of diagnostic plots, according to Hosmer and Lemeshow (2000) and Dohoo et al. (2010).