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Mild and severe udder cleft dermatitis—Prevalence and risk factors in Swedish dairy herds

L. Ekman,*† A.-K. Nyman,* H. Landin,‡ U. Magnusson,† and K. Persson Waller*†[1]
*Department of Animal Health and Antimicrobial Strategies, National Veterinary Institute, SE-75189, Uppsala, Sweden
†Department of Clinical Sciences, Swedish University of Agricultural Sciences, SE-75007, Uppsala, Sweden
‡Växa Sverige, SE-10425, Stockholm, Sweden

ABSTRACT

Udder cleft dermatitis (UCD) is an inflammatory skin condition affecting the anterior parts of the udder of dairy cows. The lesions may present as mild or severe skin lesions and have been associated with mastitis and digital dermatitis. The full etiology and pathogenesis are not understood and no large-scale studies have investigated prevalence and risk factors. Therefore, the main objectives of the study were to investigate the prevalence of mild and severe UCD in Swedish dairy herds and to identify risk factors associated with such lesions. We also wanted to investigate risk factors for all cases of UCD and to determine whether UCD increases the risk for mastitis and culling. A random sample of 100 freestall dairy herds were included in the study, and each herd was visited once. Cows were registered as having no, mild, or severe UCD. Additional cow and herd data were obtained via observations, interviews, and the Swedish Official Milk Recording Scheme. The data were analyzed using logistic regression models to identify risk factors for mild and severe UCD. In total, data from 3,479 cows in 99 herds were analyzed. The prevalence of mild and severe UCD was 19 and 9%, respectively. Lesions were found in 98 of 99 herds but the within-herd prevalence of mild (0–43%) and severe (0–33%) UCD varied notably between herds. Breed (Swedish Red compared with Swedish Holstein), certain udder conformation traits, and higher parity were risk factors associated with increased risk of UCD. In addition, cows with hock lesions and cows in herds with high incidence of culling due to hoof and leg diseases had a higher risk for mild UCD. More days in milk and high milk yield were cow-related risk factors associated with severe UCD. Three housing-related factors (shorter cubicles, mattress as cubicle base, and cubicles installed before 2001 compared with 2001–2005), a high incidence of veterinary-treated clinical mastitis and culling due to udder diseases, and a low incidence of culling of first-parity cows in early lactation were herd-related risk factors associated with increased risk for severe UCD. In addition, cows in herds with a high proportion of heifers older than 17 mo that were not inseminated were associated with lower risk of all UCD. Finally, UCD was not associated with the outcomes milk somatic cell count, veterinary-treated clinical mastitis, or culling in the multivariable analyses. The etiology of UCD is most likely multifactorial, involving udder conformation traits and other cow-related risk factors as well as herd-related risk factors. The high prevalence of severe UCD lesions in Swedish dairy cows emphasizes the need for preventive measures and efficient treatments.

Key words: udder cleft dermatitis, dairy cow, ulcerative mammary dermatitis, intertrigo

INTRODUCTION

Udder cleft dermatitis (**UCD**) in dairy cows is an inflammatory skin condition in the anterior junction between the udder and the abdominal wall, or between the front quarters of the udder. The condition is also known as ulcerative mammary dermatitis or intertrigo, and has been reported in several countries (Warnick et al., 2002; Olde Riekerink et al., 2014; Persson Waller et al., 2014). Udder cleft dermatitis lesions may differ in severity, and some develop into deep exudative ulcers, impairing the welfare of affected cows. The lesions can contain a variety of bacteria (Warnick et al., 2002; Persson Waller, 2003), indicating a possible link between UCD and infectious diseases such as mastitis. In line with this, Persson Waller et al. (2014) found a higher risk for clinical mastitis in cows with UCD.

Although UCD has been reported in selected herds (Beattie and Taylor, 2000; Warnick et al., 2002; Hansen and Nissen, 2010), only 2 studies have investigated the prevalence in randomly selected dairy herds (Olde Riekerink et al., 2014; Persson Waller et al., 2014). In

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[1]Corresponding author: karin.persson-waller@sva.se

these studies, the average within-herd prevalence of UCD was 18% (range 0–39%; Persson Waller et al., 2014) and 5% (range 0–15%; Olde Riekerink et al., 2014). As there is no common definition of UCD, comparisons between studies must be made with caution. Recent studies, however, have categorized UCD lesions as mild (mostly undisrupted skin integrity) or severe (mostly involving open wounds) using similar criteria (Persson Waller et al., 2014; Bouma et al., 2016). Previous studies on the prevalence of UCD (Olde Riekerink et al., 2014; Persson Waller et al., 2014) have included only a limited number of herds. This, together with the large between-herd variation in prevalence of mild and severe UCD lesions, warrants investigation of a larger number of randomly selected herds.

The etiology and pathogenesis of UCD are largely unknown, despite the identification of some cow- and herd-related risk factors. Certain udder conformation traits (e.g., loose fore udder attachment or a deep udder) increase the risk of UCD (Hansen and Nissen, 2010; Olde Riekerink et al., 2014; Persson Waller et al., 2014). Other cow-related risk factors include breed (Persson Waller et al., 2014), higher parity (Warnick et al., 2002; Persson Waller et al., 2014), higher DIM (Bouma et al., 2016), and high milk yield (Hansen and Nissen, 2010). Infectious agents such as treponemes (Boyer and Singleton, 1998) and mange mites (Allenstein, 1991) have been suggested to cause, or worsen, UCD lesions, although not all studies support this (Warnick et al., 2002; Hansen and Nissen, 2010; Persson Waller et al., 2014). At the herd level, risk factors associated with UCD are breed (high proportion of Swedish Red cows) and high production (Olde Riekerink et al., 2014; Persson Waller et al., 2014). Nevertheless, risk factors in previous studies explain only a small part of the variation in UCD prevalence (Olde Riekerink et al., 2014; Persson Waller et al., 2014), indicating that other factors may exist. Moreover, these studies did not take into account the degree of UCD severity. For example, risk factors for hock lesions (**HL**) in dairy cows are known to vary depending on severity of lesion (Potterton et al., 2011). Given the results of these previous studies on UCD and HL, separate modeling of risk factors for mild and severe UCD lesions is warranted.

Prevention of UCD lesions is important because these lesions may be common in dairy herds and they have a negative effect on animal welfare. Large-scale studies on prevalence and risk factors for UCD are needed to improve recommendations for prevention and to better understand the epidemiology of UCD lesions of different severity. The main aims of our study were to investigate the prevalence of mild and severe UCD in freestall dairy herds in Sweden, and to identify cow- and herd-related risk factors associated with mild and severe UCD. We also wanted to investigate risk factors for all cases of UCD. In addition, we investigated whether UCD was associated with increased risk for mastitis and culling.

MATERIALS AND METHODS

Herd Selection

A total of 100 randomly selected Swedish dairy herds were enrolled in a cross-sectional study using the following criteria: freestall housing, herd size of 50 to 210 cows, herringbone or tandem milking parlor, and affiliation with the Swedish Official Milk Recording Scheme (**SOMRS**). The sample size was calculated by use of the formula $n = [Z^2 \times P(1 - P)]/e^2$, where $Z = 1.96$, the estimated true prevalence (P) was 20 to 30%, and the precision (e) was set to 10%, which gave a sample size of 60 to 80 herds. Because of the risk of herds quitting the study, the sample size was set to 100 herds. Participating herds were in the southern half of Sweden, where 90% of herds meeting the inclusion criteria are located. A letter about the project was sent to all eligible herd owners (n = 961), after which they were contacted via telephone until a representative sample of 100 herds (based on dairy production density in each county) agreed to participate. In total, 197 herds were contacted, 64 of which were excluded because they had changed to an automatic milking system or used a parallel milking parlor. Thirty herds declined to participate in the study. Reasons given were no interest in the study (12 herds), lack of time (10 herds) or the farmer had quit or was going to quit dairy production (8 herds). Of the remaining 103 herds, 1 was later excluded as most of the cows were milked in an automatic milking system, and 2 herds were not visited due to logistical reasons.

Data Collection

Each herd was visited during one milking (morning, midday, or evening) in the winter housing season; that is, February to April 2014 (39 herds) or December to March 2014–2015 (61 herds). All visits and registrations were performed by the first author. Additional cow and herd data were obtained from the SOMRS.

Cow Data

A detailed list of collected cow-related variables (n = 19) and how they were obtained is given in Supplemental Table S1 (https://doi.org/10.3168/jds.2017-13133). During milking, every second to third cow entering the