



Influence of grazing management on claw disorders in Swedish freestall dairies with mandatory grazing

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ABSTRACT

Our hypothesis was that grazing time, the number of days (duration) and number of hours per day, affected claw health. From Swedish freestall herds that fulfilled our criteria of claw-trimming routines, 201 herds were randomly selected for a telephone interview regarding grazing management. Herd data were retrieved from the Swedish Official Milk Recording Scheme. Claw disorders to be analyzed were recorded at maintenance claw trimming before and after the grazing period and included mild and severe dermatitis, severe heel-horn erosion, and sole ulcer (including severe sole hemorrhage). Any remark included one or more of these recorded disorders. The odds for having a recorded claw disorder at the autumn trimming in relation to grazing management, as well as to herd- and cow-related parameters, was tested using multilevel logistic regression models. The final statistical analysis included 17,600 cows in 174 herds, which were distributed from the south to the north of Sweden with decreasing length of mandatory grazing period because of climate. Grazing duration was statistically associated with the risk of sole ulcer, but it was not linear. However, grazing duration was not statistically associated with the odds for any remark, dermatitis, or heel-horn erosion. The odds for dermatitis were lower with access to pasture for 24 h compared with either day or night access. Otherwise, the number of hours that the animals had access to grazing per day was not significantly associated with any of the other analyzed claw disorders. Higher pasture stocking density (number of cow hours per day per hectare) was associated with a higher odds for dermatitis and sole ulcer. For all recorded claw disorders, the highest odds for having a disorder after

the grazing period were consistently when the cow had the same claw disorder before the release to pasture. The positive effects of grazing on claw health were less than expected, and the previous known effects of breed, days in milk, parity, production system, housing environment, and management were verified for most claw disorders. If cows in today's loose housing systems have a more restrictive grazing than cows in tie-stall herds previously experienced, one cannot expect as strong an effect even if grazing is mandatory in all Swedish dairy cattle. Despite some positive effects of grazing, good stall environment and management during the housing period seem to be more important to obtain good claw health.

Key words: dairy cow, pasture, claw disorder, lameness

INTRODUCTION

Since 1988 it is legislated that all Swedish dairy cattle shall be on daily pasture for a continuous period in summer, which for dairy cows is related to climate and vegetation zone and varies from 4 mo in the very south, 3 mo in south to mid, and 2 mo in the north of Sweden (SBA, 2010). Since the law was enacted, milk production and its infrastructure have changed much, and in 2011 it was estimated that more than 60% of cows were loose housed (mainly freestalls) compared with around 20% in 1988. Moreover, from 2007 building new tie stalls was no longer allowed, and consequently, the trend toward loose housing and larger herds accelerated further (SBA, 2010). At the same time, automatic milking systems (AMS) rapidly increased, and today more than 30% of Swedish milk is produced in AMS farms.

Grazing favors the cows, in accordance with the intent of the Animal Welfare Act, and the ability to behave naturally, and depending on environmental conditions, it improves their locomotion with less lameness and better claw and leg health (Hernandez-Mendo et al., 2007; Laven and Holmes, 2008; Rutherford et

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al., 2008). Studies have also shown that modern cow houses, which meet the needs of space and optimal cow comfort, reduce the risk of lameness and claw and leg injuries as well as offer from better hygiene (Fulwider et al., 2008; Cook and Nordlund, 2009). A pasture with sufficiently large area per animal reduces infectious pressure provided that track ways are maintained and designed to the actual number of animals. However, with increased herd size, the risk exists for potential bottlenecks at the exit and entrance from the barn or milking area, which instead become contagion traps during particularly bad weather conditions (Stafford and Gregory, 2008). If the animals need to go longer distances on hardened, poorly maintained track ways, the risk of traumatic claw injuries increases (Clackson and Ward, 1991). Depending on the pasture design, number of cows per hectare, precipitation, and track-way conditions, grazing can in poor conditions mean a deterioration in the cow environment and risk of traumatic lesions. This could result in higher risk for infectious claw disorders (Bendixen et al., 1986; Alban et al., 1996). With a concrete sealing of roads and holding areas, outdoor conditions become equivalent to those indoors with requirements of comfortable, hygienic, slip-resistant surfaces, which otherwise under poor husbandry conditions can disadvantage claw health (Loberg et al., 2004).

The motivation of cows to graze when given a free choice is dependent on different factors (Charlton et al., 2013; Lyons et al., 2014). In a Canadian preference study, dairy cows in a conventional freestall system chose being out at night but to a lesser extent in rainy weather and chose to be inside during the day and to a greater extent with increased outdoor temperature and humidity (Legrand et al., 2009). A Swedish study showed that cows in AMS that were offered grazing alone during parts of the day spent more time outdoors and on pasture than cows that were offered pasture with free access to silage indoors (Andersson, 2012).

Grazed dairy heifers had better claw health than zero-grazed heifers when assessed during the grazing period (Holzhauer et al., 2012). However, in the same study no difference in claw health was seen when the same animals were compared during the housing period. Moreover, it has not been examined how much grazing is needed to achieve a long-lasting positive effect on claw health. Results from Canada (Hernandez-Mendo et al., 2007) showed that locomotion disorders or lameness improved relatively quickly when the animals came out to pasture during a 4-wk period compared with those who remained housed in freestalls bedded with sand.

The study's goal was to highlight the issue of grazing duration, how many daily hours, what part of the day

the cows were grazing, and how the stocking density of cows on pasture affected claw health.

MATERIALS AND METHODS

Study Population and Design

Dairy herds enrolled in the Swedish Official Milk Recording Scheme (**SOMRS**) and meeting the following criteria were selected: freestall system, at least 80% of the cows in the herd were claw trimmed and claw disorders were recorded and reported during spring and autumn 2010, and that the claw trimmer of the herd should have gathered claw-trimming reports in at least 5 other herds meeting the criteria above.

Information about the study herds was retrieved from the SOMRS. The data included herd characteristics, such as herd size and milking system, as well as information of individual cows, such as breed, parity, calving date, and records of claw disorders made at maintenance claw trimming.

Information about grazing routines, pasture management, and housing (Table 1) during 2010 and 2011 were collected by telephone interviews during the summer in 2011 by 3 persons. The 269 dairy farms meeting the inclusion criteria were given a random number, and the farmers were then contacted in ascending numerical order. Of 230 owners or managers contacted, 19 declined participation and 10 wanted to be called back later but could then not be reached. A total of 201 herds participated in the telephone interview, which fulfilled the goal of 200 herds. A total of 174 herds (87% of those interviewed and 65% of the sample) had information on the date of release to pasture and time of housing as well as had trimmed the main part of the cows in the herd within given range for spring and autumn trimming and were included in the study. The questionnaire (in Swedish) is available from the corresponding author upon request.

Claw-Disorder Records and Data Editing

Claw disorders that were analyzed were recorded by professional claw trimmers at routine claw trimming and reported to the SOMRS. The diagnoses and scoring followed the common Nordic Claw Atlas (<https://www.landbrugsinfo.dk/kvaeg/sundhed-og-dyrevelfaerd/produktionssygdomme/klove-og-lemmer/sider/startside.aspx>) with the following diagnoses: mild and severe dermatitis [severe dermatitis is synonymous with digital dermatitis (**DD**)], mild and severe heel-horn erosion, mild and severe sole hemorrhage, and mild and severe sole ulcer.

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