



Area of hock hair loss in dairy cows: Risk factors and correlation with a categorical scale



P.Y. Lim ^{a,b}, J.N. Huxley ^a, M.J. Green ^a, A.R. Othman ^b, S.L. Potterton ^a, C.J. Brignell ^c,
J. Kaler ^{a,*}

^a School of Veterinary Medicine and Science, University of Nottingham, Sutton Bonington Campus, Sutton Bonington, Leicestershire LE12 5RD, UK

^b Universiti Sains Malaysia, 11800 Pulau Pinang, Malaysia

^c School of Mathematical Sciences, University of Nottingham, University Park, Nottingham NG7 2RD, UK

ARTICLE INFO

Article history:

Accepted 12 November 2014

Keywords:

Dairy cows
Hock lesions
Hair loss
Hock maps
Welfare

ABSTRACT

Data from 3691 dairy cows from 76 farms were used to investigate the risk factors associated with the area of hair loss over the lateral aspect of the hock and the correlation between the area of hair loss (as calculated using a hock map) and hock lesion scores determined using a pre-existing categorical scale. Six factors were associated with a greater area of hair loss, including cows with locomotion score 3, a cleanliness score (10/28 to 18/28), high daily milk yield (25.1–58.1 kg), poor body condition score (1–1.5), duration of winter housing (≥ 41 days) and some combinations of cubicle base and bedding materials.

Compared with cows housed in cubicles with a concrete base and whole straw or rape straw bedding, cows housed in cubicles with concrete bases with sand or chopped straw bedding had smaller areas of hair loss and cows housed on a mattress base with whole straw or rape straw bedding had larger areas of hair loss. Area of hair loss, as measured on hock maps, was not significantly different between cows with score 1 (median 23.6 cm²) and score 2 (median 20.3 cm²) on the categorical scale for hock lesions. This suggests that the categorical scale was not reflecting the extent of hair loss and that hock maps are a good alternative for studying the dynamics of hock lesions over time.

© 2014 Elsevier Ltd. All rights reserved.

Introduction

Hock lesions are commonly seen in housed dairy cows across the world including in the United Kingdom (Whay et al., 2003; Potterton et al., 2011b), Europe (Kielland et al., 2009; Brenninkmeyer et al., 2012), the USA (Fulwider et al., 2007; Lombard et al., 2010) and Canada (Weary and Taszkun, 2000). The term ‘hock lesions’ or ‘hock injuries’ has been widely used in the literature to describe a variety of presentations, including hair loss, broken skin, open wounds, crusts, localised swelling of the hock and swelling of the entire hock joint (Livesey et al., 2002; Kielland et al., 2009). The three presentations that have been mostly commonly reported are hair loss, swelling and ulceration; of these, hair loss is the most frequent presentation (Huxley et al., 2004; Potterton et al., 2011a) and is most commonly observed on the lateral aspects of the hock (Weary and Taszkun, 2000; Fulwider et al., 2007; Potterton et al., 2011b).

The impact of hock lesions on welfare is largely unknown (Rutherford et al., 2008; Laven and Livesey, 2011). However, it has been assumed that the severity of hock lesions reflects the degree of comfort and the abrasiveness of the lying surface (Livesey et al.,

2002; Lobeck et al., 2011; Brenninkmeyer et al., 2012), which may have an impact on welfare and health (Haskell et al., 2006). Hock lesions are associated with an increased risk of lameness (Whay et al., 2003; Kielland et al., 2009; Brenninkmeyer et al., 2012) and injuries at other locations, such as the udder and other joints (Sogstad et al., 2006). This suggests that they may be of use as welfare indicators (Whay et al., 2003; Regula et al., 2004).

The severity of hock lesions seen in dairy cattle varies from mild hair loss to open wounds and swelling (Weary and Taszkun, 2000; Kielland et al., 2009). However, there is a lack of understanding of how these lesions develop. The majority of studies on hock lesions have investigated risk factors associated with the presence or absence of hock lesions, amalgamating data from all lesion types (Regula et al., 2004; Rutherford et al., 2008; Kielland et al., 2009), based on the assumption that there is a linear progression from hair loss to swelling. However, Potterton et al. (2011a) investigated the risk factors for hair loss, ulceration and swelling separately and identified unique and shared risk factors for each presentation, suggesting that the assumption of a linear progression may be wrong. It is unclear whether the factors identified by Potterton et al. (2011a) as being associated with the presence of hock lesions also contribute to the extent and severity of lesions (in animals in which a lesion already exists) and/or whether there are additional risk factors in these animals.

* Corresponding author. Tel.: +44 115 9516564.

E-mail address: jasmeet.kaler@nottingham.ac.uk (J. Kaler).

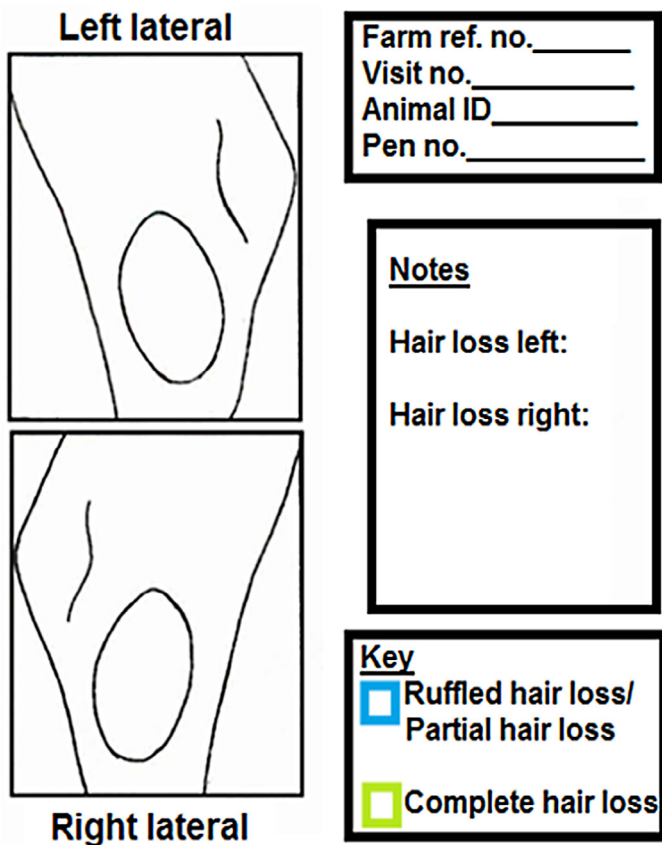


Fig. 1. Example of a hock map used for data collection in this study.

Categorical scales (Weary and Taszkun, 2000; Rutherford et al., 2008; Kielland et al., 2009) have been used to assess the severity of hock lesions, including hair loss alone (Potterton et al., 2011a). However, there is currently no widely accepted, standard scoring system and there is little evidence for the reliability and validity of these scoring systems, nor how these scores equate to the area or areas of hair loss when measured objectively. The aims of this study were to examine the area of hair loss on the lateral aspect of the hock using detailed hock maps of lesion area and to use these data to investigate: (1) the risk factors associated with area of hair loss measured, and (2) the correlation between hair loss measured by area and scores given on a categorical scale.

Materials and methods

Data set and study methodology

Detailed descriptions of the data collection and the study methodology have been published previously (Potterton et al., 2011a,b). Seventy-six farms in the Midlands region of the United Kingdom were visited during the winter housing period of 2007–2008. Approximately 50 cows were selected randomly from each herd for assessment. Selected cows were assessed for: (1) body condition score (BCS) (scale 1–5) (Wildman et al., 1982); (2) mobility score (scale 0–3; Whay et al., 2003); (3) total cleanliness score (range 0–28) based on the sum of cleanliness scores recorded at seven separate sites, including the tail, flanks and lower and upper hind limbs on the left and right side (scale 0–4; Whay et al., 2003), and (4) rising behaviour. Hair loss on both hocks for each animal was scored separately using a four-point categorical scale (score 0–3): (1) hair undisturbed with no loss (score 0); (2) area of hair loss <2 cm in diameter (score 1); (3) area of hair loss 2–2.5 cm in diameter (score 2), and (4) area of hair loss >2.5 cm in diameter (score 3) (Whay et al., 2003). The area and shape of hair loss at three locations over the hock (lateral, dorsal and medial hock) were recorded using hock maps. The location, areas and shape of partial hair loss (hair thinning without complete loss of hair cover) or complete hair loss (skin devoid of all hair) for both hocks for each cow were recorded separately as drawings (Fig. 1; Potterton et al., 2011b). Following the animal assessment, a detailed evaluation of the farm and animal environment was undertaken.

Milk records and farm data were obtained to gather information on breed, age, parity, days in milk, duration of winter housing and milk yield (mean milk yield from the three most recent monthly milk records). Hock maps were scanned and stored electronically as JPEG images; areas in pixels of partial hair loss and complete hair loss were calculated using mathematical algorithms in a programme written in Matlab (Mathworks). The area of hair loss in pixels was converted into cm² by using a scaling factor calculated from the mean width of 30 randomly measured hocks in cm divided by the distance in pixels from the hock map (Potterton et al., 2011b).

Data analysis

Hock map selection and analysis

A total of 3691 cows from 76 farms were selected for inclusion in this data set. Out of 7382 hocks, 6896 (3447 left hocks and 3449 right hocks) had complete information on hair loss. The remaining 486 hocks were excluded because of missing data ($n=87$) or dirty hocks that meant data could not be accurately recorded ($n=399$). Of the 6896 hocks, 6884 had complete hock maps; 12 could not be used due to technical difficulties. Of these 6884 maps, 1276 (18%) were excluded because no lesions were recorded (hair loss or any other lesion type), thus leaving 5608 usable maps. A total of 5431/5608 (97%) hocks had some area(s) of partial hair loss and, of these, almost all had at least one area of partial hair loss (5352/5431; 99%) on the lateral surface. Thus, a statistical model was constructed to explore factors associated with larger area of hair loss on the lateral hock surface.

Of the 5352 hocks with an area of partial hair loss on the lateral side, 2296 hocks (43%) also had an area of complete hair loss. Of the 2296 hocks that had an area of both partial and complete hair loss, in 2143 (93%) cases all areas with complete hair loss were surrounded by an area of partial hair loss (Fig. 2), whereas in 153 (6.6%) cases complete hair loss was not always surrounded by an area of partial hair loss. Of these 153 cases, 58 had at least one area of complete hair loss that was surrounded by partial hair loss, whilst 95 did not (Fig. 2); these 153 cases were excluded. Thirteen hocks were excluded from the data set because the animal identity could not be confirmed. The final data set used in the univariable and multivariable analysis contained a total of 5186 hocks (from 2996 cows).

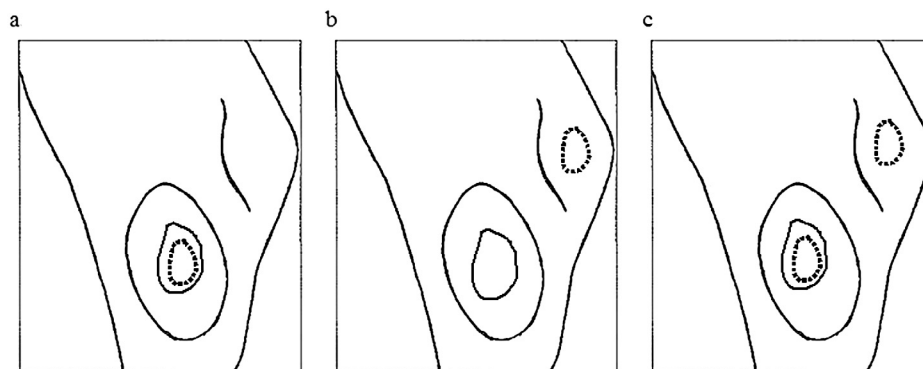


Fig. 2. Examples of different locations of partial hair loss and complete hair loss on the lateral surface of the hock as measured by hock maps. (a) Area of complete hair loss surrounded by an area of partial hair loss. (b) Area of complete hair loss not surrounded by an area of partial hair loss. (c) Area of complete hair loss surrounded by an area of partial hair loss plus another area of complete hair loss not surrounded by area of partial hair loss. (straight line, area of partial hair loss; dashed line, area of complete hair loss).

Download English Version:

<https://daneshyari.com/en/article/5797604>

Download Persian Version:

<https://daneshyari.com/article/5797604>

[Daneshyari.com](https://daneshyari.com)