



Genetic analyses of claw health in Norwegian Red cows

C. Ødegård,*†¹ M. Svendsen,† and B. Heringstad*†

*Department of Animal and Aquacultural Sciences, Norwegian University of Life Sciences, PO Box 5003, NO-1432 Ås, Norway

†Geno Breeding and A. I. Association, PO Box 5003, NO-1432 Ås, Norway

ABSTRACT

The aim of this study was genetic analyses of claw health in Norwegian Red. Claw health status at claw trimming has, since 2004, been recorded in the Norwegian Dairy Herd Recording System. The claw trimmer records whether the cow has normal (healthy) claws or if one or more claw disorders are present. Nine defined claw disorders were recorded: corkscrew claw (CSC), heel horn erosion (HH), dermatitis (DE), sole ulcer (SU), white line disorder (WLD), hemorrhage of sole and white line (HSW), interdigital phlegmon (IDP), lameness (LAME), and acute trauma (AT). Data from 2004 to 2011, with a total of 204,892 claw health records, were analyzed. The disorders were defined as binary traits with 1 record per cow per lactation. Further, 3 groups of claw disorders were analyzed: infectious claw disorders (INFEC, containing HH, DE, and IDP); laminitis-related claw disorders (LAMIN, containing SU, WLD, and HSW); and overall claw disorder. The 9 single traits and the 3 groups were analyzed using univariate threshold sire models. Multivariate threshold models were performed for the 5 most frequent single traits (CSC, HH, DE, SU, and WLD) and for CSC together with the grouped traits INFEC and LAMIN. Posterior mean of heritability of liability ranged from 0.04 to 0.23, where CSC had the highest heritability. The posterior standard deviations of heritability were low, between 0.01 and 0.03, except for IDP (0.06). Heritability of liability to INFEC and LAMIN were both 0.11 and for overall claw disorders, the heritability was 0.13. Posterior means of the genetic correlation among the 5 claw disorders varied between 0.02 and 0.79, and the genetic correlations between DE and HH (0.65) and between WLD and SU (0.79) were highest. Genetic correlation between INFEC and CSC was close to zero (0.06), between LAMIN and CSC it was 0.31, and between LAMIN and INFEC it was 0.24. The results show that claw disorders are sufficiently heritable for genetic evaluation and inclusion in the breeding scheme. At present, data are scarce with few recorded

daughters per sire. Claw trimming records from more herds would therefore be beneficial for routine genetic evaluation of claw health.

Key words: claw disorder, dairy cow, genetic parameter, threshold model

INTRODUCTION

Claw health has become important in Norway due to the increased use of freestalls (Simensen et al., 2010). The incidence of claw disorders in Norwegian Red treated by veterinarians has increased from 1990 to 2005 (Østerås et al., 2007). Sogstad et al. (2005) found, in a cross-sectional study, that 71.8 and 47.8% of the cows in freestalls and tiestalls, respectively, had claw lesions. Lameness causes economic losses to the farmer (Enting et al., 1997) because it influences production diseases (Sogstad et al., 2006), fertility (Sogstad et al., 2006; Walker et al., 2008), early culling (Sogstad et al., 2007a), and milk production (Sogstad et al., 2007b). Not all cases of claw disorders show clinical signs, so the number of cows with claw disorders may be higher than the number of lame cows. Environmental factors, such as herd, flooring, and feeding, affect claw disorders (e.g., Bielfeldt et al., 2005; Fjeldaas et al., 2011; Buttchereit et al., 2012). Experience in detecting claw disorders may vary between claw trimmers. Holzhauer et al. (2006) found differences between trained claw trimmers in their ability to diagnose chronic laminitis, interdigital dermatitis or heel horn erosion, sole hemorrhage, and white line disease. Claw disorders can be grouped into infectious (hygiene) or laminitis (feed)-related claw disorders depending on the cause of disease. For example, dermatitis and heel horn erosion are infectious disorders, whereas sole ulcer and white line disorder are laminitis-related claw disorders (Fjeldaas et al., 2007; Buch et al., 2011).

The heritabilities of claw disorders are generally low and genetic correlations among them vary between -0.19 and 0.95 (e.g., van der Waaij et al., 2005; Buch et al., 2011; Johansson et al., 2011). Genetic correlations among claw disorders and feet and leg conformation traits have been estimated by several researchers (e.g., van der Waaij et al., 2005; Laursen et al., 2009; Häggman et al., 2013). Laursen et al. (2009) found the

Received December 20, 2012.

Accepted July 16, 2013.

¹Corresponding author: cecilie.odegard@umb.no

highest genetic correlation for overall claw health with locomotion (0.46) and with rear leg rear view (0.21). Among single claw disorders and leg and conformation traits, van der Waaij et al. (2005) estimated that the highest genetic correlations were for foot angle with white line disease (0.64) and for locomotion with interdigital hyperplasia (0.82). Uggla et al. (2008) concluded that genetic correlations among claw health traits and feet and leg conformation traits in Swedish Red and Swedish Holstein were insufficient to select indirectly for claw health.

Currently, corkscrew claw is the only claw disorder included in routine genetic evaluation of Norwegian Red. This trait is recorded together with other conformation traits on first-lactation cows (Geno Breeding and AI Association, 2011). Recording corkscrew claw at claw trimming would probably be a more accurate measure, because the cow is fixed and each claw examined more thoroughly. Claw health recorded at claw trimming has, since 2004, been an integrated part of the Norwegian Dairy Herd Recording System, but has so far not been used for genetic evaluation.

The objective of this study was the first genetic analysis of Norwegian claw health records. The aims were to estimate heritabilities of and genetic correlations among claw disorders, for single disorder, grouped disorder, and overall claw disorder.

MATERIALS AND METHODS

Data

Data from the Norwegian Dairy Herd Recording System from 2004 to 2011 were used in the analyses. The data included 309,885 claw health records from 178,452 cows recorded at claw trimming. The claw trimmers recorded whether the cow had normal (healthy) claws or if one or more of 9 claw disorders were present (Table 1). Claw disorders included were corkscrew claw (CSC), heel horn erosion (HH), dermatitis (DE), sole ulcer (SU), white line disorder (WLD), hemorrhage

of sole and white line (HSW), interdigital phlegmon (IDP), lameness (LAME), and acute trauma (AT). Identification of claw trimmer, date of claw trimming, and other disorders or remarks were also recorded. Claw trimmers were categorized into professional claw trimmers, other claw trimmers, farmers, and others such as veterinarians or veterinary students. Professional claw trimmers are certified by the Norwegian Cattle Health Services (Sogstad and Fjeldaas, 2008), whereas other claw trimmers and farmers lack certification. Professional claw trimmers have a unique code so that they can be identified when recording claw health, whereas other claw trimmers and farmers use a universal group code. A cow could have several claw disorders reported on the same day; however, the leg involved (front or rear) was not reported. Because reporting is voluntary, not all claw health records are reported to the central database and some herds fail to report healthy cows. In Norway, most herds do claw trimming once or occasionally twice per year, but not all cows are necessarily trimmed at each claw trimming.

The number of claw health records per year has increased gradually to about 70,000 in 2011 (Figure 1), and the number of herds reporting claw health records (Figure 2) has increased to approximately 3,000. On average, about 30% of the cows in a herd had at least one claw health record, and 23% of the claw health records noted a claw disorder. Frequencies of each of the single claw disorders have increased from 2004 to 2011, except for IDP, LAME, and AT (Table 2). In 2011, the frequency of single claw disorders (% of all claw health records) varied from 0.2% (IDP) to 10% (CSC). Veterinarian-treated cases of IDP were not reported in the claw health recording, and therefore not included in these data. The frequency of IDP may therefore be higher than shown here. A total of 2,651 sires and 6,773 herds were represented in the data.

The average herd size for herds contributing with claw health data was 26 cows, with standard deviation (SD) of 17. On average, there were 110, 46, and 1.7 claw health records per sire (includes all available

Table 1. Definitions of normal claws and claw disorders included in the Norwegian claw health recording system (Refsum, 2012)

Claw health	Abbreviation	Definition
Normal		No claw disorders when examined under claw trimming
Corkscrew claw	CSC	Small to large twist in the abaxial wall on the lateral hind claws
Heel horn erosion	HH	Moderate to severe degree of erosion in the heel bulb with distinct V-shape
Dermatitis	DE	Dermatitis (bleeding, exuding, or wart-like) in front or rear in the interdigital claw
Sole ulcer	SU	Defect in the horn near the corium between the sole and heel bulb
White line disorder	WLD	Defect in the white line, in severe cases it can reach the corium
Hemorrhage of sole and white line	HSW	Hemorrhage of more than 20% of the sole or white line or both
Interdigital phlegmon	IDP	Severe infection in the interdigital claw, with swelling of the leg
Lameness	LAME	Locomotion score ≥ 3
Acute trauma	AT	For example, fractures and dislocation of joint

Download English Version:

<https://daneshyari.com/en/article/10975067>

Download Persian Version:

<https://daneshyari.com/article/10975067>

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