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Bovine claw and limb disorders related to culling and carcass characteristics

Å.M. Sogstad [a,b,*], O. Østerås [a,b], T. Fjeldaas [a], O. Nafstad [c]

[a] Department of Production Animal Medicine, Norwegian School of Veterinary Science, 0033 Oslo, Norway
[b] Department of Norwegian Cattle Health Services, TINE Norwegian Dairies BA, 1431 Ås, Norway
[c] Norwegian Meat Research Centre, 0513 Oslo, Norway

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Abstract

As part of a cross-sectional study in Norwegian Red Cattle, associations of lameness, lesions at the tarsus, claw shapes and claw lesions to time of culling and carcass characteristics were examined. Fifty-five tie-stall herds and 57 free-stall herds were sampled by computerized systematic selection and 2665 cows were trimmed by 13 specifically trained claw trimmers, during the late winter and spring of 2002. After exclusions, 2645 cows were included in this study. Most claw lesions were mild (score 1). The prevalence of moderate and severe lesions (2+3) did not exceed 5% for any of the lesions. The hazard ratios (HR) for time of culling were identified using Cox regression analyses incorporating herd as a random effect in a positive stable frailty model. Associations to carcass characteristics were examined using regression analysis (Proc Mixed) with lameness and each disorder as independent fixed variables. Lameness in lactation 1 was associated with earlier culling (HR=4.2) and lower conformation class of the carcass (−0.76) whereas lameness in lactation 2 was associated with lower carcass weight (−42.5 kg) and economic value (−2113 Norwegian kroner, 8.1 NOK=1 €). Lameness in lactations ≥3 was associated with lower conformation class (−0.57). Lesions at the tarsus in lactations ≥3 were associated with lower carcass weight (−15.9 kg), conformation class (−0.51), fat cover class (−1.2) and economic value (−650 NOK). Corkscrewed claws in lactation 2 were associated with lower weight (−21.6 kg). Heel-horn erosions score 1–2–3 in lactation 1 were associated with lower fat cover class (−0.68), and heel-horn erosions score 3 in lactations ≥2 were associated with earlier culling (HR=7.7). Haemorrhages of the white line score 1–2–3 in lactation 2 were associated with higher economic value (506 NOK). Haemorrhages of the sole score 2–3 in lactation ≥2 were associated with earlier culling (HR=2.1). Sole ulcers score 1–2–3 in lactation 2 were associated with higher conformation class (0.95).

Keywords: Claw; Disorders; Lameness; Culling; Carcass

1. Introduction

Claw disorders cause approximately 90% of lameness in dairy cattle (Logue et al., 1993; Murray et al., 1996). Lameness reduces animal welfare and is an important constraint to the dairy industry (Kossaibati and Esslemont, 1997). Losses are primarily due to prolonged calving intervals, costs of premature culling, reduced milk yield and

Abbreviations: NDHRS, Norwegian Dairy Herd Recording System.

* Corresponding author. Department of Production Animal Medicine, Norwegian School of Veterinary Science, 0033 Oslo, Norway. Tel.: +47 22964955; fax: +47 22964762.
E-mail address: aase.sogstad@veths.no (Å.M. Sogstad).

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quality and finally veterinary costs or treatment by the farmer (Enting et al., 1997).

Lameness is one of the main reasons for culling (Collick et al., 1989) and has been shown to be the third most important reason for culling after infertility and mastitis (Whitaker et al., 1983). Hardly any studies are published on the effect of tarsal lesions, claw shapes and claw lesions on culling, but we know that lameness-causing lesions are often chronic, they require therapy and the cow often needs a long time to recover and is likely to be culled earlier than cows with sound feet. Poorer reproductive performance in lame cows (Hernandez et al., 2001) might also be a motivation for the herdsman to cull. Probably, a high milk yield increases the risk of lameness and claw lesions, while a lameness incident decreases the milk production temporarily (Fourichon et al., 1999). Cows with low milk yield and lameness and claw lesions are more likely to be culled. Cows with high milk yield stay in the herd longer and have an increased chance of experiencing lameness and claw lesions.

The carcass weight, conformation and the amount of fat of the carcass is evaluated at the slaughter house according to the EUROP system and these factors are important determinants for the economic value of the carcass (European Union, 1981, 1991; De Boer, 1982). Lameness is often the result of pain, leading to reduced eating time as well as increased energy expenditure and has been found to result in reduced price of the carcass (Enting et al., 1997).

This study was performed to reveal possible consequences of disorders of the claw and limb in order to emphasize the importance of preventive measures. The aim was to identify possible associations of the presence of lameness, lesions at the tarsus, claw shapes and different severities of claw lesions identified at claw trimming to time of culling and carcass characteristics.

2. Material and methods

2.1. Selection procedure

Herds were stratified on the three most animal-dense regions of Norway and approximately 500 herds with more than 15 cow-years were sampled by computerized systematic assignment from each region by using the Norwegian Dairy Herd Recording System (NDHRS) (Østerås, 2003). The total number of herds with ≥15 cow-years within the three regions was 4960. The study was part of a project on claw health of Norwegian cattle where the main focus was to compare claw health in tie stalls and free stalls (Sogstad et al., 2005a). Consequently herds were allocated to two groups: tie stalls or free stalls. In region 1, 91 herds had free stalls and every third was included. In region 2, only 25 had free stalls and all were included. In region 3, 84 herds had free stalls and every third was included. One tie stall for every free stall was then randomly sampled. One hundred and ninety-three farmers were invited to participate in the study and with negative response, exclusions and dropouts, 55 tie stalls and 57 free stalls were included. Claw lesions of cows and heifers more than 18 months of age and of the Norwegian Red cattle breed were recorded. Only cows that had calved or were less than 30 days from first calving were included in this study.

2.2. Study population

The mean number of cows in the herds (SD) was 25 (10) and the mean milk production per cow per year was 6286 kg (844). Approximately 37% of the energy consumption came from concentrates, 40% from grass-silage, 18 % from grass at pasture and the rest from other sources. Feeding, housing and management are described in more detail by Sogstad et al. (2005b).

The prevalence of lameness and claw lesions in hind claws in the whole study population was: lameness 1.2%, heel-horn erosions 26.4%, haemorrhages of the sole 16.3%, haemorrhages of the white line 10.9%, sole ulcers 2.8% and white-line fissures 7.8%. Most lesions were mild (score 1). The prevalence of moderate and severe (score 2+3) did not exceed 5% for any of the lesions (Sogstad et al., 2005a).

The original study population contained 2665 cows. Exclusions due to missing parity ($n=8$), missing identity ($n=1$) or missing calving date ($n=11$), resulted in a final number of 2645 cows, 1037 in first parity and 1608 in later parities. All together 194 (18.7%) cows were culled in their first lactation and 390 (24.3%) in lactations ≥2. When evaluating carcass characteristics, also cows culled in the subsequent lactation were included and cows were grouped into lactation 1 ($n=467$), 2 ($n=366$) and ≥3 ($n=562$), because the body weight and conformation change according to lactation number.

2.3. Recording of data

Thirteen professional claw trimmers attended two courses covering claw trimming procedures and diagnosis, recording and treatment of claw lesions. Each claw trimmer was given individual training at the initiation of the practical work. The cows were trimmed and examined once during the period from the 1st of January 2002 to summer let out. The last herd was visited on the 28th of June. Lameness was assessed when the animal was moved to the trimming chute as