THE PREVALENCE OF LAMENESS IN THE ASSESSMENT OF TRANSYLVANIAN DAIRY HERDS BY LOCOMOTION SCORE AND ACCORDING TO THE FARMERS' ESTIMATES

Silvana POPESCU, Cristin BORDA, Eva DIUGAN, Andra POPA

University of Agricultural Sciences and Veterinary Medicine, Faculty of Veterinary Medicine,
3-5 Manastur St., 400372, Cluj-Napoca, Romania

Corresponding author email: silvana.popescu@usamvcluj.ro

Abstract

Lameness in dairy cows represents one of the most serious animal welfare problems. Monitoring on-farm lameness prevalence is important for dairy producers and veterinarians in their efforts to reduce lameness. The aim of this study was to compare the prevalence of lame dairy cows assessed by locomotion score and estimated by farmers. For the on-farm lameness assessment a five point locomotion score was used. A number of 751 dairy cows were assessed in the cold season in 10 Transylvanian dairy farms. The results were statistically processed using the SPSS software, version 17. Out of 751 assessed cows 33.49% presented normal locomotion; 40.38% presented slight lameness; 18.03% were moderately lame; 5.17% were lame and 2.93% presented severe lameness. The prevalence of lameness established using the locomotion score varied from 4.76% to 68% (median 23.38%), and that estimated by the farmers ranged between 0 and 15% (median 7.50%). There were statistically significant differences (P<0.05) between the prevalence of lameness assessed using the locomotion score and that estimated by the farmers. It follows from the findings of this study that the dairy farmers are not aware about the locomotion problems of their cows.

Key words: dairy cows, lameness prevalence, locomotion score.

INTRODUCTION

Lameness represents one of the most severe and frequent problems encountered in the commercial dairy farms worldwide, with a strong negative impact on the welfare and production of the animals (Whay et al., 2003). Lame cows are also prone to other health problems (Walker et al., 2008), decrease in milk production (Warnick et al., 2001), impairment of the body condition (Ozsvari et al., 2007) and finally the dramatic shortening of their productive lives (Booth et al., 2004). Despite the fact that lameness is a serious welfare and economic problem, some studies (Wells et al., 1993; Whay et al., 2003; Espejo et al., 2006; Rutherford et al., 2009; Leach et al., 2010; Sarova et al., 2011; Richert et al., 2013) have shown that farmers tend to underestimate the prevalence of lameness, contributing to the increase of the lame cows' percentage in their farms. Improved detection of lameness, so the farmer would estimate better the actual lameness prevalence, could play a significant role in persuading farmers on the importance of lameness on their farms. Additionally, the identification of the slightly

lame cows may reduce considerably the economic losses represented by the longer duration of the treatments and the higher costs in the cases of severe lameness.

Although the Romanian farms face the same problems, as those in other countries, the researches regarding lameness in dairy cows are extremely limited in Romania. The insufficiency of the studies and the lack of information, knowledge and concernment of the farmers regarding the importance of this problem determine significant economic losses.

The aim of this study was to compare the prevalence of lame dairy cows assessed by locomotion score and estimated by farmers in Transylvanian farms.

MATERIALS AND METHODS

This study was accomplished in 10 dairy farms (5 farms with loose housing and 5 farms with tie stalls) from Transylvania (Cluj, Bistriţa-Nasaud, Sibiu and Satu-Mare counties), between December 2012 and February 2013.
The farms were selected with the help of the

veterinarians in the area, based on the following criteria: the housing system (loose and tie stall barns); the numbers of the animals in the farms (at least 20 dairy cows); easy access to the farm during the winter; the agreement of the farmers to participate to the study. The mean characteristics of the farms are presented in Table 1.

Table 1. The main characteristics of the investigated farms

Barn	No. dairy cows	Breed	Mean milk production (l/head/day)	Resting surface	Bedding	Manure evacuation	Access to paddock/pasture
1	75	Holstein Friesian + Red Holstein	15	Cubicles	-	Mechanical	Paddock
2	70	Holstein	13	Cubicles	Straw	Mechanical	-
3	70	Holstein	15	Cubicles	Straw	Mechanical	-
4	96	Romanian Spotted Cow	10	Cubicles	Straw	Mechanical	-
5	104	Holstein Friesian + Red Holstein	12	Cubicles	Straw	Mechanical	-
6	21	Romanian Spotted Cow	15	Medium long stall	Sawdust	Manual	Pasture
7	42	Romanian Spotted Cow	11	Medium long stall	Straw	Manual	Pasture
8	100	Romanian Spotted Cow + Holstein	16	Short stall	Straw	Mechanical	-
9	13	Romanian Spotted Cow + Holstein	18	Short stall	Straw	Mechanical	-
10	60	Romanian Spotted Cow + Holstein Friesian	15	Medium long stall	Straw	Mechanical	-

Farms 1-5: loose housing system
Farms 6-10: tie stall system

The farms with loose housing, having between 70 and 104 milking cows, with a mean number (SD) of 83 (15.9), had closed barns (in 2 farms) and half-opened barns (in 3 farms). In all of these farms the cows were mechanically fed and watered. All of the farms with tie stalls had closed barns and the numbers of milked cows varied in these farms between 21 and 113, with a mean number (SD) of 67 (38.71) animals. The feeding and watering was made manually (in 2 farms) and mechanically (in 3 farms). The cows were milked (manually or mechanically) twice per day in all the farms included in the study.

The lameness of different degrees in the cows was assessed using the locomotion score (LS) elaborated by Sprecher et al. (1997). This system is based on the evaluation of the cows' dorsal line, and of the position of their feet, giving scores from 1 to 5. All the milked cows were assessed in the investigated farms, 336 in the farms with tie stalls and 415 cows the farms with loose housing. Each animal was observed standing and in movement, at a slow pace on a hard flat surface, where it was possible. For the locomotion assessment of the cows kept in tie stalls, these were loosened and were taken out of the barns. The cows from the farms with loose housing were assessed after the morning milking (as they exited the milking parlor). Were considered lame cows those that presented obvious lameness and obtained scores from 3 to 5 (Amory et al., 2006). It was calculated the percentage of the cows with different locomotion scores and that of the lame cows per barn and per overall number of assessed cow. A range of data was provided by the farmer (mean milk production, access of the animals in paddock and/or pasture, the estimated prevalence of lameness, etc).

The habituation of the assessor with the loco-motion score was realized in a preliminary study, in a farm with 36 dairy cows kept in loose housing system. The locomotion scoring was carried out until a correlation coefficient of 0.80 was obtained among the determinations (intra-observer agreement).

The data obtained was statistically processed, using the SPSS statistical software, version 17. The descriptive statistical indicators (mean, standard error of the mean, median, minimum and maximum) were calculated for the determined parameters (different loco-motion scores, lameness prevalence). The obtained values were compared with the Mann-Whitney test or the t test, depending on the data distribution. The differences were considered significant if $P<0.05$.

RESULTS AND DISCUSSIONS

The results of the cows' locomotion assessment in the 10 investigated farms are presented in table 2. The percentage of the cows with different locomotion scores varied in the investigated farms due to the different housing and management conditions of the animals (Cook and Nordlund, 2009).

Table 2. The percentage of the cows with different locomotion scores in 10 Transylvanian farms

Farm	Locomotion score				
	1	2	3	4	5
1	13,33	18,67	24.00	28.00	16.00
2	25.96	53.85	16.35	1.92	1.92
3	22.86	30.00	41.43	4.28	1.43
4	28.57	35.72	30.00	5.71	0.00
5	31.25	55.21	11.46	1.04	1.04
6	40.48	47.62	7.14	2.38	2.38
7	25.00	53.00	15.00	4.00	3.00
8	37.17	38.05	16.82	4.42	3.54
9	15.00	71.67	13.33	0.00	0.00
10	95.24	0.00	4.76	0.00	0.00
Mean	33.49	40.38	18.03	5.17	2.93
SEM	7.37	6.52	3.50	2.61	1.51
Median	27.26	42.84	15.67	3.19	1.67
Minimum	13.33	0.00	4.76	0.00	0.00
Maximum	95.24	71.67	41.43	28.00	16.00

Farms 1-5: loose housing system
Farms 6-10: tie stall system
SEM = standard error of the mean

Out of the 751 assessed cows 252 presented normal locomotion (LS=1); 303 were slightly lame (LS=2); 135 showed moderate lameness (LS=3); 39 were lame (LS=4), and 22 presented severe lameness (LS=5), respectively.
In order to evaluate the locomotion of the cows in this study the system suggested by Sprecher et al. (1997) was used because its objective and clear descriptions that differentiate each score. The proportion of the cows with normal gait (LS=1) was slightly higher than that obtained by Espejo et al. (2006) in the evaluation of the cows from 50 farms from Minnesota and lower than the value reported by Cook (2003) following the investigation of the cows in 30 dairy farms in

Wisconsin (54.9%). Less than a half of the cows assessed in this study presented abnormal locomotion (SL=2), but were not clinically lame. Similar results were recorded by Espejo et al. (2006). The percentage of the cows with a locomotion score of three (LS=3) was much less than recorded in Chile by Tadich et al. (2010). The percentage of the cows with score 4 (LS=4) was similar to that obtained by Yalylaket al. (2010) in Turkey and slightly higher than that recorded by Cook (2003) in the USA. The proportion of the cows with the locomotion score of 5 was higher than that reported by Tadich et al. (2010). It is considered that the presence of at least two cows with severe lameness in a farm represents a good indicator of the lameness

problems (von Keyserlingk et al., 2012). In this study at least two severely lame cows were found in half of the evaluated farms.

By classifying all of the cows that obtained a locomotion score higher than two in the „lame" category (Amory et al., 2006) it was established the lameness prevalence at farm level. In the studied farms, the lameness prevalence varied from 4.76% to 68% (Figure 1). Reported to the overall number of the assessed cows, the lameness prevalence was 26.10%.
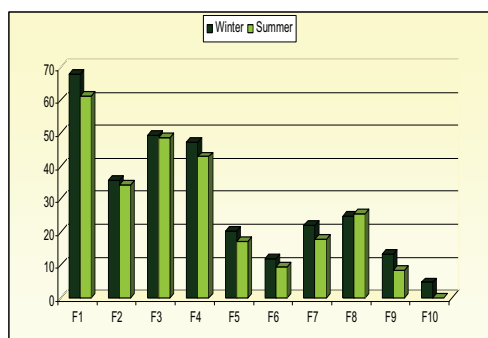

Figure 1 Lameness prevalence in the investigated farms

The prevalence of lameness was significantly higher (P>0.05) in the farms with loose housing system (44.07%) than in those with tie stalls (15.35%). Some studies reported a lower rate of lameness in the tethered cows than in those kept loose (Cook, 2003; Sogstad et al., 2005). This finding suggests that the loose system expose the cows to adverse environmental conditions that present importance in lameness epidemiology (Cook and Nordlund, 2009).

The studies accomplished in different countries of the world report various prevalence of lameness in dairy cows. It is possible that these high variations, both national and regional, in the estimation of lameness prevalence to be caused by the use of different assessment systems (Amory et al., 2006). Recent reports establish o scale of lameness prevalence in dairy cows from 20% (Espejo et al., 2006) to 54.8% (von Keyserlingk et al., 2012) for the cows kept in loose systems and from 1% to 21% for the systems in which the cows are tethered at least periodically (Sogstad et al., 2005; Zurbrigg et al., 2005). The new investigations

accomplished in Romania indicate a prevalence of lameness of 15.12% in dairy cows kept in tie stalls with access to free movement in paddocks and/or pasture and of 22.21% in those with access to move (Popescu et al., 2013b). In the Transylvanian dairy farms with loose housing a lameness prevalence of 31.04% was reported for the winter (Popescu et al., 2013a). The results of the present study indicate a slightly higher prevalence of lameness in the cows kept in loose housing systems.

Some authors (Raven, 1985) consider that the differences in the prevalence and severity of lameness in cows would be related more to hereditary factors and farm practices than to housing conditions. Other authors (Phillips and Schofield, 1994) claim the effect of flooring quality in the emergence of foot problems of the cows and the relatively hard surface of the resting bed. Generally, the increase in the lameness prevalence is associated with the hard, concrete floors, slippery traffic alleys (Cook and Nordlund, 2009), dirty and uncomfortable barns (Chapinal et al., 2013), improper body hygiene of the cows (Cook, 2002) and permanenet stabulation, without outside access (Cook, 2003; Zurbrigg et al., 2005; Haskell et al., 2006).

One of the key factors reducing lameness in dairy farms is its detection. The frequent assessment of lameness in dairy cows using animal-based measurements (locomotion score) presents several advantages, such as: implementation of some preventive measures at herd level, individual assessment and of the herd's welfare, but also the detection and early treatment of the lame cows. All these will contribute to increase the welfare degree of the dairy cows by reducing the incidence of lameness and of the pain and discomfort associated with it.

The lameness prevalence according to the farmers' estimates in each investigated farm is presented in figure 2.
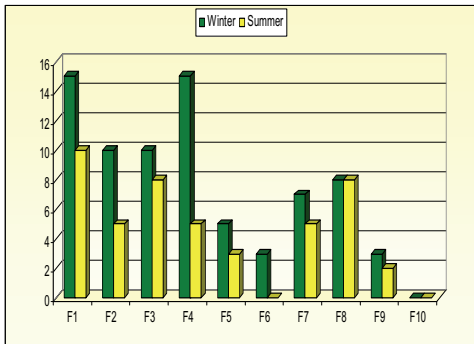
Figure 2 The lameness prevalence estimated by the farmers in 10 dairy farms

The prevalence of lameness estimated by the farmers was significantly higher (P<0.05) in the farms with loose housing system than in those with tie stalls.

Table 3 presents the descriptive statistical indicators for the lameness prevalence determined by the locomotion score and that estimated by the farmers. Significant differences (P<0.05) can be observed among the medians of the determined values.

Table 3. Descriptive statistical indicators for the lameness prevalence determined by the locomotion score and that estimated by the farmers in 10 dairy farms

Parameter	Locomotion score	Farmers' estimate
Mean	29.71	7.60
SEM	6.30	1.59
Median	23.38*	7.50
Minimum	4.76	0.00
Maximum	68	15.00

*P<0.05 – the difference between the lameness prevalence determined by the locomotion score and that estimated by the farmers is significant

In this study the lameness prevalence estimated by the farmer was 3 and up to 9.5 times lower (with a mean value of 3.1 times) comparing with that determined using the locomotion score. Different researchers reported similar results. Wells et al. (1993) found a lameness prevalence of 13.7% in summer and 16.7% in spring, these values being of 2.5 times higher than the prevalence estimated by the farmers. In a subsequent study Espejo et al. (2006) reported prevalence 3.1 times higher than that estimated by the farmers, in 50 dairy cows kept in loose system in Minnesota, using the scoring system of Sprecher et al. (1997). In the Great Britain Whay et al. (2003), using a locomotion scoring system with 4 points, reported a lameness prevalence of 22.1%, almost 4 times higher than that estimated by the farmers (5.7%). More recently, Sarova et al. (2011), using a 3 point scale locomotion scoring tools (0 – does not presents lameness, 1 – moderate lameness, 2 – severe lameness), reported that, in the Czech dairy farms, the mean prevalence of lameness was of 31%, comparing to 6% estimated by the farmers. These studies demonstrate that in the dairy farms from the United States and Europe the workers of the farms and the farmers perceive a much lower prevalence of lameness in the cows than it is in reality (determined using different locomotion scoring systems).

The farmers and farm employees seem to be unable to recognize about 30% of the lame cows (Whay et al., 2003; Espejo et al., 2006). In addition to the difficulty to identify the lame cows, the subtle changes of their behavior and also changes in their gait are not identified until the lesions of their hooves are advanced (O'Callaghan et al., 2003).

The results of the accomplished research show that the proportion of the lame cows identified using the locomotion score, but unidentified by the farmers and farm personnel varies between 60 and 80%. The main impact of the farmers' inability to recognize lameness is on the delay of treatment initiation. Leach et al. (2012) reported that a two-week delay in the beginning of treatment reduced the healing rate from 75% to 60% and shortened the time interval between the treatment and relapse from 4.5 weeks to 3.5 weeks in the cows that become lame again after the treatments. The same authors showed that the identification of the lame cows based on the locomotion score and not on the recognition by the farmers reduced the relapse rate from 58.3% to 36.9%.

CONCLUSIONS

In 70% of the investigated farms (100% with loose system and 40% with tie stall system),

the prevalence of lameness was unacceptable (≥ 15%).

The lameness prevalence was significantly higher in the loose dairy farms than in those with tie stalls.

Both in the farms with loose housing and in those with tie stalls the degree of lameness varied from mild to severe.

In all of the farms included in the study the farmers underestimated the prevalence of lameness.

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