MONITORING LAMENESS IN A DAIRY COWS FARM

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Abstract
Lameness has an important impact on milk production, welfare and farm profitability. Monitoring cattle was done in a farm A with 1000 Holstein from Bacău County, in the east of Romania. The indices used to evaluate the herd lameness were: incidence rate of lameness for treated cases, recurrence rate of lameness for treated cases, lameness index, monthly incidence rate and monthly recovery rate of lameness. Data collected from each lame cow included its unique identification, a locomotion (mobility) score, the identity of the lame leg(s) and any other pertinent information. We were focused on four most common lesions associated with lameness: sole ulcers, white line disease, digital dermatitis and interdigital necrobacillosis. In the farm A, percentage of lame cow with score 2 was 25, and the percentage of severely lame (score 3) was 5, much higher comparing to the targets. All other lameness indices were much higher comparing to the targets of a normal farm, which may explain the fertility problems and a decreased milk production during the last 2 years. Once lame cows have been identified, they should be examined, diagnosed and treated as soon as possible. A combination of early detection and effective treatment may have a number of benefits to the cow, herd and farm.
Key word*: lameness, locomotion score, foot-trimming, dairy cows*

Introduction

Lameness is a disease in all dairy farms where animals are raised for high milk production whether they are indoors, at pasture or a combination of both systems. In UK dairy cattle, during winter, the mean herd prevalence was 23.9% and 21.1% in summer (Cook, 2003). Other studies in UK based on data from 227 dairy herds, the prevalence of lameness during winter was estimated at 36.8% (Barker et al., 2010). The financial losses associated with lameness come from infertility, slaughter reduction in milk yield and high treatment costs. In a study, the average cost of lameness in UK herd was 80 euro per cow (Willshire and Bell, 2009). In this study we focused on the most common lesions associated with lameness and indices used to evaluate the herd lameness.

Materials and methods

Monitoring cattle was done in a farm A with 1000 Holstein from Bacău County, in the east of Romania. Data collected from each lame cow included its unique identification, a locomotion (mobility) score, the identity of the lame leg(s) and any other pertinent information. The indices used to evaluate the herd lameness were: incidence rate of lameness for treated cases, recurrence rate of lameness for treated cases, lameness index, monthly incidence rate and monthly recovery rate of lameness. We were focused on four most common lesions associated with lameness: sole ulcers, white line disease, digital dermatitis and interdigital necrobacillosis.

Results and discussions

In this farm A lameness has been monitored and recorded poorly in comparation with mastitis and fertility. This may explain in part explain why lameness control has lagged behind that of other diseases. Usually, the treatment records can be used to estimate the incidence and causes of lameness and the success of treatment.

There are many risk factors for lameness. Wet, slurry contaminated surfaces are major risk factors for digital dermatitis and interdigital necrobacillosis, but also predispose cows to heel erosion, soft claw horn, sole bruising, sole ulcers and possibly white line lesions. Forcing cows to stand for more than 2 h/ day while waiting for milking, artificial insemination, pregnancy diagnosis or other routine management activities can predispose to foot lesions. Poor lying comfort can also

lead to prolonged standing. In the farm A, cows are on concrete surfaces with insufficient straw bedding, which may explain the high lameness indices.

The role of nutritional management and an adequate ration (carbohydrates, protein, trace minerals, and vitamins) are very important in the control of lameness. Cows with a low body condition score at calving and in early lactation are predisposed to suffer from lameness because condition score is positively correlated with the thickness of the digital cushion, and the prevalence of sole ulcers and white line disease are associated with the thickness of the digital cushion (Bicalho et al., 2009; Hoedemaker et al., 2009). The supplementation of diets with biotin (20 mg/cow/ day) leads to a significant reduction in the incidence of white line disease (Pötzsch et al., 2003). In this farm A, cows are not receiving any kind of vitamins and minerals supplements. Supplementing diets with methionine, zinc, manganese, copper and cobalt at different levels of inclusion and in different forms may improve claw health and reduce the incidence of claw horn lesions.

The four most common lesions associated with lameness found in the farm A were: sole ulcers (pododermatitis circumscripta), white line disease (white line separation or white line haemorrhage), digital dermatitis (Mortellaro disease) and interdigital necrobacillosis (foot rot, foul or interdigital phlegmon) (Figs. 1, 2).

Sole ulcer is characterized by exposed corium below the flexor process of the pedal bone. In white line disease, the junction between the sole and wall is affected, including bruising (haemorrhage), separation (fissuring) and the formation of abscesses. Digital dermatitis is a well-circumscribed infection of the skin, between the heel bulbs or palmar/plantar pastern area. Lesions start as exudative epithelial erosions/ulceration, progressing to granulation, followed by hyperkeratosis and scab formation. Interdigital necrobacillosis is an acute bacterial infection of the subcutaneous tissues of the interdigital space characterized by symmetrical swelling, separation of the claws and interdigital skin necrosis, with a pungent odor (Huxley et al. 2012). Sole haemorrhage and ulcers are considered the result of contusions and damage to the tissues lying under the distal phalanx. White line haemorrhage and separation may have a similar cause.

Digital dermatitis is caused by bacteria, a combination of *Treponema* spp. is implicated. The bacteria are in lesions on diseased feet, and the transmission is cow to-cow via the environment. Interdigital necrobacillosis is caused by *Fusobacterium necrophorum*, which is present in cattle faeces and shed into the environment.

Claw horn lesions lead to greater losses than other lesions, with sole ulcer resulting in the largest losses. Animals have low productions for some time after treatment. Lame cows produce less milk before they are visibly lame (Reader et al., 2011). Total milk lost varies by lesion, for example, in case of sole ulcer, approximately 600 kg milk per lactation is lost (Huxley et al. 2012). In the farm A there are a decreased milk production per cow in the last 2 years.

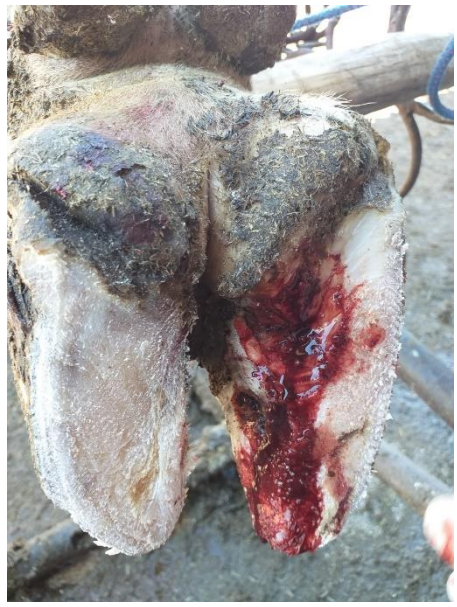

Fig. 1 Sole ulcer in a Holstein cow

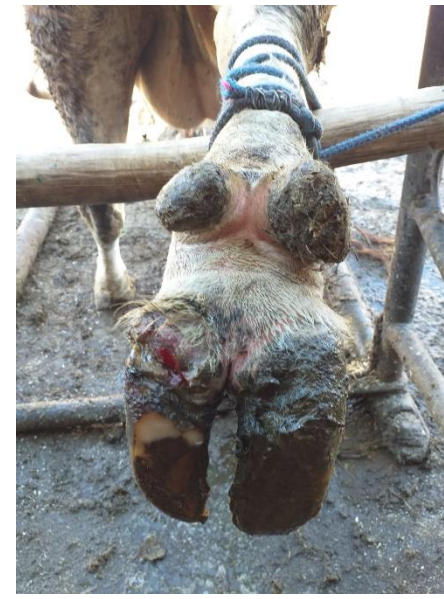

Fig. 2 Heel horn erosion in a Holstein cow

Regarding the fertility, lame cows have reduced cyclicity because of anoestrus or cystic ovarian disease, have a lower conception rate (Melendez et al., 2003), an increased risk of conception failure (Hernandez et al., 2005) and require more services per pregnancy. Lame cows have long calving to first service intervals calving to conception intervals, numbers of days open and long calving intervals (Hultgren et al., 2004). The farm A have all this fertility problems during the last 2 years

Locomotion score data was used to estimate the prevalence of lameness, to identify animals for treatment and to measure the success of control programs over time. Many locomotion scoring systems have been described, but, the two most commonly used are those of Sprecher et al. (1997), who proposed a five-point scale from not lame through to barely able to stand, and Whay et al. (2003) and Archer et al. (2010), who proposed a four-point scale.

For routine on-farm monitoring it is recommending the four-point scale for its simplicity and versatility. This score provides: Score 0 (cow walks with even weight bearing and rhythm on all four feet, with a flat back, long, fluid strides are possible; Score 1 (cow steps are uneven with rhythm or weight bearing or strides shortened, affected limb or limbs are not immediately identifiable); Score 2 (cow presents uneven weight bearing on a limb that is immediately identifiable and/or obviously shortened strides, usually with an arch to the center of the back); Score 3 (cow is unable to walk as fast as a brisk human pace (cannot keep up with the healthy herd) and signs of score 2 (Archer et al., 2010).

In the farm A, percentage of lame cow with score 2 was 25, and the percentage of severely lame (score 3) was 5, much higher comparing to the targets of a normal farm. Key indices found in the farm A and targets recommended for lameness are presented in Table 1. Regular, consistent locomotion scoring of all the cows in the herd allows the farmer to create an action list of lame cows for treatment and to conduct important analyses.

The estimation of incidence rates of lameness at different times and in different groups of cows is very important. Incidence rate is the number of new cases of lameness in a group of

individuals at risk over a specified time period, and is usually expressed as cases per 100 cows per year. The incidence rate of lameness should be evaluated for different stages of lactation, for cows of different parity, in different groups of cows within the herd, at different times of the year and for different lesion types and severities. It can be assessed over a two-weekly, monthly, or three-monthly period (Huxley et al. 2012). In the farm A this index was 30, much higher comparing to the target (<10-20).

The recurrence rate of lameness for treated cases (percentage of cows treated for lameness in which the lameness recurs in a six-month period), is high, indicating that the treatment is not appropriate every time. All other lameness indices were much higher comparing to the targets of a normal farm.

Table 1.

Lameness indices in the farm A

Index	**Target** (Huxley et al. 2012)	**Farm A**
Incidence rate of lameness for treated cases (cases/100 cows at risk/year)	<10-20	30
Recurrence rate of lameness for treated cases (percentage of cows treated for lameness in which the lameness recurs in a six-month period)	<25	30
Lameness index (score2)	<10-15	25
Lameness index (score3)	<1-2	5
Monthly incidence rate of lameness defined by mobility score (cows moving into a lame category as a percentage of those in the non-lame category at the previous recording)	<1-5	10
Monthly recovery rate of lameness defined by mobility score (cows moving into a non-lame category as a percentage of those in the lame category at the previous recording)	>75	55

Early identification and effective treatment reduce the prevalence of lameness by shortening the length of time. This also leads to a reduction in the incidence of future lameness by reducing the number of repeat cases. The severely lame cows (score 3) must be treated as soon as they are identified and lame cows (score 2) within 2 days. The most successful farms treat all lame cows as they are identified. The early stages of foot disease are easier to treat, respond more quickly and fully to treatment and are less likely to recur (Huxley et al. 2012).

In the farm A is no regular program of early detection of lameness. Many cows (25%) remain for a long time with the claw overgrowth, foot imbalance (mediolateral claw imbalance) and lameness. Foot-trimming interval is larger than 1 year in this farm (Fig.3)

Foot-trimming intervals should vary according to need. All cows that are lame or have overgrown claws (>9 cm of the dorsal wall for Holsteins) should be examined and trimmed as soon as practically possible. Given that most claw lesions develop in the weeks following calving, preventive trimming immediately before or soon after drying off is an appropriate time for many herds. In housed animals, a further examination may be warranted in mid-lactation (Hernandez et al., 2007).

Foot bathing is one of the principal measures for controlling lameness associated with digital dermatitis, both as a primary disease and when it is secondary to other lesions (Evans et al., 2011). Numerous chemicals with disinfectant qualities are used as foot bath solutions for dairy cattle, including formalin (5%, range 2–10%), copper sulfate (5%, range 2–6%), peracetic acid (1–2%) and hypochlorite (2%). Formalin and copper sulfate are the most widely used agents, but are not recommended for animals with painful, ulcerated lesions.

In the farm A, it is used copper sulfate solutions (5%) and formalin (5%) as feet antiseptics (Fig. 4). Antibiotics (tetracyclines, lincomycin) are also used to treat complicated cases of lameness. The fact that the cows are not often observed and the foot-trimming interval is larger than 1 year, the lameness persists with a high percentage in this farm. It is recommended foot bathing after 4–6 milkings each week (either consecutive milkings or consecutive days), which can then be adjusted up or down depending on the prevalence of lameness lesions.

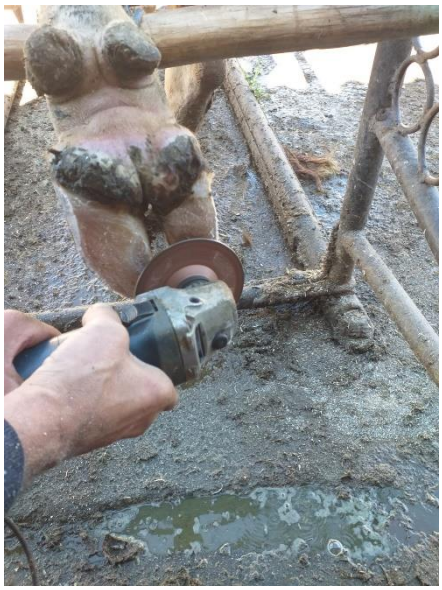

Fig.3 Foot-trimming in a Holstein cow with an incipient digital dermatitis

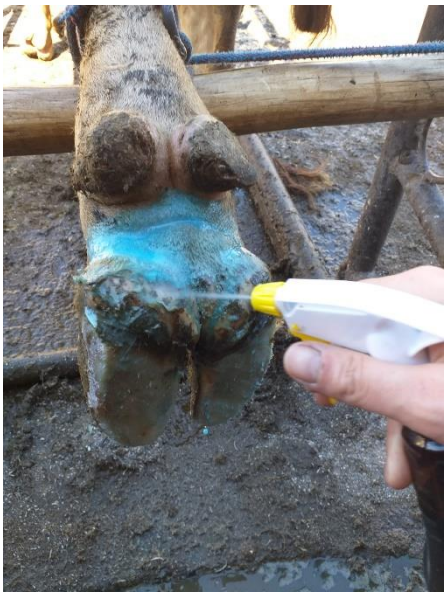

Fig. 4 Foot asepsis with copper sulfate solution

Conclusions

All the lameness indices from farm A, were much higher comparing to the targets of a normal farm, which may explain the fertility problems and a decreased milk production during the last 2 years.

Once lame cows have been identified, they should be examined, diagnosed and treated as soon as possible.

A combination of early detection and effective treatment may have a number of benefits to the cow, herd and farm.

Milk production and lameness have a heritable component so, it is recommended to select for cows that produce more milk and are less likely to become lame.

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