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Impact of Clinical Lameness on the Milk Yield of Dairy Cows

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Abstract: This study investigates the impact of lameness on milk yield. Lameness in dairy cows is an important disease with a multifactorial etiology and represents one of the three most common health problems, after infertility and mastitis. The dataset includes 488 cows on five farms in Tiaret area, Algeria, collected over 12 months during 2014. Total prevalence of lameness was of 12.7% but in dairy cows it was of 27.93% even treated the pathology remains with 3.86 and 8.56% in total herds and in dairy cows, respectively. In clinically lame cows, milk yield was reduced from up to 32.34% before a case of lameness was treated and for 4.74% after treatment but at cows with chronic lameness the reduction was of 42.41%. The total mean estimated reduced milk yield per day-lactation was approximately 3.49 L in herds but in individual lame cow it was of 8.2 l. As well, following treatment, the fall of lactation remains considerable, it was of in 1.1 l knowing that in cows with chronic lameness the fall is of 5.68 L/day. We conclude that clinical lameness was important with a significant impact on milk production. This is important information for assessing the economic impact of clinical lameness and its impact on cow health. It adds weight to the importance of early identification of clinical lameness and the urgency of techniques to improve the definition of this highly subjective diagnosis.

Key words: Dairy cow, clinical lameness, prevalence, dairy production, treatment

INTRODUCTION

Lameness is of concern in dairy cow because of its negative repercussion on dairy production (Green *et al*., 2002), association with pain (Whay *et al*., 2003), other diseases (Barkema *et al*., 1994) and because of the attributed economic losses.

Lameness represent the third disease of economic importance in breeding with an average of 11% of cows and a high variability inter-breedings.

If there is a downward bias in identifying whether or when a cow becomes lame, the impact of lameness on health, production and therefore, the consequential economic loss is likely to be underestimated.

The difficulty in defining clinical lameness may in part explain the high variability in the reported incidence of clinical lameness in dairy cows.

There is also clearly large variability in the incidence and types of lameness between farms (Hedges *et al*., 2001).

Part of the variation may also be attributed to the different skills of personnel responsible for identifying lame cows. Parlor workers, farm managers, veterinarians and research workers have been used to identify lame cows both within farms (Clarkson *et al*., 1996).

Despite this, the outcome clinical lameness is the best measure we have and is frequently used in observational research throughout the world (Barkema *et al*., 1994; Hedges *et al*., 2001).

The evidence for the impact of lameness on milk yield is conflicting. Some researchers report a decreased milk yield after diagnosis (Warnick *et al*., 2001), others a decrease in milk yield before a cow was treated as well as after and others that there is no change in milk yield (Cobo-Abreu *et al*., 1979).

This finding led Barkema *et al*. (1994) to conclude that an estimate of milk loss by calculating the deviation from the lactation curve of daily yields was necessary to assess the impact of lameness on milk production rather than comparison of cumulative yields. This is the aim of this study to assess the impact of lameness on the milk yield in dairy cows.

MATERIALS AND METHODS

The data collected during 2013 come from 488 Friesian/Holstein cows including 222 dairy cows on five farms in Tiaret Department, Algeria. The herds were spring calving and have same environment. Cows were at pasture in the summer months and fed with concentrate

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ration fed the parlor. During the winter, cows were housed in spans and fed a concentrate ration (16-17 kg) in the parlor and conserved forage (feed and straw) in yards.

Clinical lameness was identified by the farmer and diagnosed and treated by veterinarians on standard form. The milk production and the prevalence of lameness were measured by regular visits to herds, during which locomotion was scored on a 1-5 point scale and after each visit the prevalence of lameness was calculated as the proportion of cows with scores of 3 or more. The occurrence of clinical lameness in lactation was used to estimate the impact of lameness on milk yield.

Statistical analysis: Association between reduction in lactation and lameness were compared with Student's t-test.

RESULTS AND DISCUSSION

Table 1 summarized lameness in percent in each general herd than at dairy cows. Over 12.7% of cows became lame at least once but prevalence was higher 27.93% in dairy cows which represent 45.49% of total herd. The chronic lameness is higher in dairy cows 8.56%.

In Table 2, the dairy production was recorded in every breeding to estimate the lameness incidence. The estimated average reduction in milk yield due to lameness is of 3.49 L/day but in individual lame cows the fall is of 8.2 L/day. Even after treatment the reduction was of 1.1 L/day while at cows with chronic lame the loss is of 5.68 L/day.

We noticed that dairy cows return to the normal lactation when therapy was applied early in contrary bred heifers do not come back to the normal from calving.

After lameness episode, delay returning in heat was observed especially among heifers where sequelae are observed (bad balance) ever after treatment.

There are several known risk factors for appearance of lameness in cattle (Flower and Weary, 2009). The state of grounds but also the supply system has an impact on the locomotion note or the proportion of clinical lameness (Olmos *et al*., 2009). In our study, we noticed hard ground and non-compliants cowshed (hygiene).

The mean average lameness is of 12.70% nevertheless other studies in Algeria revealed lameness prevalence of 78.5 and 4.6%, respectively (Ghozlane *et al*., 2010). Our finding joins the results reported by Whay *et al*. (2003) where average prevalence in herds measured during a punctual visit is estimated at 20-25%.

A considerable disparity in lameness prevalence in dairy herds is reported worldwide, e.g., 3.5% in Ethiopia, 7% in Denmark, 11% in Kenya, 18% in Netherlands, 28.5% in Canada and 36.8% in England and Wales as reported by Sulayeman and Fromsa (2012), Alban (1995), Mohamadnia (2006), Clarkson *et al*. (1996), Ito *et al*. (2010) and Barker *et al*. (2010), respectively. Another studies reported high variability in incidence is reported, e.g., Harris *et al*. (1988) reported 0-50% in Australia, Barkema *et al*. (1994) reported 9-50% in the Netherlands when Eddy and Scott (1980) and Hedges *et al*. (2001) reported incidence of 5 and 70%/year, respectively.

Probably these results were associated with the difficulty of defining clinical lameness (Clarkson *et al*., 1996).

This study showed 90% cases of lameness are arthritis, interdigital whitlow and interdigital dermatitis when in another study the four most frequent diagnoses of lameness were sole ulcer, white line disease, interdigital necrobacillosis and digital dermatitis (Green *et al*., 2002). This is due probably to herd management.

In this study, the estimated reduction in mean daily milk yield after the episode of lameness was 1.68 kg/day and the incidence was significant ($p<0.05$). But slightly lower (Green *et al*., 2002; Espejo *et al*., 2006) and higher (Bicalho *et al*., 2008) mean daily milk yield losses were also recorded after onset of lameness. This variation in

Table 1: Lameness prevalence at herds (%)

Herd	Lameness	Lameness in dairy cows	Chronic lameness at herd	Chronic lameness in dairy cows
A	15.91	53.85	5.91	20.00%
B	8.33	14.63	1.39	2.44
C	12.50	41.67	0.00	0.00
D	6.06	13.33	3.03	6.67
E	11.38	15.73	3.25	4.49
Mean	12.70	27.93	3.89	8.56

Table 2: Lameness incidence on dairy production (L/day)

	Milk production (L/day)				
Herd	Before lameness (total herd)	Herd with lame (total herd)	Lame cows	After treatment (total herd)	Chronic lame
A	25.00	19.61	15.00	23.92	18.00
B	30.00	29.12	24.00	29.56	24.00
C	18.00	14.66	10.00	16.75	0.00
D	20.00	18.80	11.00	19.33	11.00
E	20.00	18.65	13.50	19.00	16.00
Mean	23.20	19.71	15.00	22.10	17.52
SD	3.97	4.17	3.22	4.14	2.31

the amount of milk yield loss due to lameness may be attributed to the difference in productivity of the cows and type and severity of lesion. Cows with abscesses or foot rot tended to have larger decreases in milk production (Warnick *et al*., 2001).

CONCLUSION

Even where there is an adequate quantity and quality of food, high yielding cows must stand for long periods to eat and this too may increase their risk of lameness (Green *et al*., 2002). Genetic studies indicate that high milk yield is negatively correlated with low incidence of lameness. However, it may also be that these cattle are at greater risk of lameness innately (Hansen *et al*., 1979). A better management in dairy herd can reduces the lameness prevalence.

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