



Cumulative Incidence of Locomotor Disorders in Dairy Herds of Tehran Province

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Abstract

Objective- Locomotor disorders are prevalent health problems in dairy herds that negatively affect milk production, reproduction performance and animal welfare. The ultimate cost of locomotor disorders in dairy cattle is substantially greater than treatment costs alone. As limited information is available on incidence of feet and leg disorders in Iran, the objective of this study was to determine cumulative incidence of locomotor disorders in dairy herds of Tehran province.

Design- Historical cohort study

Study population and procedures- Totally, 10506 Holstein cows, from 32 Iranian dairy herds, which calved from March 2007 to March 2008, were followed until the next calving or culling and cumulative incidence of locomotor disorders was calculated based on registered data.

Results- Cumulative incidence of locomotor disorders in the studied cows was 23.2% (95% CI: 22.4- 23.9). This index was 20.0% (18.7-21.2), 19.6% (18.2- 21.0), 29.3% (27.1-31.5), 29.3% (27.1-31.5), 35.6% (31.6-49.3) and 23.8% (19.2-28.4) in the first to sixth and more than sixth lactation, respectively. This showed, locomotor problems are important issue in this area. Moreover, with increasing parities cumulative incidence of locomotor disorders increased; this increase could be due to weight gain, increased milk production and culling susceptible animals to these health disorders before sixth lactation.

Conclusion and Clinical Relevance- Our findings confirm the results of previous studies that dairy herd-health programs should emphasize the control of feet and leg disorders.

Keywords- Incidence, Locomotor disorders, Dairy cattle, Tehran Province.

Introduction

Locomotor disorders are important health problems in dairy cattle from both animal welfare and economic points of view. The high incidence, duration, and severity of these health disorders account for their importance.¹ Welfare of the cows refers to ethical quality of production, and locomotor disorders, causing pain and suffering to cows, are important issues.^{2,4} Economic losses arise from the direct costs of treatment,

negative effects on milk production⁵⁻⁷ and reproduction⁸⁻¹⁰, and increased culling.¹¹

The costs due to feet disorders, which are present without treatment or detection by farmers, are considerable. This finding implies that farmers might underestimate the benefits of taking action earlier and more thoroughly.¹

Knowing the number of lame cows is very important principle to herd economics. Incidence, obtained from longitudinal studies, shows the number of new cases and therefore is a very good and important index.^{5, 12} Despite the availability of data about the feet disorders occurrence and risk factors in dairy herds, there are a few studies about incidence of these health problems in Iranian dairy herds. This study was conducted to determine the incidence of this health disorder in dairy cattle in Tehran province, Iran.

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Materials and methods

Study population and data collection

Herds with >50 cows, 55- >5000 cows/herd, located in the Tehran province, with continuous veterinary supervision included in this study. From the 679 registered herds 32 were selected with complete records on health, productive and reproductive performance records. Predominant breed in this area is Holstein- Friesian cows, with annual breeding programs. Cows were housed in open-shed or free stall barns and milked 2 or 3 times a day. Herds are fed on total mixed rations; diets are based primarily on corn silage, alfalfa hay and concentrates including corn, soya meal, bone meal and mineral supplements.¹³

In total, 10506 cows which calved between March, 21th 2007 and March, 20th 2008 were included in the study. These cows were followed until next calving or culling. Data on occurrence of foot and leg disorders were recorded based on either veterinary diagnosis or farmers' observations followed by veterinary confirmation.

Statistical Analysis

Cumulative incidence (CI) was calculated based on the following formula:

$$CI = \frac{\text{Number of newly affected individuals in a defined time period}}{\text{The population at risk}}$$

95% confidence intervals (95% CI) was calculated based on a binomial distribution.¹²

To compare cumulative incidence of locomotor disorders among multiple groups, we assumed the relative risk of disease is equal to one in the first lactation and the risk of disease in other groups was calculated in comparison to this group.

Data management and analysis were performed using Stata statistical software (StataCorp. 2007. Stata Statistical Software: Release 10.1 College Station, TX: StataCorp LP.).

Results

Of these 10506 cows, 3904 (37.2%), 3163 (30.1%), 1699 (16.2%), 837 (8.0%), 551 (5.2%), 251 (2.3%), 71 (0.7%) and 30 (0.3%) were in the first to eighth lactation or more, respectively. Locomotor disorders were diagnosed in 23.2% of studied cows. Of these 2434 cows, 552 (22.7%) and 111 (4.6%) were lame for second and third times, respectively. Higher parity cows had a higher risk of locomotor disorders (Table 1).

Table1. Cumulative incidence and Relative risk of locomotor disorders in different lactation of Dairy Herds of Tehran Province.

Parities	Number of Cows	Number of affected cows	Cumulative Incidence Percentage (95% CI*)	Relative Risk (95% CI)	p_value
1	3904	779	20.0 (18.7- 21.2)	1	---
2	3163	619	19.6 (18.2-21.0)	0.99(0.92- 1.05)	0.7
3	1699	498	29.3 (27.1- 31.4)	1.40(1.29- 1.53)	<0.0001
4	837	260	31.1 (27.9- 34.3)	1.61(1.41- 1.83)	<0.0001
5	551	196	35.6(31.6- 39.8)	1.97(1.68- 2.31)	<0.0001
≥6	352	83	23.8(19.2- 28.4)	1.16(0.93- 1.46)	0.09
Total	10506	2434	23.2(22.6- 24.2)	---	---

*95% Confidence Intervals

Discussion

In this study, we investigated the cumulative incidence of locomotor disorders in dairy herds in Tehran province. Estimates were based on a convenient sample of 32 herds, which corresponds to approximately five percent of the herds with >50 cows. We found that more than 23 per 100 cow-lactation of cows were lame in lactation period and

the risk of this health disorder increased up to sixth lactation in comparison to first lactation.

Incidence of leg disorders was reported from 1.9% to 37.9% in one lactation period in different studies; in Canada, 1983, (5.0%)¹⁴, in United States, 1986, (1.9%)¹⁵, in Ontario, 1990, (3.6%)¹⁶, in France, 1994, (5.0%)¹⁷, in Finland, 1998, (2.3%)¹⁸, in Australia, 2000, (3.7%)¹⁹, in British dairy herds, 2000, (23.7%)²⁰, in two study in Minnesota, USA, 1998 and 2006,

(2.9% and 24.6%).²¹⁻²², and lastly in United States, 2009, (37.9%).²³ Differences in selection criteria, country, environmental conditions, housing, sampling season, method of data collection, duration of study and definition of clinical health disorders undoubtedly contributed to these fluctuations in reported incidence of locomotor disorders. According to these data, the incidence of locomotor disorders increased during time, and recent studies showed higher rate than the earlier ones; this can be related to rise in milk production in dairy cows.

We found that the cumulative incidence of locomotor disorders increased with parity. This rise could be due to weight gain, increased milk production up to this age and also culling susceptible animals to feet and leg disorders before sixth lactation.

In this study, we relied on registered data on husbandry that can influence on reliability the data. Disadvantage of these kinds of data is underreporting of health disorders; for this reason, we only chose herds with more than 50 cows that had a reliable registered database.

Conclusion

The results of this study and previous studies in dairy herds in Iran show locomotor disorders are important in Iranian dairy herds and factors relating to control of these health disorders must be improved in these herds to increase reproductive performance and reduce the risk of culling.^{8,11,13}

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چکیده

بروز تجمعی مشکلات اندام های حرکتی در گاوداری های صنعتی استان تهران

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هدف - مشکلات اندام های حرکتی عوارضی با شیوع بالا در گله های گاو شیری می باشند که اثرات منفی بر تولید شیر، عملکرد تولید مثل و رفاه و راحتی حیوان می گذارند. هزینه نهایی مشکلات اندام های حرکتی در گاوهای شیری بیشتر از هزینه های درمان به تنهایی است. به دنبال دسترسی محدود اطلاعات میزان بروز مشکلات اندام های حرکتی در ایران، هدف از این مطالعه مشخص کردن میزان بروز تجمعی مشکلات اندام های حرکتی در گاوداری های شیری استان تهران بود.

طرح - مطالعه هم گروهی تاریخی

حیوانات - تعداد ۱۰۵۰۶ گاو هلشتاین از ۳۲ گاوداری شیری که از اول فروردین تا ۲۹ اسفند ۸۶ زایش داشتند به مطالعه وارد شدند.
روش کار - گاوها از زمان زایش تا زایش بعد یا حذف از گله مورد پیگیری قرار گرفتند و بروز تجمعی مشکلات اندام های حرکتی براساس داده های ثبت شده محاسبه گردید.

نتایج - بروز تجمعی مشکلات اندام های حرکتی در گاوهای مورد مطالعه ۲۳/۲٪ (فاصله اطمینان ۹۵ درصد: ۲۳/۹-۲۲/۴) بود. این شاخص ۲۰/۰٪ (۲۱/۲-۱۸/۷)، ۱۹/۶٪ (۲۱/۰-۱۸/۲)، ۲۹/۳٪ (۳۱/۵-۲۷/۱)، ۲۹/۳٪ (۳۱/۵-۲۷/۱)، ۳۵/۶٪ (۴۹/۳-۳۱/۶) و ۲۳/۱۸٪ (۲۸/۴-۱۹/۲) به ترتیب در گاوهای شکم اول تا شکم ششم و بیش از آن بود. این نتایج نشان داد که مشکلات اندام های حرکتی مسئله مهمی در گاوداری های این منطقه می باشد. هم چنین با افزایش تعداد شکم زایش بروز تجمعی مشکلات اندام های حرکتی هم افزایش می یابد، این افزایش می تواند ناشی از افزایش وزن، افزایش تولید شیر، حذف گاوهای مستعد به لنگش قبل از شکم ششم باشد.
نتیجه گیری و کاربرد بالینی - یافته های ما نتایج مطالعات قبلی را تایید کرد که برنامه های حفظ سلامت گاوهای شیری باید بر لزوم کنترل مشکلات اندام های حرکتی تاکید کنند.

کلمات کلیدی - بروز، مشکلات اندام های حرکتی، گاو شیری، استان تهران