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 reproduction6-10, 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.
Materials and methods

Study population and data collection

Herd 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).

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

*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%), and lastly in United States, 2009, (37.9%). 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.

References

چکیده
بروز تجمع مشکلات اندام های حرکتی در گاوداری های صنعتی استان تهران

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هدف - مشکلات اندام های حرکتی عارضی با شیوع بالا در گله های گاو شیری می باشند که اثرات منفی بر تولید شیر، عملاکرد تولید مثل و رفاه و راحتی حیوان‌ها را گزارش دارند. هزینه‌های مالی مشکلات اندام های حرکتی در گاوداری شیری بیشتر از هزینه‌های دارند به تنهایی است. به دنبال دسترسی محدود اطلاعات این بروز مشکلات اندام های حرکتی در ایران، هدف از این مطالعه مشخص کردن کاربرد بروز تجمع مشکلات اندام های حرکتی در گاوداری های شیری استان تهران بود.

طرح - مطالعه هم گروهی تاریخی

حیوانات - تعداد 106 گاوهای شیری که از اول فروپیدن تا 24 اسفند 84 راژ منطقه دشتی داشتن به مطالعه وارد شدند.

روش کار - گاوهای از زمان زایش تا انتقال بعد با حذف از گله مورد پیگیری قرار گرفته و بروز تجمع مشکلات اندام های حرکتی براساس داده‌های تبدیل شده محاسبه گردید.

نتایج - بروز تجمع مشکلات اندام های حرکتی در گاوهای مورد مطالعه در 94/6 درصد (فاصله اطمینان 95 درصد: 2/23-2/20) بود این شاخص 200/6، 180/1، 180/2، 180/3، 180/4، 180/5، 180/6، 180/7، 180/8، 180/9، 180/10، 180/11، 180/12، 180/13، 180/14 درصد را برآورد کرد. در این تحقیق نشان داد که در نوبت انتقال نشان داد که در نوبت انتقال نشان داد که مشکلات اندام های حرکتی نیست مسئله مهمی در گاوداری های این منطقه می باشد. هم جنین با افزایش تعداد شیری بروز تجمع مشکلات اندام های حرکتی هم افزایش می یابد این افزایش می تواند ناشی از افزایش وزن، افزایش تولید شیر، حذف گاوهای مستعد به افزایش قیف از شکم شمش باشد.

نتیجه گیری و کاربرد بالینی - یافته‌های ما نتایج مطالعات قبلی را تایید کرد که برای مهارت حفظ سلامت گاوهای شیری باید بر لزوم کنترل مشکلات اندام های حرکتی تأکید گردد.

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