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ANALYSIS OF THE MOST COMMON DISEASES IN FINNISH AYRSHIRE COWS

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L'occurrence des principales maladies a été décrite sur 39 727 vaches laitières ayant vêlé en 1993 et de race Finnish Ayrshire. Toutes les maladies ont été diagnostiquées par un vétérinaire. Le taux d'incidence au cours de la lactation et le délai médian après vêlage du premier traitement sont présentés pour 16 maladies différentes. Une occurrence de maladie a été considérée comme nouvel épisode de cette pathologie s'il y a eu au moins trois semaines d'écart entre les traitements consécutifs. La récurrence d'une maladie et le nombre de traitements/épisodes sont donnés pour les principales pathologies.

Les mammites cliniques ont été prises comme exemple de maladie pouvant survenir à n'importe quel moment de la lactation, et l'analyse de survie (event-time analysis) a été appliquée pour décrire la dynamique de la pathologie. Le taux d'incidence des mammites cliniques au cours de la lactation était de 17%, et le délai médian d'apparition de la maladie après vêlage de 47 jours. Plus de 14% des vaches ayant eu une mammite clinique ont subi un deuxième épisode de la maladie au cours de la lactation. Le taux d'incidence au cours de la lactation était le plus élevé pour les vaches de rang 4 ou plus, et le plus bas pour les vaches primipares. Le taux d'incidence de mammite clinique était le plus élevé en début de lactation, i.e. durant les deux premières semaines suivant le vêlage.

L'analyse de survie permet une description plus détaillée du profil temporel de la maladie au cours d'une lactation que la description de l'occurrence de la maladie avec le plus traditionnel taux d'incidence au cours de la lactation (i.e. incidence cumulée). L'analyse de survie donne le taux réel de maladie à tout moment durant la lactation.

INTRODUCTION

Occurrence of diseases can be described in many different ways; the basic measures of disease frequency are incidence rate, cumulative incidence and prevalence (3). A commonly used measure describing disease occurrence in dairy cows is lactational incidence risk (2).

As the dairy business becomes more and more competitive, all the decisions farmers make about treatments and replacement of their cows should be based on economics. In order to make rational decisions a farmer must have a valid estimate of the future profitability of each cow, accounting for factors including e.g., age, production level, and disease history. The more detailed information we have about disease occurrence and recurrence of diseases during lactation, the more accurate estimates we can obtain about the effects of diseases on production and on culling and consequently on the profitability of a dairy cow. Important questions are: 1) how much disease is there, 2) when do diseases occur, 3) how many treatments do cows require for an episode of a disease, and 4) how frequently do diseases recur.

The objective of this paper is to describe the disease occurrence in Finnish Ayrshire cows in more detail than has been done previously.

MATERIALS AND METHODS

The data consisted of 39,727 Finnish Ayrshire cows that calved during 1993 and were followed until next calving or culling. The cows were in herds that belong to the milk registry and the national health recording system (2). All diseases were diagnosed by a veterinarian under normal field conditions.

The first occurrence of a disease was expressed as lactational incidence risk (LIR), which was calculated as the number of cows with at least one occurrence of the disease divided by the number of cows at risk. This measure gives the cumulative incidence of a disease during a lactation. An occurrence of a disease was considered to be a new episode of that disease if at least three weeks had passed between consecutive treatments.

Using acute mastitis as an example of a disease which can occur at any time during the lactation, event-time analysis (1) was applied to describe the dynamics of the disease.

RESULTS AND DISCUSSION

Table I presents the lactational incidence risks and median time to first treatment of 16 different diseases. The percentage of cows experiencing the same disease again during the same lactation is also given in Table I. The five most common diseases were: acute mastitis (LIR 17.0%), anestrus (8.1%), ovarian cysts (7.3%), milk fever (5.4%), and ketosis (4.9%). Lactational incidence risk of acute mastitis was highest for the oldest cows, i.e., parity $\geq$ 4 (20.2%) and lowest for cows in parity 1 (14.2%) (not presented in the table). For cows in parity 2 and in parity 3 LIR was 16.5% and 17.6%, respectively . The highest recurrence percentage was observed for acute mastitis; over 14% of cows with acute mastitis contracted the disease again later on during the lactation. About

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12% of cows who had once been treated for fertility disorders, were diagnosed with the same disorder later on during the same lactation.

Table I
Lactational incidence risks of the most common diseases in 39,727 Finnish Ayrshire cows calving in 1993.

Diagnosis	LIR1[1]	n[2]	dim1[3]	LIR2[4]	n[2]
Dystocia	2.1	833	0	na	
Retained placenta	3.1	1225	2	na	
Metritis	3.2	1259	21	7.6	96
Anestrus	8.1	3200	85	11.9	381
Ovarian cysts	7.3	2890	94	12.2	353
Milk fever	5.4	2161	1	na	
Other paresis	1.0	382	27	2.6	10
Ketosis	4.9	1966	28	8.5	168
Hypomagnesemia	0.5	199	47	1.0	2
Displaced abomasum	0.7	295	16	4.4	13
Rumen disorders	1.6	654	38	2.1	14
Hardware	0.8	307	80	0.7	2
Acute mastitis	17.0	6738	47	14.2	958
Teat injury	3.4	1334	100	6.1	81
Chronic mastitis	4.1	1631	135	8.2	134
Lameness	2.3	931	52	5.4	47

[1]LIR1 = # of cows with at least one occurrence of the disease divided by the total number of cows at risk
[2]n = number of cows experiencing the disease
[3]dim1 = median time in days from calving to the first diagnosis
[4]LIR2 = percentage of cows with a disease who have a second episode of that same disease; second episode occurs at least 3 weeks later than the preceding treatment
na = not applicable

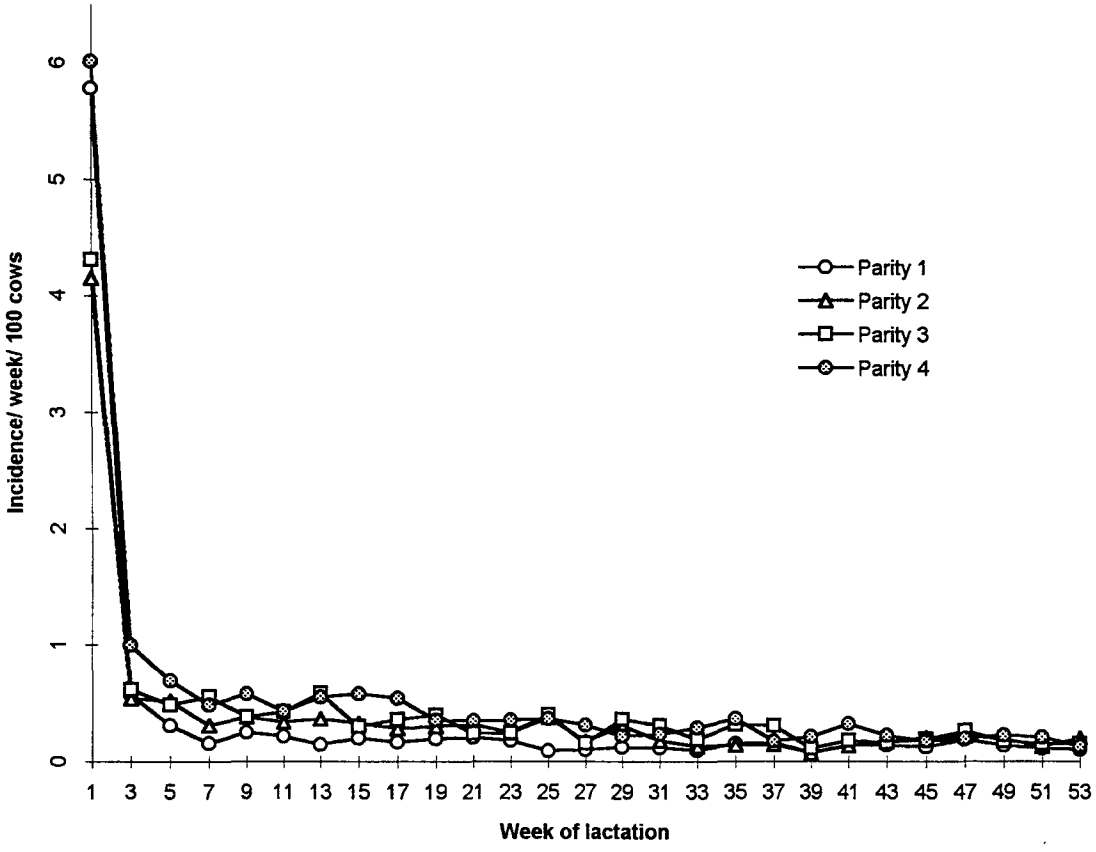
Table II presents the percentage of cows with a disease who were treated once, twice or three or more times for the first episode of the disease. Milk fever was the one disease that required the most repeated treatments: almost 30% of the cows were treated at least twice, whereas for the other diseases about 10% of the cows required at least two treatments. Of cows with acute mastitis almost 14% were treated at least twice for the first episode of the disease.

Table II
Percentage of cows requiring 1, 2, or 3 or more treatments for the first episode of the five most common diseases in 39,727 Finnish Ayrshire cows, n=number of cows experiencing the disease

Disease	1	2	≥3	n
Anestrus	92.6	6.7	0.7	3200
Ovarian cyst	90.3	8.7	1.0	2890
Milk fever	70.2	22.1	7.7	2161
Ketosis	91.4	7.7	0.9	1966
Acute mastitis	86.3	11.9	1.8	6738

Figure 1 presents the weekly incidence rates of acute mastitis / 100 cows by parity. The mastitis incidence was highest during the first two weeks after calving for all cows, even though the median time to first diagnosis after calving was 47 days. Cows in parity 1 were at the lowest risk of mastitis over the whole lactation; however, their mastitis incidence during the first weeks of lactation was almost as high as that of cows in fourth or higher parity. Then, later on during the lactation, the incidence rate of acute mastitis for parity 1 cows was lower than that of any older cows.

Figure1
Weekly incidence rates of acute mastitis / 100 cows by parity over one lactation, in 39,727 Finnish Ayrshire cows.



CONCLUSIONS

Event-time analysis allows a more detailed description of the temporal pattern of the disease during a lactation than does describing the occurrence of the disease with the more traditional lactational incidence rate (i.e., cumulative incidence). Event-time analysis gives the actual rate of disease at any point during lactation.

REFERENCES

1. Allison,P.D. 1995. Survival analysis using the SAS® system: A practical guide, Cary, NC: SAS Institute Inc., 292 pp.
2. Gröhn Y.T., Erb H.N., McCulloch C.E., Saloniemi H.S.1990. Epidemiology of mammary gland disorders in multiparous Finnish Ayrshire cos. Prev. Med. Vet. 8, 241-252.
3. Rothman K.J.1986. Modern Epidemiology. Little, Brown and Company, Boston, pp. 23-34.