Is Bovine Mastitis Being Reduced?

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Abstract

The International Dairy Federation has carried out surveys of its member countries at five year intervals in an attempt to quantify the mastitis situation and monitor progress in control. The survey takes the form of a questionnaire which has gradually expanded and now includes questions on the dairy cow population, mastitis control schemes, monitoring procedures, mastitis control measures, milk payment, progress in mastitis control and future plans. Nine countries replied to the first questionnaire in 1973; by 1994 this had increased to 24 countries. Data on mastitis cell counts have been available in some countries from the first survey, but seven countries were still unable to provide national data in 1994. Most of the available data demonstrate a reduction in national average cell counts. In the 1994 survey 13 countries recorded a reduced cell count since 1990 although 21 considered there had been definite or some improvement recently. Few data are available on the national situation on subclinical and clinical mastitis and comparative information is rare. In the same survey the prevalence of subclinical mastitis had been reduced in three of seven countries since 1990 and the incidence of clinical mastitis had been reduced in two of six countries. These data indicate little progress in reducing mastitis in recent years.

Introduction

Published data from most dairying countries provide convincing evidence of a reduction in clinical and subclinical bovine mastitis during the 1970s and 1980s. For example, Booth (1988) demonstrated a reduction in the annual incidence of clinical mastitis in the UK from approximately 150 cases/100 cows/year in the 1960s to 40-50 cases/100 cows in the early 1980s. In the same paper the prevalence of subclinical mastitis in the UK was shown to have been reduced from over 50% of cows infected in the 1960s to 32% in 1977.

The progress achieved in reducing mastitis over these decades was attributed to the adoption by the majority of dairy farmers of a comprehensive mastitis control programme founded on the fundamental research carried out in the 1960s.

Cell Counts

The cell count of milk has long been regarded as a measure of subclinical mastitis. The advent of an electronic method of counting cells in milk in the 1960s (Tolle, Zeidler and Heeschen, 1966) provided a simple and inexpensive means of monitoring cell counts in bulk milk. Several countries now have data on their national average mastitis cell counts going back more than 20 years.

The cell count of bulk milk has now come to be regarded as a measure of the quality of milk produced by a herd. Over the last decade this has resulted in the increasing application of payment schemes for milk which penalise high cell counts. Dairy farmers have reacted very effectively to these schemes by reducing their bulk milk cell counts.

The question now is whether this reduction in cell count reflects a parallel reduction in mastitis infection in its clinical and subclinical forms.

The International Dairy Federation (IDF) has issued regular questionnaires, at approximately five year intervals, requesting information on progress in the control of mastitis. Summaries of the replies from the national dairy associations have been published by the IDF. The first survey contained information from nine countries for 1970/71 (IDF, 1973).

Comparatively few data were available at that time, but subsequent questionnaires have elicited comprehensive information on the mastitis and cell count situation from an increasing number of national dairy associations. The most recently published survey (Booth, 1995a) contained information from 24 IDF member countries. Table 1 reproduces the national cell count

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information since 1980 provided by the 17 countries having data.

Table 1. National mastitis cell counts

Country	Mean	Cell count (000/ml) 1980	1985	1990	1993	Change since 1990
Australia	A	-	-	379	313	-66
Belgium	G	-	550	307	265	-42
Denmark	A	390	350	368	309	-59
Finland	A	-	-	282	186	-96
Germany	G	-	-	274	237	-37
Hungary	A	-	-	419	351	-68
Israel	A	-	-	395[a]	450	+55
Italy	A	-	-	434	426	-8
Japan	A	-	250	260	280	+20
Netherlands	A	400	350	320	280	-40
New Zealand	W	-	-	345	255	-90
Norway	A	236	248	206	194	-12
South Africa	A	-	-	350	465[b]	+115[b]
Sweden	G	282	266	230	231	+1
Switzerland	A	171	128	117	104	-13
UK	G	469	376	329	277	-53
USA	A	550[b]	500[b]	400[b]	350[b]	-50[b]

Means: A Arithmetic
G Geometric
W Weighted

[a] Only 44.2% of herds
[b] Estimate

All but four of the 17 countries show cell count reductions since 1990. All countries having data for more than ten years are able to show a marked reduction.

There is little doubt that, under the pressure of increasingly severe cell count payment schemes, national cell counts have declined further since 1993. In England and Wales for example, the national average declined from 273 thousand cells/ml in 1993 to an estimated 256 in 1994 and 215 in 1995. This represents a reduction of 21% over two years, and a total reduction of 62% from the average of 573 thousand cells/ml in 1970.

Sub Clinical Mastitis

There are far fewer national data available on the prevalence of subclinical mastitis, and in a number of countries these are estimates. Table 2 reproduces the information provided since 1980 by the national dairy associations of nine countries in response to the most recent IDF mastitis control questionnaire (Booth, 1995a).

Table 2. National subclinical mastitis data

Country	% cows infected 1980	1985	1990	1993	Change since 1990
Belgium	45	-	-	35	-
Denmark	-	39.5[c]	42[d]	49.9	+7.9
Hungary	-	60	60	70	+10
Netherlands	8	9	15	15	0
Norway	-	-	25.4	24.1	-1.3
Sweden	-	28[e]	28[e]	30[e]	+2
Switzerland	22.4[ab]	-	20.7[ac]	19[a]	-1.7
UK	32	-	-	-	-
USA	45	40	30	24	-6

[a] Approximate
[b] 1979
[c] 1989
[d] 1991
[e] Estimate

Only three of the seven countries with comparative data since 1990 are able to show any reduction in the prevalence of subclinical mastitis and these are comparatively small. Three countries shown an increase.

Reliable data on the prevalence of subclinical mastitis are expensive and time-consuming to obtain and, apart from the Scandinavian countries and Switzerland, few countries attempt the exercise. In the UK for example, the last national survey was carried out in 1977 (Wilson and Richards, 1980) and no data, or even estimates, are available to indicate what has or has not been achieved over the past 19 years.

Clinical Mastitis

Clinical mastitis data, which at first would appear to be much easier than subclinical mastitis data to obtain, are equally sparse. Table 3 reproduces the information since 1980 provided by the national dairy associations of nine countries in response to the 1994 mastitis control questionnaire (Booth, 1995a). Again, a number of the figures given appear to be estimates.

Table 3. National clinical mastitis data

Country	Cases/100 cows/year 1980	1985	1990	1993	Changes since 1990
Denmark	-	-	-	29	-
Finland	37	38	37	42	+5
Hungary	-	1	1	<1	-?
Netherlands	20-25	20-25	20-25	20-25	0
Norway	18.0	19.4	23.1	24.4	+1.3
Sweden	-	18.9	18.3a	18.82[a]	+0.52
Switzerland	15[bc]	-	-	-	-
UK	74	48	-	-	-
USA	50	48	47	45	-2

[a] Cases/100 finished lactations
[b] Approximate
[c] 1982

Three of the six countries with comparative data since 1990 show an increase in the incidence of clinical mastitis. Data from the other three countries appear to be estimates; two a slight reduction and one no change. More recent information from Sweden (Plym Forshell, 1996) shows that the incidence of clinical mastitis continued to increase and had risen from 19% to 23% between 1993 and 1995.

Within the UK, published data on clinical mastitis indicated an incidence of 37 cases/100 cows/year in control herds in the mid 1980s (Booth and Rowlands, 1990). The most recent information available showed no change with an incidence of 37 cases/100 cows in 1992/93 (Esslemont, 1994).

Discussion

Many countries now have data on their national average cell count and most are able to demonstrate a

marked reduction, especially over recent years. There seems little doubt that this has been stimulated by the widespread use of cell counts as a measure of milk quality and the adoption of payment schemes, of increasing severity, to persuade farmers to reduce their cell count.

The very limited data available on the prevalence of subclinical mastitis, most of which come from the Scandinavian countries, indicate little recent change, indeed a number of countries demonstrate an actual increase since 1990. This appears to conflict with the cell count situation.

Clinical mastitis data are no more plentiful and they too originate mostly from Scandinavia. The overall impression from these data is of an actual increase in clinical mastitis in recent years.

If these trends are genuine, and it has to be said that at this stage the evidence is only an indication, then there must be concern about the situation.

Attempting to explain these trends is difficult and no doubt a number of influences are at work. It is suggested that these influences may include:

a) Withholding milk from high cell count cows. This would obviously reduce the cell count of the bulk milk but there would be no change in the mastitis situation.

b) Culling high cell count cows. The cell count would be reduced and the mastitis situation would be improved temporarily.

c) Low cell count cows more susceptible to infection. This theory has been around for many years especially amongst farmers. Hill (1981) showed that it was not the number of cells present in the quarter but their speed of mobilisation that was one of the main factors involved in overcoming infection. Even in a high cell count herd there are many low cell count cows.

d) Cows more susceptible following the removal of minor pathogens. Minor pathogens provide a protective effect against major pathogens and Lam (1996) has shown that their removal can increase the incidence of infections due to *E coli* though not those due to *S aureus*.

e) Change in etiology under the influence of mastitis control measures. Certainly the contagious major pathogens, especially *S agalactiae*, have decreased and the environmental pathogens, such as *E coli* and *S uberis*, have increased as a proportion of all infections. However, it is questionable whether there has been an overall increase.

f) Increased pathogenicity of causative bacteria. With the demonstrated wide range of serotypes of the major pathogens, it seems conceivable that the more pathogenic strains have become relatively more wide spread, but there is no published evidence of this.

g) Less attention to herd mastitis control since cell count payment. The widespread adoption of single cow cell counts (Booth, 1995b) may have encouraged farmers to believe that action on this information is all that is required to control infection in their heads.

h) Data from more representative populations. It is possible that previous infection data came largely from herds involved in control programmes, which might be expected to be better than average, and that current information includes the whole spectrum of herds.

i) Improved recording of data. Recording of clinical mastitis on farm has improved, though there is room for further improvement, and the apparent increases may be purely a reflection of this. In the case of Scandinavian this seems unlikely.

Conclusions

Mastitis cell counts have been reduced in most countries. Recently there has been evidence from some countries that mastitis infection has increased.

Possible explanations for these conflicting trends have been discussed. It seems possible that the emphasis on cell count payment has diverted the attention of farmers from the control of mastitis in their herds. In addition, it may well be that the present control measures, diligently applied, have achieved most of their potential and that additional measures are now required to make further progress. Certainly, if these trends showing an increase in mastitis are confirmed, further action is urgently required to limit and reduce their financial impact on dairy farmers.

With the increasing concern in many countries regarding the welfare of the animals that produce our food, serious attention must be paid to ensuring that mastitis in the dairy cow continues to be controlled and reduced.

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