Economic Importance of Digital Diseases in Cattle

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Introduction

Lameness in dairy cows is undoubtedly an important cause of economic loss to the milk industry, ranking third or fourth after mastitis, infertility, and possibly metabolic diseases. Information on losses in young cattle and beef stock due to lameness is very scanty, and this paper is only concerned with adult dairy cattle, and primarily the cow rather than the bull. Of course lameness due to infectious systemic diseases, a prime example being Foot and Mouth disease, causes severe weight loss due to discomfort, pain and the development of secondary infection where, in countries without a slaughter policy, affected cattle are permitted to survive and probably to make a partial recovery. But I must exclude infectious systemic diseases and consider only primary digital diseases.

The importance of economic loss due to digital diseases is difficult to quantify with any precision. One requires to know a) the proportion of the population at risk which is affected; b) the different ways in which economic loss may arise; c) the average financial loss due to each of the factors (b above) in an individual dairy cow which is lame.

Incidence of Lameness in Dairy Cows

Most lameness is located in the digits rather than in other parts of the musculoskeletal system. Figures range from 80-90% in the UK and will differ little in most Western European countries. Figures for the proportion of lame cows will therefore tend to reflect closely the incidence of digital disease. The annual incidence of lameness in dairy cows in the UK and Ireland has been difficult to estimate since most surveys only cover veterinary practice records, and these figures range from 4.7-30%:

4.7%—single veterinary practice in Somerset, SW England (Eddy and Scott, 1980);

5.5%—46 veterinary practices in UK and Eire (1) (Russell and others, 1982);

30.0%—8 dairy farms attached to Liverpool veterinary school (Prentice and Neal, 1972).

However it is a fact that many lame cows, not only in the UK, are treated by the farmer, and are never seen by the veterinarian unless chronic lameness develops. In 30 farms associated with the East of Scotland College of Agriculture the incidence of lameness in dairy cattle was 10% per annum (Bell and Miller, 1977), while in Ireland (Arkins, 1981) 23% of cattle on 20 farms were lame annually.

Until recently the fraction of farmer-treated lame cattle could only be surmised. A recent study (Whitaker, Kelly and Smith, 1983) of 185 dairy herds in the UK has shown that the true incidence of lameness on these farms (aveage 121 milking cows, annual yield 5457 kg, predominantly Friesians) was 25%, with 18.7% of first cases being treated by the farmer and only 6.3% by the veterinarian.

The incidence of lameness in dairy cows in other western European countries such as West Germany, Netherlands, Belgium and Denmark is probably similar to the UK. It is impossible to state what proportion is farmer-treated, and so affecting the reliance of veterinary practice statistics.

Lameness incidence figures refer to clinical lameness. Subclinical lameness is a controversial subject: the incidence and significance of subclinical laminitis is one example. This form of laminitis may precede clinical digital disease of various overt manifestations, but by itself is of unknown economic importance (Weaver, 1979).

Ways in Which Economic Loss May Arise

There are five ways in which economic losses may occur:

a) loss of milk production;
b) loss of bodyweight and condition;
c) deaths and premature disposals (culls);
d) reduced fertility (e.g. prolonged calving interval);
e) costs of veterinary and farmer treatment including additional labour.

a) The major economic loss is undoubtedly in reduced milk yield, which may account for 60-80% of the total financial loss. This figure has been disputed by Whitaker and others (1983), who have estimated the average loss of milk to be only 2.4% of the total lactation yield (i.e. 132 kg per cow), not 20% as suggested by Greenough, MacCallum and Weaver (1981). Mieth and Ritter (1959) suggest that high yielding cattle suffer a loss of about 1000 kg yield over a lactation when they become lame in the early postpartum period, and Prange (1969) found there was an average reduction of 15% in annual milk yield. The figure clearly depends on the interval postpartum when a cow first becomes lame, and naturally on the duration of that lameness episode. Lameness is particularly liable to develop in the first two or three months after parturition (Prentice and Neal, 1972, Russell and others, 1982), which is the period of maximum yield. Since individual daily recording of milk yield is virtually unknown outside a number of experimental farms and institutes, an accurate figure as to the loss in milk yield in a single incident in a series of dairy cows has never been published, and it has been necessary to

extrapolate figures from the total daily yield of the herd in which the number of lame cows is known (Weaver, 1971). Accurate individual estimates would also have to include figures for the expected yield in the later part of lactation so as to assess any longterm fall in yield.

It should be recalled that not only is there a natural drop in milk yield during the period of lameness, but all the milk has to be discarded if, as is the usual practice, antibiotics such as oxytetracycline or penicillin have been given for systemic treatment.

b) The second most important factor in economic loss is possibly the loss in bodyweight and condition, which can be dramatic in some animals, relatively subtle in others. In all cases additional feeding (usually of concentrates) is necessary to bring the cow back into good condition in order to avoid a prolonged reduction of yield following the disappearance of lameness.

c) Deaths and disposals represent severe manifestations of loss of condition. Culls are often due to a number of causes, classified perhaps as "not in calf" and "lame", or "chronic mastitis" and "poor yield" (due to "bad feet"). Published figures for the percentage of total culls due to lameness are relatively low, e.g. less than 2% in the UK (Beynon and Howe, 1974) and 3% in West Germany (Thiel, 1980). The loss due to culling must realistically include the cost of replacement, which appears to spiral upwards over the last decade, and in the recent report (Whitaker and others, 1983) the calculated loss from culling is even greater than that due to reduced yield, and is shown below:

Total financial losses in 100 cow dairy herd in one year (average of 185 herds).

	Cost per cow	**Cost per 100 cow herd**	**% of total**
Loss of 3 days milk during treatment at 20 kg/day = 60 kg Loss of 6 kg/day for next 12 days = 72 kg			
i.e. Total loss = 132 kg @ 13.5p/kg	£ 17-80	£ 445	37.8%
Each treatment by farmer	£ 2-00	£ 37	
Each treatment by veterinarian	£ 10-00	£ 63	8.5%
Culling at 1.4% per annum, replacement cost	——	£ 630	53.6%

Total cost £ 1175 per annum

£ 1 (one pound) = 1.40 U.S. dollars approx.

d) Economic losses due to reduced fertility are often more speculative. It is easy to appreciate the financial consequences if a bull is unable to mount for natural service. In many artificial insemination centres there are aged bulls with severe osteoarthritic or digital conditions which prevent natural service, but electroejaculation is usually a practical alternative in such places. In dairy cows, as already stated, much digital lameness develops in the postpartum period during which a cow is normally reinitiating oestrous cycles and in which she would be served or inseminated. Dairy cows which are lame in a hind digit, (and hind digits account for over 80% of all digital lameness (Russell and others 1982)), are less likely to mount other cows when they are themselves in season, will lie down for a longer period of the day than average, and will therefore be less easy to detect when in oestrus. A dairy cow is required to be in calf by day 85 postpartum if an average calving interval of 365 days is to be maintained, and every day over 85 days involves the farmer in a loss of at least £2. As well as the physical interference with oestrus behaviour, there may also be a direct effect on ovarian activity due to anoestrus as a result of a continuing loss of bodily condition.

The magnitude of economic loss due to this form of reduced fertility is most probably underestimated today because it is simply not appreciated.

e) The costs of farmer and veterinary treatment of lame dairy cattle are relatively minor compared with the items discussed above, but the additional labour costs in man hours are serious. Under the intensive systems of dairy husbandry increasingly practised today, with one man responsible for 100 cows, it is increasingly irksome to spend unnecessary hours bringing in lame cows from grass, changing dressings and trimming overgrown digits which commonly accompany cases of lameness encountered in the winter-housed period.

Conclusions

A comparison with other major causes of economic loss in British dairy cattle indicates that infertility and mastitis are of greater financial importance. Preventive methods of control have apparently done little to reduce the incidence and economic importance of any of these three areas. The most recent figure for the overall cost to the British farmer of dairy cow lameness is £35,000,000 based on the Whitaker (1983) data, but if the true figure for the reduction in yield is taken as 10%, then the overall cost doubles to £77,000,000 (or about U.S. $115,000,000). The Whitaker data took no account of losses due to reduced fertility or of reduced bodily condition. Digital lameness is increasingly in the eye of the animal welfare lobby, which is much concerned with the conditions under which farm livestock are reared, and which is engaged in attempts to stimulate a greater degree of humane treatment of stock. While not exciting the same degree of sympathy as a lame horse, a lame cow does present, to the layman, a picture of apparently avoidable disease. Unfortunately, the financial resources which are available in most countries to investigate the aetiology of bovine digital disease and to investigate the effect of suggested prohylactic measures such as formalin footbaths (Davies, 1982) continue to be lamentably small.

References

1. Arkins, S.: Irish Vet. J. *35* (1981):135, 163. 2. Bell, E.M. & Miller, A.M.: Lameness in dairy cattle–interim report. Edinburgh, East of Scotland

College of Agriculture 1977. 3. Beynon, V.H. & Howe, K.S.: The disposal of dairy cows in England and Wales 1972-73. Report 192, University of Exeter 1974. 4. Davies, R.C.: Vet. Rec. *111* (1982):394. 5. Eddy, R.G. & Scott, C.P.: Vet. Rec. *106* (1980):140. 6. Greenough, P.R., MacCallum. F.J.: Weaver, A.D. (1981): "Lameness in Cattle". Bristol, Wright-Scientechnica. 7. Mieth, K. & Ritter, K.: Mh. Vet. Med. *14* (1959):717. 8. Prange, H.: Mh. Vet. Med. *24* (1969):281. 9. Prentice, D.E. & Neal, P.A.: Vet. Rec. *91* (1972):1. 10. Russell, A.M., Rowlands, G.J., Shaw, S.R. & Weaver, A.D.: Vet. Rec. *111*, (1982):155. 11. Thiel, N.: Prakt. Tierarzt *61* (1980):1073. 12. Weaver, A.D.: Vet. Rec. *89* (1971):288. 13. Weaver, A.D.: Bovine Practitioner *15* (1979): 70 14. Whitaker, D.A., Kelly, J.M. & Smith, E.J.: Vet. Rec. *113* (1983):60.

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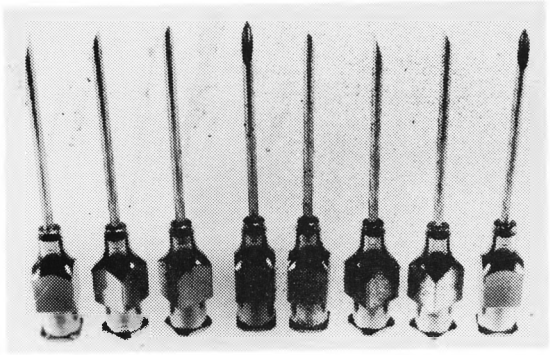

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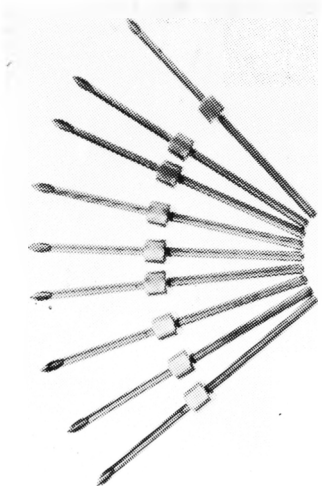

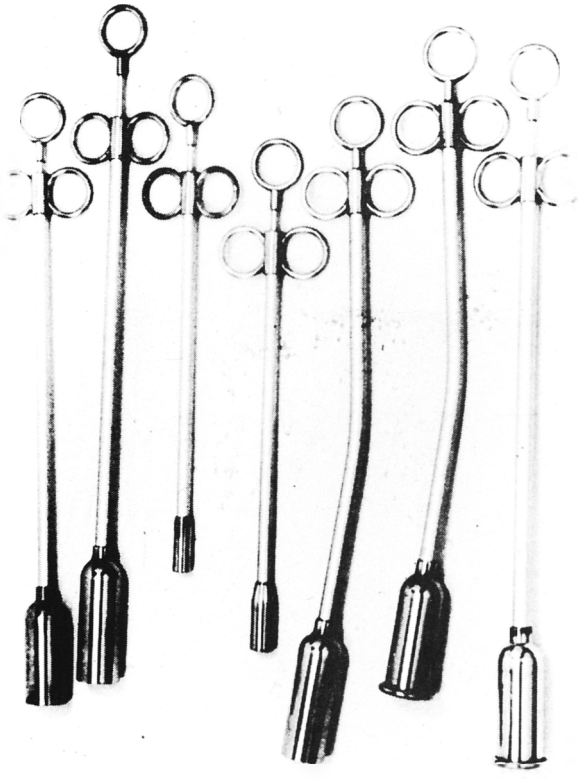

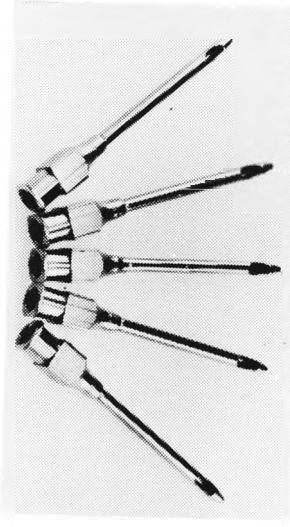

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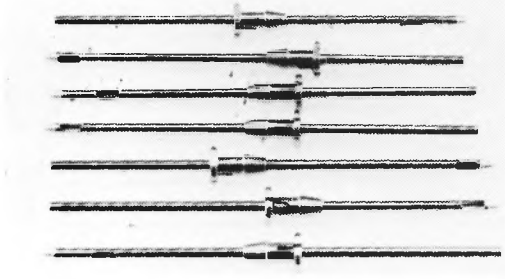

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