

# Changing Patterns of Nutritional Myodegeneration (White Muscle Disease) in Cattle in Great Britain

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## Abstract

Analysis of data accumulated between 1975-1980 from a computer bank of diagnoses of cattle disease occurring on farms in Great Britain, and from pathological and biochemical examinations revealed nutritional myodegeneration to be the most frequently reported and probably the most economically important myopathy. Reported disease incidence increased between 1976 and 1979. The increase in incidence was relatively greater in yearlings and adults than in calves in which the disease predominates. In calves three clinical syndromes (dyspnoea; locomotor and postural disorders; sudden death) were recognized. The presenting signs in yearlings were locomotor or postural disorders; in cows they resembled milk fever. In weaned calves and yearlings disease risk increased in the spring and was frequently associated with turnout to pasture in adverse weather. The commonest environmental associations with the disease are dietary deficiencies of selenium, vitamin E or both, coupled with cold wet and windy weather, sudden increased exercise, and in cows, bad management and parturition. Changing methods of feeding, increases in herd size and increased awareness are possible reasons for the increased incidence. Risk of the disease developing can be reduced by selenium supplementation.

## Introduction

So-called nutritional myodegeneration (White Muscle Disease = WMD) has been reported to be the most common and certainly the most economically important animal myopathy (4). Though affecting a wide range of wild and domestic species this report is concerned only with the disease in cattle. Ten years ago the typical acute, non-progressive disease was recognized principally in young calves, particularly those on a milk diet. Factors associated with WMD were deficiencies of vitamin E and selenium, excessive polyunsaturated fatty acids (PUFA's) or legumes in the diet and unaccustomed muscular activity and other stresses (4).

Incidents of farm animal disease in Great Britain are frequently referred by practising veterinary surgeons for investigation by State veterinarians (VIO's) in Investigation Centres (VIC's) situated throughout the country. Samples from live animals, post mortem specimens and carcasses are submitted to the VIC's and a proportion of specimens is sent to Weybridge for further examination and report. Diagnoses are made by the local VIO and are reported to the practising veterinary surgeon. A record of the diagnosis and other data is also prepared for incorporation into a centralised computer data bank known as the Veterinary Investigation Diagnosis Analysis (VIDA). The current mark II system (5) has been in operation since 1975.

The availability of this data and the histological examination of sections of skeletal and cardiac muscle from a proportion of the cases has enabled us to investigate the epidemiology of WMD from 1975 to 1980 and to relate the pathological findings to the clinical syndromes.

It is important to record that the specimens received by VIC's represent a biased sample of the field problems of animal disease. Therefore, though we have used VIDA II computer data as the best available source of information to compile this report, great caution must be exercised in its extrapolation.

## Materials and Methods

The source of data was the VIDA II computer bank referred to in the introduction. Submissions originated from VIC's investigating herd disease incidents in Great Britain in the period January 1975 to June 1980. Analysis of data was undertaken on the basis of age of animal and date of specimen submission.

The source of pathological material was from animals involved in a proportion of these incidents. Fixed specimens of skeletal and cardiac muscle were prepared for histological and ultrastructural examination by standard methods.

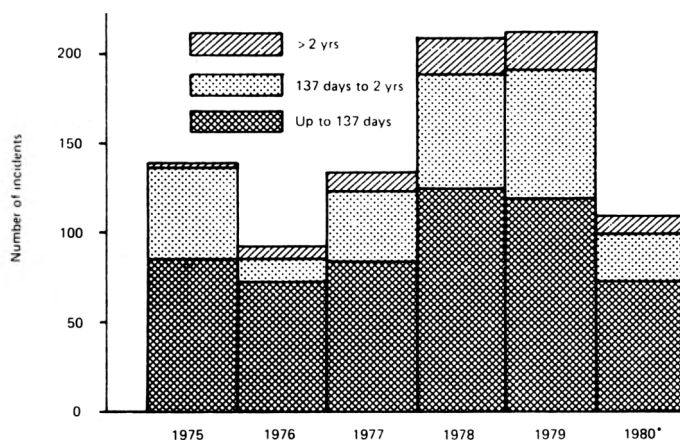
Some incidents, particularly those involving yearling and

adult cattle or sudden death were investigated additionally with regard to history, clinical signs, biochemical findings (blood enzyme analysis for creatine kinase and glutathione peroxidase and tissue levels of vitamin E and selenium), feed analysis for vitamin E and selenium and weather reports at the time of and immediately preceding the onset of disease. The effects of treatment and prophylaxis were noted.

## Results

There has been considerable variation in the annual incidence from 1975 to 1980. From 1976 to 1979 the incidence increased. The increase has been relatively greater in adults (which have the lowest incidence) and yearlings than in calves (which have the highest incidence) (Figure 1).

**Figure 1** Number of herd incidents of WMD in cattle of three age groups diagnosed between 1975–1980 in Great Britain



\*1980 figures projected from number of incidents recorded in Jan-June 1980.

The fluctuation in incidence between years seems associated with annual variation in weather conditions; cold and wet springs being associated with a higher incidence.

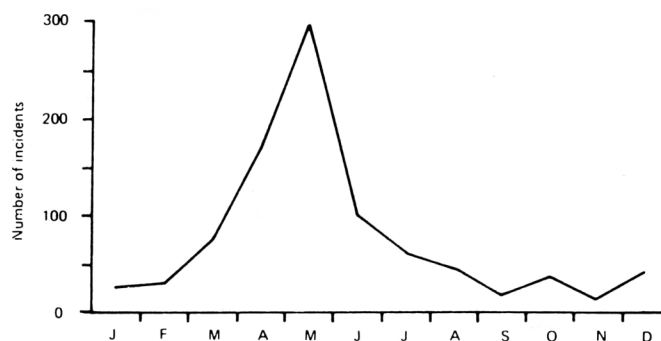
The disease in calves predominates and presents in one of three clinical forms. Dyspnoea associated with degeneration of cardiac and/or respiratory muscle. Locomotor or postural disease associated with skeletal myodegeneration. Sudden death associated with sub-acute or peracute myocardial necrosis (2).

In yearlings and adults the presenting signs are usually locomotor or postural disorders accompanied sometimes by myoglobinuria (1). In dairy cows the disease occurs around parturition. The clinical signs resemble those of milk fever (hypocalcaemia), but affected animals do not respond to conventional milk fever therapy (3).

Economic loss results from death, costs of investigation and treatment and from temporarily impaired growth rate or loss of condition.

In weaned calves and yearlings disease risk is increased in the spring (Figure 2).

**Figure 2** Number of herd incidents by month of WMD in cattle for the years 1975 - 1979 in Great Britain



The months in which cattle are most at risk are April and May. There is between year variation in the month of peak risk; this is probably due to climatic factors affecting herbage growth which determines when in-wintered cattle are turned to pasture and when supplementary or dry feeding are stopped.

## Aetiology

No genetic factors have been identified. Most incidents in which biochemical investigations have been undertaken have been associated with low selenium and/or vitamin E status of the animals. In the period immediately preceding the onset of disease sudden increase in exercise, exposure to cold, wet and windy weather, and in dairy cows parturition have also been implicated. Sudden death in unweaned calves is often preceded by excitement such as that stimulated by feeding.

## Treatment and Control

WMD is preventable by maintaining adequate dietary intake of vitamin E and selenium, if necessary to feed supplementation and by allowing cattle time to adapt to changed environmental conditions. Parenteral administration of vitamin E and selenium is effective for treatment in most cases and is, in some forms with repeated injection, useful also for prevention.

## Discussion

Economic pressures have stimulated increases in herd size (which provides less opportunity for attention to individual animals) and changed feeding practices. A greater proportion of cattle are now fed almost entirely on feeds produced on the farm where they are kept and this has exposed hitherto unsuspected selenium-deficient areas in Great Britain. The use of unsupplemented urea-based diets and propionic acid-treated cereals are added hazards. All

these factors have contributed to disease occurrence, but weather conditions appear to be of greater importance and account for the annual fluctuations. Increased awareness and improved diagnostic methods are suggested as additional reasons for the upward trend in incidence up to 1979.

#### References

1. Allen, W.M., Bradley, R., Berrett, S., Parr, W.H., Swannack, K., Barton, C.R.Q., MacPhee, A. (1975) *Br. Vet. J.* 131, 292-308.
2. Bradley, R., Markson, L.M., Bailey, J. (1981) *J. Path.* In press.
3. Gitter, M., Bradley, R., Pepper, R. (1978) *Vet. Rec.* 103, 24-26.
4. Hadlow, W.J. (1973) In: *The Striated Muscle* pp 364-409, Williams and Wilkins Co., Baltimore.
5. Hall, S.A., Dawson, P.S., Davies, G. (1980) *Vet. Rec.* 106, 260-264.

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