

RISK FACTORS FOR BSE WITH EMPHASIS ON IMPORT OF CATTLE FROM GREAT BRITAIN INTO COUNTRIES OF THE EUROPEAN UNION.

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Cette étude a pour objectif l'estimation quantitative du risque encouru par certains pays, notamment ceux de l'Union Européenne, lors d'importation de bovins du Royaume Uni, et ce, dans la période précédant ou celle juste après l'interdiction d'importation d'animaux vivants en 1989 et 1990. L'étude s'est basée sur l'estimation de la chance pour que les animaux importés du Royaume Uni à une certaine date, soient détectés comme cas positifs de BSE. En utilisant le taux d'incidence annuel séparément pour la cohorte des naissances, et le taux d'élimination des animaux au Royaume Uni, nous avons pu calculer l'incidence cumulée pour chaque cohorte de naissance. Ces figures ont été ensuite combinées avec les figures d'importation d'animaux vivants par d'autres états de l'Union Européenne, selon un index de risque à l'importation propre pour chaque pays, ayant un taux d'élimination d'animaux similaire à celui du Royaume Uni. Les pays peuvent ainsi être classés selon leur degré de risque vis à vis de la BSE due à l'importation d'animaux de Grande Bretagne, en terme de nombre d'animaux malades attendus.

INTRODUCTION

As a major epidemic, bovine spongiform encephalopathy (BSE) has been confined largely to the United Kingdom (UK) and principally to Great Britain (GB). Apparently it was only here that all risk factors required for a large scale epidemic were simultaneously present (Wilesmith and Wells 1991). Risk factors for BSE to occur in countries outside the UK can be divided in import related factors and factors relevant to indigenous BSE. Among the latter, the incidence of scrapie, the level of inclusion of meat and bone meal (MBM) in cattle rations and the efficacy of the local rendering industry in inactivating the agents causing transmissible spongiform encephalopathies (TSE), are the most important ones. Among the import related risk factors for BSE to occur in countries outside the UK, the import of MBM and the import of live cattle from the UK are the most obvious and important ones. The importance of the import of live cattle has been demonstrated by the cases in Oman, the Falkland Islands, Denmark, Canada, Germany, Portugal, Italy, and the Republic of Ireland, where one or more cattle originating from the UK succumbed to BSE.

The present paper describes the result of a study to assess quantitatively the risk that countries which were members of the European Community in 1989 have incurred by the import of cattle from the UK in the period previous to or around the introduction of the EC bans on import of live breeding stock. It focuses on the question what the chances were for animals imported from the UK in a certain year, to have been infected with BSE in their country of origin. This issue is addressed by calculating the chance for these animals to have become a detected BSE-case, had they not been exported but remained in GB. This study does not address the risk from meat and bone meal imported from the UK.

MATERIAL AND METHODS

The number of cases of BSE which occurred in Great Britain (GB) in each year from 1987 to 1996, by their year of birth, were obtained from the main BSE epidemiological database (Wilesmith and others, 1992). Annual incidence of BSE in dairy and beef suckler herds, combined, were calculated for each 12 months birth cohorts from July 1974 to June 1975 to 1994/95. The total adult cattle population in Great Britain in 1992, divided in birth cohorts on the basis of the age distribution in affected herds, was used as denominator, the year 1992 being the mid-point of the period of interest.

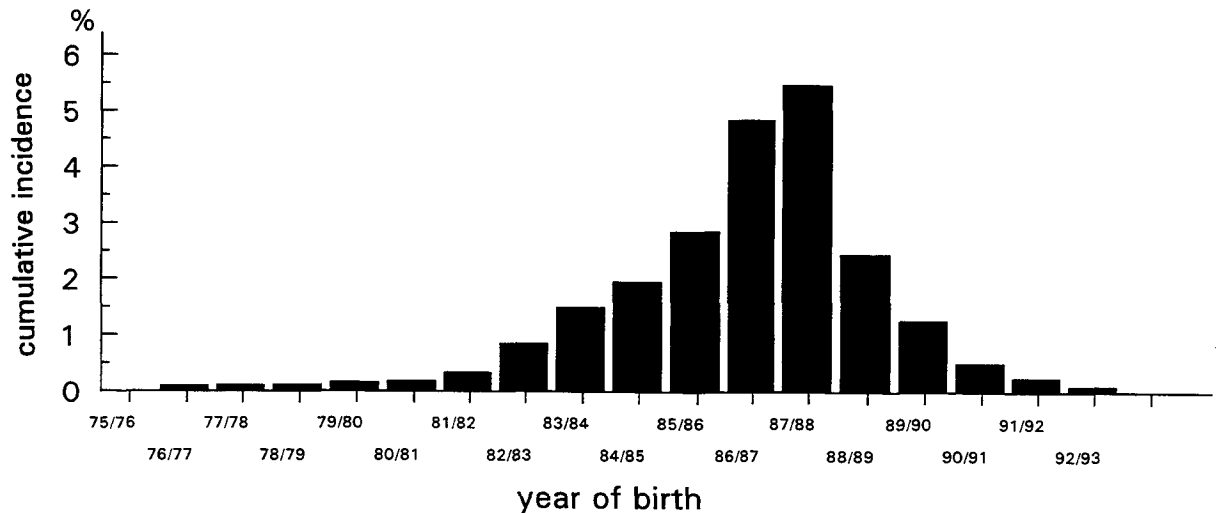
The cumulative incidences of BSE, during the commercial lifespan of the animals, for each birth cohort, were calculated by summing the individual incidence rates for each year from 1987 through 1996 (Fig. 1).

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Figure 1
Cumulative incidence in various birth cohorts



For the purpose of this study, certain assumptions had to be made:

1. it was assumed that culling rates in the other member states were not different from the culling rates in GB and in the UK;
2. it was further assumed that all BSE infected cattle have become infected in the first one-and-half to two years of their life, *i.e.* prior to export (most BSE cases will have been infected within the first two years of their life (Anderson *et al.*, 1996).
3. it was finally assumed that the exported cattle represented, with regard to BSE, a random sample of the British cattle population: no distinction was made on the basis of herds of origin, while separate calculations were made for dairy and beef breeds.
- 4.

In addition, the numbers of cattle imported annually from the UK into the various member states of the EU were available, for the years 1985 through 1992. These data had been extracted from reports by EUROSTAT, the Statistical Department of the EU which were checked against data provided by the UK MAFF statistical department. The mean of both datasets was used to calculate the number of imported animals into the various countries. Only the years 1985 through 1989 were used for the subsequent calculations, as from March 1990 onwards, breeding animals were no longer permitted to be exported (or permitted to live beyond six months).

The present report relates to animals in the categories "pure-bred animals for breeding purposes" and "live heifers etc. weighing over 220 kgs", all other categories were thus excluded. The average age for these two categories of animals at the time of export from GB was assumed to be: *one-and-half to two years*, as the majority will have been bulling heifers or in-calf-heifers.

By combining the numbers of imported animals with the intrinsic risk for each import group to become a detected BSE-case, had they remained in the UK, a **risk index** for the involved countries was obtained.

This risk index, indicating the cumulative risk involved in the imports of cattle for the individual countries during the years 1985 through 1989, was calculated with the following formula: Risk index = sum (n x CI)

in which: n = number of animals imported in a certain year

CI = cumulative incidence in animals born in the calving season previous to the year of import (thus one birth cohort earlier)

The resulting index figure equals, with the given assumptions, the potential number of imported BSE cases.

RESULTS

The cumulative incidence for each successive birth cohort increased until that for the 1987/88 cohort, with a peak of 5.4%. This was the calving season just before the feed ban for MBM was introduced. For dairy herds, the cumulative incidence peaks 7.1 and 6.7% respectively, for beef herds 0.8 and 0.6%.

The import risk index for the involved countries varied from almost zero (Greece) to 911 (Republic of Ireland), with the other EU countries in between. Countries were listed in ranking order, starting from "zero or low risk" to "high risk", using the combined dairy and beef incidence rate.

Certain countries may have incurred an actual risk different from the "average": e.g. Germany, with most imports being beef breeds, probably incurred a lower risk, while Portugal, with imports being predominantly dairy cattle, a higher risk.

DISCUSSION

As suggested from the preliminary findings of this study, more cases of BSE in animals exported from the UK were expected in the other member states of the EU than have been identified (Schreuder and Straub 1996). Also, the present results indicate that cases of BSE in these imported animals would have been reported from more member states than was the case at the time of the analysis.

Although the results in terms of the ranking of countries by their risk is in close agreement with the observed incidence, the precision of the estimates of the number of BSE cases is naturally affected by a number of potential biases, that needs further discussion.

The degree of surveillance in the importing member states is important too in assessing the expected number of BSE cases to that observed. There is no uniform means of surveillance for BSE throughout the EU member states, and this would be difficult to achieve practically.

The objective of these analyses was not to expose potential under-reporting of BSE and criticise the degree of surveillance in member states of the EU. Instead, it was to highlight the evidence that BSE cases are likely to have occurred in the importing member states. This is important as the epidemiological evidence from the epidemic in GB is that, whatever the origin, the majority of cases have occurred as a result of recycling infected cattle tissues via meat and bone meal (Wilesmith, Ryan and Atkinson 1991; Wilesmith and Wells 1991). The future risk of secondary cases occurring will not be the same for all countries. There are variations in feeding practices, the efficacy of rendering processes and the year when legislation was enacted to eliminate the feed borne risk (some countries in the EU imposed a feed ban for MBM only as late as 1994).

The results of this study should therefore be of assistance in assessing past risks from the importation of live animals in the member states concerned.

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