The BSE Inquiry / Statement No 455
Ms Frances Wolferstan
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THE BSE INQUIRY

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Personal Details

1. I am a graduate of Cambridge University. I obtained a 2:1 in the Natural Sciences tripos and then went on to read Veterinary Medicine at the Cambridge Veterinary School where I obtained my Vet MB.

2. After qualifying, I was in practice in Canterbury for a short period of time. I have continued to be actively interested in the biochemistry of symptoms and nutritional medicine. I am an associate member of the British Society for Allergic, Environmental and Nutritional Medicine (BSAENM).

Background Information

3. The project described below has been undertaken on an entirely voluntary basis. As the BSE crisis developed, I came to believe that the MBM/infectious prion theory did not really explain the emerging facts I began to think that some of the other changes in farm husbandry which have occurred in the last twenty years might be responsible for the disease. The chief of these changes is the increased use of chemicals on the farm, but there have also been changes in animal feed and a relentless drive to raise the productivity of animals.

4. In June 1996, I heard Mark Purdey talk on his Phosmet theory and decided to test it by questioning some local farmers. This showed me that Phosmet could not have caused the BSE cases on any of these farms, but my interest had been stimulated and I decided to look into the matter a little further.

5. Enquiries of various contacts in research institutes indicated that very little if any work was being undertaken on alternatives to the infectious Prion Theory. As a result I decided to carry out a slightly more formal survey to see if it would throw up any reasonable alternative hypothesis.

6. I approached various contacts who might be able to put me in touch with a wider circle of farmers. Among these were representatives of the Green Network, who told me that they had been contemplating undertaking a similar survey themselves. We decided to work together. This we did until the Green Network ran out of funds to support a person to work with me. Since that time I have been entirely responsible for the project.

7. The database I use has been prepared for me by a young software engineer, (James Roberts BSc Hons UCE) in his spare time. Without his help this project would not have been possible.

BSE, Human Health and Farm Husbandry Survey

8. The purpose of the survey is to look for possible connections between various aspects of modern farm husbandry and the occurrence of BSE or human illness on the farm. This preliminary report covers only the occurrence of BSE.

9. There are certain inherent difficulties in carrying out the survey.
   - Firstly, it is retrospective and so does not have the controls which a pre-planned experiment would have.
   - Secondly, farms are self selecting because their entry into the survey depends on individual farmer volunteers having good paper records and being prepared to put the necessary time and effort into completing a survey form.
   - Thirdly, there is a preponderance of traditional farms in the survey to date because the survey form is easier for the traditional farmer to complete.

Method

10. Farmers are asked to complete the survey form as far as possible from their paper records and to take them back to 1985 or well into the lifetime of the dam of their first BSE animal, whichever is the earlier.

Obviously, when going back this far, the earliest paper records have often been destroyed. Under these circumstances, farmers are asked to complete the record from memory and to mark such entries clearly in the database with an "M".

11. Information(see **Annex 1** - BSE and Farm Husbandry Survey Form) is sought in the following five areas:-

- The evolving pattern of farm husbandry in snapshot years 1985, 1990 and 1997
- The BSE animals and their dams
- The breeding problems in the herd during the survey years.
- The use of chemicals on animals and crops.
- The overall feed policy and any feedstuffs bought in

12. Completing the form is time consuming and tedious work for farmers. They have to dig deep into their records and memories. In most cases the information supplied on the form has to be supplemented by telephone calls, but despite this the number of farms for which the full picture has been obtained is disappointingly small.

13. Of the survey forms returned so far:-

- 14 supplied no information at all in one or more fields and were unusable.
- 6 may yet produce sufficient detail for their information to be useable.
- 3 farms with considerable BSE problems have recently taken survey forms and it is hoped will complete them adequately.
- 18 farms are sufficiently complete to have been entered into the database.

14. Information relating to each farm is fed into a database under the headings:-

General Information,

Pesticide/Medical Drug Overview,

Pesticide/Medical Drug Purchase and Use

Feeding Policy

Feed Purchase Record
BSE Animals and relatives
Breeding Problems.

15. Breeding problems are marked in the database as of unknown cause, if they are not due to one of the normal hazards of calving/breeding such as large calf, breech birth, twins or a recognised disease.

16. In looking for the reason for a cow becoming barren, it is necessary to look back up to 15 months for the cause. The cow will usually be allowed to milk out after her last calf and then perhaps be given a few more months grace before culling.

17. Two sub databases have been built which contain information on pesticidal and medical products and the chemicals in them. The books used for this purpose are :-

- The Pesticide Manual 9th Edition. Pub. British Crop Protection Council
- Pesticides 1989 Pub. MAFF
- Pesticides 1997 Pub. MAFF
- Veterinary Products 1984-1985 Pub. Datapharm Publications Ltd
- Veterinary Products 1995-1996. Pub. National Office of Animal Health Ltd

18. The database can produce a Farm Overview report for each farm, which within the limitations of the data supplied can show month by month what pesticidal and medical products were used on the farm and what BSE births/deaths or breeding problems occurred.

19. It can also produce printouts across all the farms of the problems occurring during the survey period, the chemicals in the trade products used and so on. A report which can make an across farm comparison of all chemicals used is under development.

20. The farms vary greatly in both the size of their herds and in the number of years for which they supply information. In order to make comparisons between farms, the occurrence of BSE and breeding problems on each farm is expressed as the average

number of problems per year surveyed converted to a percentage of the average herd size over the same period.

Results

21. I have submitted to the Inquiry Secretariat the eighteen farm surveys which have been completed so far:-

- 6 have no breeding problems of unknown cause.
- 5 have combined calf/cow breeding problems of unknown cause of ranging from 0.7 to 2.9%
- 3 have combined calf/cow breeding problems of unknown cause of ranging from 4.7 to 11.9%
- 4 had BSE and breeding problems ranging from 4.1 -.15.3%

22. Nearly all the farms have used **Ivermectin** freely throughout the survey period, including those which have no breeding problems or BSE.
Most of the farms have used **Pyrethroids** to a greater or lesser extent. Again this includes the farms with no breeding problems or BSE. One farm reported an incident in which two cows treated with Cypermethrin became "anxious".

23. Only 4 farms used **Organophosphate** products on more than one occasion. Of these one had moderate breeding problems and the other 3 had quite serious breeding problems as well as BSE.

24. None of these farmers used OPs irresponsibly. They all followed professional advice.

Of the BSE farms:-

25. Three farms have combined "unknown cause" breeding problems ranging from 8.5 to 15.2. On the 4th BSE farm no breeding records were available but after conversation with the farmer, a modest guess puts unknown cause breeding problems at 4.1%.

The records from the 3 non BSE farms with serious breeding problems show :-

26. Farm 1211R. Calf problems 2.2% Barren cows 5.3%

The farm has a copper deficiency problem. Their breeding problems arose when cattle were first introduced to the farm which had gone organic three years earlier.
Since the copper situation has been rectified their problems have died right away.
No bought in feedstuffs were used.

27. Farm 1139. Calf problems 4.4% Barren cows 0.6%
An incident is reported in 1986 of neonatal death in two calves whose dams had been dressed with Young's Warble pour on shortly before their birth.
An abortion and stillbirth occurred in January and February 1988 after use of Phosmet on the dams in the previous November. After this the use of OP's ceased but fly killers containing the pyrethroids, permethrin and alpha-cypermethrin are quite generously used on in calf heifers and dry cows. Bought in feedstuffs were used through out the survey period.

28. Farm No 2003W. Calf problems 10% Barren cows 1.9% This farm had a problem with neonatal deaths which began in 1994 and faded away again by 1997.
The only apparent changes in their husbandry at about this time were:-

- a change of bought in compound in 1994.
- the use of a permethrin fly spray in the summers of 1994 and 1995. This had also been used in 1992. No calf deaths followed its use but three cows were culled barren in December 1994.

The farmer believes that the deaths which occurred during birth were simply the result of the heifers being too fat and the calves big. The heifers all survived and remained healthy and so did the calves if the farmer was present at the calving to pull the calf away.
(Bought in feedstuffs were used throughout the survey period.)

The records for the 4 BSE farms show:-

29. Farm No.1008R Calf problems 7.7% Barren cows 7.5%
The cows were dressed yearly from 1980 -1986 with a product containing phosmet - an OP. Most of the calf problems occurred between 1982 - 1989 after which they started to die down again. Barren cows peaked in 1990-1991.

No feed records were provided prior to 1984, but bought in compounds were used continuously from then until 1993. The 4 BSE animals were born between 1982 and 1985 when OP levels would have been high.

The breeding problem record for the BSE dams shows that:-

One animal after giving birth to a BSE calf in 1983, had stillborn twins in 1984, a single stillborn calf in 1985 and was culled barren in early 1987.

A second animal gave birth to a suspect BSE animal (278), which was eventually shown to be inconclusive for BSE at autopsy. This was followed by a normal calf in 1983 and then BSE animals in 1984 and 1985.

30. Farm No. 2005W Calf problems 4.94% Barren cows 6.75%

The records for this farm are not very complete. Information supplied on breeding problems goes back only as far as 1988. The Barren cow record may perhaps be artificially high as the present manager is not sure whether the records before he came to the job in 1990 include cows culled barren in old age.

Home grown grain from stores treated with pirimiphos- methyl(OP) was fed to the animals from sometime in the mid eighties until 1989.

By 1988 when breeding records become available, breeding problems were high. They reached a peak in 1989 but did not greatly decline until 1993. Calf problems reached their peak in 1991 and 1992.

Bought in feed compounds were used throughout the period

The 14 BSE animals were born between 1984 and 1987.

The fertility record of the BSE dams is interesting:-

Two had an infertile year immediately preceding the birth of the BSE animal.

One gave birth to BSE animals two years in succession. Eight of the thirteen BSE dams had to be culled early having given birth to five or less calves.

31. Farm No. 1014R Calf problems 5.9% Barren cows 2.6% ….Infertility 8.1%

This farmer volunteered information on cows treated for infertility problems over the survey period. This adds an extra dimension to the analysis.

The animals were dressed for warbles every year from 1977-1985 in November and sometimes in April as well.

In addition, home grown grain from a store treated with pirimiphos methyl was fed throughout the period. In 1985 after the breakdown of a partition wall a problem with mites developed in the grainstore. On professional advice, the building was treated again with the equivalent of 3 normal applications of pirimiphos methyl and the grain itself dressed with another pirimiphos- methyl product.

This meant that during late 1985 until harvest in 1986, the cattle would have been eating grain dressed with 5x the normal recommended dose. Their maximum consumption would have been in June 1986 when they were fed the sweepings and screenings from the grainstore.

From 1985 until the farm was sold in 1991, the store continued to be treated annually with a pirimiphos spray and the grain treated with a pirimiphos dust.

Some bought in feed products were incorporated with the home grown grain throughout the survey period.

The infertility rate was high throughout the whole period but rose still higher from 1988 -1990.

The barren rate showed a slight increase from 1988, with a large increase in 1990. It was still running at a high level when the farm was sold in 1991. Calf problems showed peaks in 1985, 1988 and 1990.

The three BSE animals were born in 1986, 1987 and 1988.

In addition:-

In November 1986, three serious digestive disorders and one unexplained death occurred.

In 1988, one death, one liver failure and one stomach cancer were recorded.

In 1989, there was one unexplained death, one toxic reaction and one liver failure.

In 1990, there was one unexplained death and one toxic reaction.

32. Farm 2004W Calf problem 4.1(estimate) Barren cows unknown.

There are no breeding problem records available for this farm and the chemical records go back only as far as 1987. Nevertheless, it is probably fair to assume that their pattern of chemical use was much the same in earlier years. Based on this assumption, the record shows little use of chemicals except wormers. Pyrethroid fly repellents were used occasionally and a phosmet dressing for mange was used once in 1992. Although regular use was made of OP sheep dip, no spent dip was ever sprayed on the pastures.

The farm has no arable land and is heavily dependent on bought in compound feed and some bought in fodder. There is a considerable mineral imbalance problem on the farm, but no general health problems appear to arise from this cause because heavy use is made of mineral licks. The four BSE animals on this farm were born between 1986 and 1988.

33. Farms 2005W, 1014R and 2004W all have copper deficient soil.

Discussion

34. A survey of 18 farms is not sufficiently large to carry statistical weight. Nevertheless it does offer some pointers towards a possible cause of BSE.

35. The half life of organophosphates is relatively short, but their breakdown products may be just as harmful or worse, since they become incorporated into the organophosphate pool where they cause continuing disruption of intermediary metabolism.[1]

A clear possibility of such a chronic organophosphate poisoning existed on the four farms in the survey which used organophosphates more than once.

36. On Farm 1014R, this possibility is further emphasised by the series of twelve unusual deaths amongst their cows between 1986-1990. All these incidents were of unknown cause but followed after the dressing of the grainstore with five times the normal amount of pirimiphos-methyl in 1985.

The description of the deaths indicates that some, or all of them, could have been the result of failure of the liver to detoxify a steadily accumulating burden of the breakdown products of pirimiphos methyl.

Under conditions of chronic OP poisoning, it is not surprising that infertility, calf problems and barren cows should ensue.

37. The one non-BSE farm which used OPs had well above average breeding problems.

38. The three BSE farms on which OPs were used had a very high rate of breeding problems. Two of them present some detailed evidence that breeding problems may be linked to the use of OPs.

39. On Farm 1008R, the cows were dressed yearly from 1980 -1986 with a product containing phosmet. Most of the calf problems occurred between 1982 - 1989 after which they started to die down again.
This could be predicted as an effect of the gradual lowering of the OP level in the dams once regular treatment with phosmet ceased. The later peak in barren cows in 1990-1991 could also be expected in view of the time lag in culling cows.

40. Farm 2005W ceased to feed grain from a pirimiphos-methyl treated store in 1989. At this date infertility problems, as represented by barren cows, were very high. Calf problems peaked in 1991-1992. By this time, OP levels in the dams could have fallen sufficiently for fertility levels to improve, whilst the dams still harboured sufficient OP's to affect some of the calves in utero.

As all the births of BSE animals fall within these periods of high breeding problems on the farms, it is not unreasonable to infer that there is also a connection between the occurrence of chronic OP poisoning and BSE.

41. Certainly the possibility exists that chronic OP poisoning of the dam could result in nervous tissue damage in the calf. Many OP products use hydrocarbons such as toluene and xylene as solvents. The combined neurotoxicity of the solvents and organophosphates can cause axonal and myelin sheath degeneration in distal fibres.[2] Organophosphate binds to the membrane bound protein resulting in degeneration.[3]

42. The survey provides some detailed practical evidence which also suggests that OPs could be linked to BSE as well as breeding problems.

43. On **Farm 2005W,** which had 14 cases of BSE, all the BSE animals were born between 1984-1987 at which time OPs in the dams would have been at high level. Two of the dams had an infertile year immediately preceding their pregnancy with the calves which later developed BSE. A third had BSE calves in two successive years.

44. Ten of the thirteen BSE dams were culled after having five or less calves. Five of these animals were culled not served - an indication that they were unthrifty. Three were culled barren and one was culled sick and the last died three months after the birth of

her BSE calf. Nine of the ten animals were culled between 1987-1990, when OP levels would have been very high as the farm did not cease feeding treated grain until 1989.

45. On **Farm 1008W.** One animal after giving birth to a BSE calf in 1983, had stillborn twins in 1984, a single stillborn calf in1985 and was culled barren in early 1987.
A second animal gave birth to a suspect BSE animal (278), which was eventually shown to be inconclusive for BSE at autopsy. This was followed by a normal calf in 1983 and then two BSE animals in 1984 and 1985.
All these events occurred during the time in which a phosmet warble dressing was being used regularly.

All four of the BSE farms fed bought in compounds throughout their survey periods. So, the possibility can not be ruled out that rogue prions from MBM are responsible for the BSE.

46. On the fourth BSE farm, **Farm 2004W,** OPs were apparently used only once and this after the birth of the last BSE animal. The record shows no other husbandry events of particular significance.
As the farm has no arable land, heavy reliance is placed on bought in compounds and fodder. The occurrence of BSE on this farm is almost certainly due to bought in feed.

However, the contaminant involved was not necessarily infected MBM. The animals could also have been receiving OPs in their food from chemicals used to dress the products incorporated in some bought in feed.

47. Throughout the 1980s and early 1990s, grain taken into intervention in the UK was repeatedly sprayed with either pirimiphos-methyl or malathion to control weevil/mite infestation.[4] Before sending their grain to the silos, farmers sprayed it regularly "to be on the safe side" because consignments of grain with any mites or weevils were always rejected. Repeat sprayings were carried out at the silos.

48. Over this period, maximum residue limits for OPs on stored grain were raised from 2-10 parts per million. Much of this grain from the intervention stores went as an ingredient of cow concentrate feeds during the 1980s and early nineties.

49. If the argument that OPs play a part in the development of BSE is accepted then,

with OP contamination of grain at this level, bought in feeds could have produced a similar situation to that described on the three BSE farms which used OP's themselves.

50. If this is so, it provides a ready explanation for all the BSE cattle born after the ban on MBM in 1988.

51. In the early 1990s, the passport system for grain was introduced, which must have resulted in some reduction in grain treatment. This in its turn would have led to the steady decline in the number of new cases of BSE which has occurred.

52. However, farmers continue to spray "to be on the safe side" because rejection of a load of grain is so expensive to them. If a load of grain is first rejected and then treated "professionally" to bring it up to standard, the charges are so high that they dig deep into the farmer's profits.

53. There is probably no way in which it is possible to discover retrospectively, which batches of feed incorporated grain heavily contaminated with OPs. Just as it is impossible to know which batches of feed might have contained contaminated MBM.

54. Unless every future consignment of grain is rigorously tested to ensure the very minimum use of OPs, contaminated loads will continue to find their way into feed with the risk of further occurrences of BSE.

55. Finally, as it is known that three of the four BSE farms have copper deficient soil, it is worth considering whether this may predispose the animals to breeding problems and BSE.

Conclusions

56. Nothing in the survey results rules out the MBM theory of the origin of BSE.
But, the evidence of the survey does provide support for the general hypothesis propounded by Mark Purdey, that BSE could be linked to the use of OPs. Certainly on one farm, BSE could be linked with the use of a phosmet warblecide. On two other farms, OPs known to be on grain fed to cattle provide further links with BSE.

57. The heavy OP dressing of grain taken into intervention provides a further possible link between OPs and BSE, as much of this grain is subsequently fed to cattle.

58. Grain storage OPs in cattle feed can not be ruled out as a possible a major cause of the BSE epidemic.

59. On the evidence of this study to date, the OP hypothesis is as viable as the MBM hypothesis and provides a more rational explanation for BAB cases.

References

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