8. Other industries

Introduction

8.1 A number of other industries were dependent upon the components and by-products of bovine carcasses but were not as central to the BSE story. This chapter examines some of these industries and the extent to which their processes and practices changed following the emergence of BSE.

Butchery and meat processing

Introduction

8.2 Butchers and meat processors take meat that is fit for human consumption and convert it into the forms in which it is purchased and eaten. They are often the final stages through which fresh meat, and potentially the BSE agent, pass before reaching the consumer.

8.3 None of the processes in these industries is rigorous enough to destroy the BSE agent. Therefore, the most important BSE-related controls were designed to remove potentially BSE-infected material at the slaughterhouse, before it reached butchers and meat processors. Nonetheless, these controls still had an effect on the processes used in butchery and the manufacture of processed meat products. They also obliged these sectors of the industry to ensure that no Specified Bovine Offal (SBO) was used or sold for human consumption.

Some features of the industry

8.4 It is difficult to draw a clear distinction between butchers and manufacturers of processed meat products. These two sectors of the meat industry have never been mutually exclusive, and as the meat products sector has become more diverse and grown in size and market share, large meat processors, independent specialist butchers, supermarket butchers and even some slaughterhouses have all been responsible for the manufacture of some processed meat products.

Meat cutting and especially further processing is also [along with slaughterhouses] undertaken by specialist companies buying raw material in various forms from the abattoirs. There are over 2,000 such companies ranging from butchers themselves, specialist boning, cutting and packaging plants and large modern processing plants which are considered more as food manufacturers, producing a range of consumer ready products, rather than purely meat processors. These companies are processing beef for both the retail and catering markets.\(^{(548)}\)

8.5 Trade associations representing butchers and meat processors included the British Meat Manufacturers Association (BMMA), the Retail Butchers Trade Association and the National Federation of Meat Trades.

8.6 Both butchery and the manufacture of processed meat products are subject to the Food Safety Act 1990 – which provides general standards for the preparation and sale of food – and similar regulatory controls applied to these sectors of the industry in 1986.\textsuperscript{549} These controls are considered in vol. 14: \textit{Responsibilities for Human and Animal Health}.

\section*{Butchery}

8.7 Butchers cut up carcasses and sides of meat into smaller portions such as joints and cuts suitable for sale to consumers. Butchery can take place in premises adjacent to the slaughterhouse, at a large centralised butchery operation or at catering or retail premises. There has been an increasing move by slaughterhouses themselves to ‘add value’ to their operations by preparing ready-made cuts of meat, including boneless joints, oven-ready packs, manufactured products and convenience foods.\textsuperscript{550} For the purposes of this chapter, ‘butchery’ is intended to cover the cutting up of carcasses both within slaughterhouse cutting plants and in supermarkets or independent high street butcher’s shops.

8.8 There has been a shift in recent times from ‘high street’ or ‘corner shop’ butchers to butchers employed by supermarkets, who prepare cuts of meat in store along with meat products such as sausages, mince and pies. In 1990, Safeway plc reported that 75 per cent of the retail packs it sold were prepared in store.\textsuperscript{551} Supermarkets increased their share of beef sales from 17 per cent in 1977 to 70 per cent in 1997, while the share of independent butchers fell from 66 per cent in 1977 to 18 per cent in 1997.\textsuperscript{552} During the 1960s there were around 33,000 independent butchers operating in the UK.\textsuperscript{553} By 1993 there were fewer than 11,000 independent butchers in the UK, and by 1996 this number had fallen to 10,380.\textsuperscript{554}

In the last few years, however, supermarkets have been increasing their range of fresh meats, and the larger chains have been expanding their numbers of in-store butchers. As a result, by 1997, most consumers were buying both fresh and processed meats as part of their weekly supermarket shopping trip.\textsuperscript{555}

\section*{Meat processing}

8.9 The processed meat and meat products sector includes many different products, such as burgers, sausages, pies and other pastries, canned meats, meat spreads and pâtés, cured and smoked meats, and ready meals and convenience foods. Re-formed meats are used to make many different types of product, including some beef roasts and various ‘rolls’ of meat. The meat processing industry is largely a product of the post-war era, when consumers began gradually to move away from traditional cuts

\begin{itemize}
\item \textsuperscript{549} The predecessor of the Food Safety Act 1990 was the Food Act 1984
\item \textsuperscript{550} Meat and Livestock Commission, ‘Economic Overview of the UK Beef Industry’, June 1998, p. 13 (M44 tab 4)
\item \textsuperscript{551} YB90/12.20/3.3
\end{itemize}
of meat, while the increased availability of refrigeration allowed the introduction of a greater range of products. Items such as sausages do, however, have a long history in British cuisine.

8.10 The increased popularity of processed meat products has meant that fresh carcass meat is no longer the largest sector of the meat and meat products market. In 1992, 33.4 per cent of consumer expenditure on meat was on carcass meat and 34.2 per cent was on meat products (the balance being spent on poultry, bacon and ham). However, by 1997 carcass meat accounted for only 28.5 per cent of expenditure on meat, and expenditure on meat products had risen to 39.1 per cent.\(^556\)

The shift away from carcass meat has led to consumers moving towards more processed meat products, with the leading manufacturers introducing a wide plethora of added-value, speciality products.\(^557\)

8.11 The possible presence of brain and spinal cord in meat products is discussed in chapters 3 and 4 above. The Inquiry was told that institutional caterers had used tonsils in beefburgers.\(^558\)

**Processes involved in butchery**

8.12 High street butchers and supermarket butchers are normally supplied with sides of meat directly from slaughterhouses or through meat wholesalers. However, the supply routes to butchers vary and, as discussed above, some slaughterhouses perform some butchery tasks themselves, such as making hamburger meat and meat trimmings.

8.13 Where butchery takes place within slaughterhouses, meat cutters work on assembly lines, with each individual responsible for a number of specific cuts. Depending on the type of cut in question, knives, cleavers, meat saws, band saws and other equipment are used. In meat packing plants and large retail food establishments, butchers and meat cutters work in large meat cutting rooms equipped with power machines and conveyors. In small retailers, the butcher may work in a space behind the meat counter.\(^559\)

8.14 Butchers separate wholesale cuts of meat into retail cuts or servings. They also cut meat into steaks and chops, shape and tie roasts, and grind beef for sale as chopped meat. Boneless cuts are prepared using knives, slicers or power cutters, while band saws carve bone-in pieces. Butchers in retail food stores may also weigh, wrap and label the cuts of meat, arrange them in refrigerated cases for display, and prepare special cuts of meat to fill unique orders. High street butchers work in the same way but also display some of their cuts of meat unwrapped.

8.15 Minced, or ground, meat is sometimes prepared from the trimmings or offcuts from other cuts of meat, but may also be made from less popular parts of the carcass, such as the forequarter. Approximately 25 per cent of the beef consumed in the UK is minced.\(^560\)

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\(^{558}\) S166 Wildman para. 4
\(^{559}\) M44 tab 11 p. 8
\(^{560}\) YB90/5.15/31.2
As discussed in Chapter 3 on head-boning and brain removal, many butchers recovered the accessible meat from the heads of slaughtered cattle and had the heads provided to them by slaughterhouses for this purpose.\textsuperscript{561}

Some butchers also removed the brain from the skulls of slaughtered cattle and sold it intact for consumption by humans or domestic pets.\textsuperscript{562} This practice was not particularly widespread, but it is estimated that as many as 270,000 brains a year may have been sold by butchers in England and Wales in the early 1980s.\textsuperscript{563}

**Legislative changes and developments in the process post-BSE**

From 13 November 1989, the Bovine Offal (Prohibition) Regulations 1989 (the 1989 SBO Regulations) banned the use or sale of Specified Bovine Offal (SBO) for human consumption.\textsuperscript{564} SBO – brain, spinal cord, spleen, thymus, tonsils and intestines – included material which some butchers may have previously sold, albeit to a limited extent, for human consumption.

As explained in Chapter 2 on slaughterhouses, all SBO should have been removed from sides of meat before it reached the butchery stage. The removal of SBO at the slaughterhouse is discussed in Volume 6: *Human Health 1989–96*.

Nonetheless, butchers had an obligation under the 1989 SBO Regulations to ensure that no SBO was used or sold for human consumption. To fulfil this obligation, retail butchers needed to be aware of which bovine material had been made SBO. It is apparent that this was not always the case. Mr Richard Lodge, the Head of Food Health & Safety at Birmingham City Council, referring to a survey undertaken in 1996, told the Inquiry:

\[\ldots\text{our butchers were}\ldots\text{not really aware of what they should be looking for, what SBOs were, how they should recognise them.}\textsuperscript{565}\]

The Inquiry heard no evidence of a general change in practice by butchers in response to the 1989 SBO Regulations. Nor does it appear that butchers were provided with any specific guidance or instructions on how to identify SBO to ensure that it did not reach consumers. For instance, in January 1990, the Meat and Livestock Commission issued a circular about BSE to all meat traders designed to ‘clarify the position’ and ‘allay customers’ concerns’. It did not, however, provide any explanation of what was SBO under the 1989 Regulations or how retailers could ensure that it was not sold for human consumption.\textsuperscript{566}

In March 1990, the BMMA printed and distributed a guidance note in relation to BSE. It was provided to the Retail Butchers Trade Association and the National Federation of Meat Trades for distribution to their members.\textsuperscript{567} It made a number of recommendations on health and safety measures but said only the following in relation to the responsibility of butchers under the 1989 SBO Regulations:

\textsuperscript{561} T58 p. 124; YB90/2.1/2.4; YB89/9.25/1.50
\textsuperscript{562} T106 p. 131
\textsuperscript{563} The Leatherhead Report, ‘Audit of Bovine and Ovine Slaughter and By-Products Sector (Ruminant Products Audit)’, pp. 7–8 (IBD5 tab 17)
\textsuperscript{564} L2 tab 3B
\textsuperscript{565} T64 p. 134
\textsuperscript{566} YB90/1.22/8.1; YB89/11.13/14.1
\textsuperscript{567} YB90/04.05/7.1
... cattle known to be affected by BSE are being kept out of slaughterhouses under legislation. Also to be extra careful, parts of apparently normal animals are being kept from human consumption. These are the brain, spinal cord, intestines, tonsils, thymus and spleen. They are covered by new regulations and are stained or sterilised.\textsuperscript{568}

8.23 In April 1996 (a period just outside the Inquiry’s terms of reference), Birmingham City Council surveyed butcher’s shops to identify the incidence of SBO in beef for retail sale. Visits were made to 353 butchers and supermarkets, 120 of which received ‘bone-in beef’. The results showed that SBO was still entering the human food chain:

Seven pieces of suspected beef were found in six (5\%) of the retail shops inspected which receive bone-in beef. Five of these were thymus (heartbread) and two were spinal canals which had not been properly cleaned. In one instance, the thymus was about to be included in meat for mincing.\textsuperscript{569}

Bovine brains and head meat

8.24 The sale of bovine brains for human consumption was prohibited by the 1989 SBO Regulations. Before the introduction of the SBO controls, many independent butchers routinely recovered meat from the heads of slaughtered cattle returned to them by slaughterhouses for this purpose. As discussed Chapter 3, butchers were not regarded as ‘specialist boning plants’ for the purposes of the 1989 Regulations, and bovine heads could therefore no longer be returned to them unless the brain (as SBO) had been removed.\textsuperscript{570}

8.25 Removal of the brain at the slaughterhouse and other practices (such as captive bolt stunning) raised the possibility of the head meat and other meat being contaminated with bovine brain material. Such contamination was particularly likely during the transport of the heads from slaughterhouses to locations such as butchers.\textsuperscript{571}

8.26 Guidance to reduce risks from brain removal is described in Volume 6: \textit{Human Health 1989–96}. Following the introduction of the Bovine Offal (Prohibition) (Amendment) Regulations 1992 in March of that year, bovine heads, even with the brain removed, could no longer be returned to butchers for recovery of the head meat.\textsuperscript{572}

Pet food manufacture

Introduction

8.27 Before the emergence of BSE, parts of slaughtered bovine animals were included in food manufactured for consumption by household pets such as cats and
dogs. If the bovine material entering this pet food was contaminated with BSE-infective material, the pet food could have been a channel for passing on transmissible spongiform encephalopathies to domestic pets. This chapter examines which bovine material was used in the manufacture of pet food and how, following the emergence of BSE, practices changed in response to the perceived risks.

**Features of the industry**

8.28 The UK pet food industry dates from the end of the 19th century, and the production of canned pet food began in the 1930s. Since that time both the sales of pet food and the range of pet food products available have continued to increase. It is estimated that half of all households in the UK now own a pet.

8.29 The total market for prepared cat and dog foods in 1985 was worth approximately £745 million. By 1998, the market for prepared pet food was worth just under £1.5 billion. Food for cats and dogs accounts for most of this market, and the Pet Food Manufacturers’ Association (PFMA) estimates that all of the 14.6 million pet cats and dogs in the UK eat prepared pet food at least once a week.

8.30 The emergence of BSE appears to have had a limited effect on the pet food industry. The Inquiry heard no evidence of a decline in demand for pet food. The industry was not reliant on bovine products to a significant extent and manufacturers were able to adapt their operations without excessive difficulty.

8.31 The manufacture of pet food in the 1980s was regulated by the Feeding Stuffs Regulations 1986. These Regulations are examined in vol. 14: Responsibilities for Human and Animal Health.

**Processes involved in the manufacture of pet food in 1986**

8.32 This section is primarily concerned with the use of bovine material in pet food, rather than the details of pet food manufacturing processes (which were not altered to any significant extent by the emergence of BSE). As will be seen below, manufacturers responded to the perceived risks of BSE by addressing ‘supply chain issues’ rather than by altering manufacturing processes. Mr Terry Plant of Spillers Petfoods (‘Spillers’) summarised the reason for this approach: ‘To minimise risk by not using raw materials about which we had any doubt.’

8.33 Pet food prepared for dogs and cats is most relevant, since bovine material was generally not included in prepared foods for other domestic pets, such as rabbits and hamsters.
Sources of raw material for pet food

8.34 A report prepared for MAFF in May 1997 made the following observations about the raw material used in the manufacture of pet food since the early 1980s:

Poultry is the major source of raw material with pork also being important. Beef and lamb are minor constituents in comparison. Since 1988, the level of imported raw materials has increased, while the amount of beef used has fallen. Bone is used in limited quantities; beef bone usage is minuscule, for reasons of palatability and functionality.\(^5\)

8.35 Pedigree Masterfoods (‘Pedigree’), one of the UK’s largest manufacturers of pet food, had largely ceased using bovine material by the late 1970s. Up until this time it had used bovine brain, tonsils, thymus, intestines and other derivative materials. However, by 1986 the only bovine materials from the UK that were being included in Pedigree products were spleen and vertebrae.\(^5\)

8.36 Although bovine material may not have been the primary ingredient in pet food, it is evident that it was used:

Ruminant offals are, of course an important raw material in the manufacture of all types of pet food, especially tripes and spleen. Thymus is also used, as are oxtails and prime offals such as heart, liver, kidney and lungs, but to a lesser extent because of their relative expense. Crushed heads (which inevitably involve brain and spinal cord material) are used to a limited extent but will also form one of the constituent raw materials of meat and bone meal [MBM], which is used extensively in pet food manufacture – particularly of the dried and compound biscuit type of product.\(^5\)

8.37 MBM was included in some pet food, although its use was progressively declining during the 1980s:

It was used as a protein source in dry pet food in relatively small quantities compared to other sources of protein meals including poultry meals, soya based and other cereal meals.\(^5\)

8.38 It has also been suggested that blood meal, a by-product of inedible raw bovine blood, was used in the manufacture of pet food.\(^5\)

8.39 Pet food manufacturers purchased bovine material from slaughterhouses, cutting plants and renderers.\(^5\) Often the raw material reached the pet food manufacturer in the form of a slurry, making identification of its individual constituents extremely difficult.\(^5\)

\(^5\) The Leatherhead Report, ‘Audit of Bovine and Ovine Slaughter and By-Products Sector (Ruminant Products Audit)’, p. 7 (IBD5 tab 17)

\(^5\) S163 Malin para. 18

\(^5\) YB91/5.29/8.2–8.3; IBD5 tab 17 p. 9

\(^5\) S163 Malin para. 25; S168 Plant para. 14

\(^5\) ‘Audit of Bovine and Ovine Slaughter and By-Products Sector (Ruminant Products Audit),’ p. 7 (IBD5 tab 17)
The meat materials we use in our manufacturing operation enter our canneries pre-prepared and in the form of blast or plate frozen blocks, each weighing up to 40 kg, on labelled and shrink-wrapped pallets.\(^{589}\)

8.40 The form in which raw materials were received meant that monitoring and inspection by pet food manufacturers was likely to be limited:

Prior to the concerns regarding BSE, raw materials would not have been subjected to any special inspection to ensure the absence of, eg, spinal cord.\(^{590}\)

8.41 As discussed in Chapter 5, although most knackers sold bovine meat and offal for pet food, their share of the market was not significant. Mr Alan Lawrence of MAFF’s Animal Health Division, writing in 1991, estimated the contribution of knackers to total pet food sold annually to be ‘about 2,600 tonnes or just under 0.2%’.\(^{591}\) The Inquiry heard that large manufacturers such as Spillers and Pedigree only used materials from carcasses passed as fit for human consumption and therefore did not source any raw material from knackers.\(^{592}\)

Products derived

8.42 Many types of cat and dog food are manufactured. The different varieties are characterised by such features as their ingredients, moisture content, packaging and the processing systems used in their production.\(^{593}\) For instance, dry pet foods have a moisture content of 10–14 per cent, consist mainly of wheat flour and are fortified with calcium and fat soluble vitamins. MBM was used in dry foods to provide animal protein.\(^{594}\)

8.43 Moist, semi-moist and frozen pet foods are also manufactured. Moist foods have a moisture content of 60 to 85 per cent, and are generally (though not always) preserved by heat treatment. The ingredients, including meats, cereals and jellies or gravies, are packed into sealed cans to preserve them.\(^{595}\)

Canned foods are effectively cooked and sterilised within the can at temperatures above boiling point. Very few people cook foods above boiling point unless using a pressure cooker. Within the industry in the UK at that time it was fairly common for manufacturers to cook and sterilise their canned meat products between 125° centigrade and 130° centigrade.\(^{596}\)

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589 S168 Plant para. 3
590 ‘Audit of Bovine and Ovine Slaughter and By-Products Sector (Ruminant Products Audit)’ p. 7 (IBD5 tab 17)
591 YB91/5.31/3.3
592 S163 Malin para. 25; S168 Plant para. 13
593 M49 tab 5A p. 8
594 S168 Plant para. 16
595 M49 tab 5A p. 8
596 T63 p. 28
Legislative changes and developments in the process post-BSE

Voluntary measures adopted by pet food manufacturers

8.44 The pet food industry first became aware of BSE in 1987. In the months that followed, the UK’s larger manufacturers of pet foods, such as Pedigree and Spillers, took a number of steps in response to the perceived risk posed by the disease.

8.45 In July 1988, Spillers stopped using bovine spleen in its products and replaced it with liver. At the same time, it changed its specification for ground bone to exclude the use of bovine heads and backbones with the intention of eliminating brains and spinal cord.597

8.46 In October 1988, Spillers stopped using MBM which originated in the UK and replaced it with poultry meal, imported pork meat meal and prairie meal (derived from maize).598

8.47 In February 1989, the report of the Southwood Working Party stated that domestic pets could be susceptible to BSE, if the agent were to reach them ‘in an adequate dose by an appropriate route’. However, the report also suggested that pets such as cats and dogs might not be able to acquire the infection orally and that the high temperatures used in the canning process might have destroyed any infectious agent present.599

8.48 By March 1989, it was reported that most companies manufacturing pet food were ‘avoiding UK cattle nerve tissue, spleen and brains’ in favour of sheep or poultry meat.600

8.49 In May 1989, following receipt of advice from the spongiform encephalopathy expert Dr Richard Kimberlin (whom the company had retained in July 1988 to advise it on BSE), Pedigree decided to remove certain bovine materials from its pet foods. In particular, it ceased purchasing from UK sources both spleen and those parts of the vertebrae which might include spinal cord.601

The materials did not represent a major part of Pedigree’s raw material supply and could be relatively easily and inexpensively replaced. Pedigree decided in May 1989 no longer to include them in its recipes, and told the PFMA and MAFF of its decision.602

8.50 Pet food manufacturers also took steps to monitor the quality of the material they were receiving from suppliers. For instance, the Inquiry heard that in 1988 Spillers used whole rather than minced offals so that its inspectors ‘could detect any adulteration or contamination of material as it entered the factory’.603 Other manufacturers adopted similar measures:

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597 S168 Plant para. 8(a)
598 S168 Plant para. 8(b)
600 YB89/3.13/6.1
601 S163 Malin para. 12
602 S163 Malin para. 5
603 S168 Plant para. 15
... as a routine procedure we would have vendor assurance technicians visiting the collector who collected from the abattoirs and from time to time the abattoirs themselves.\textsuperscript{604}

**PFMA voluntary ban**

8.51 On 16 June 1989, following the announcement of the proposed ban on SBO for human consumption, the PFMA announced a voluntary Code of Practice under which its members would not use certain bovine materials of UK origin. The materials to be excluded were those which were to become SBO upon the subsequent introduction of the Bovine Offal (Prohibition) Regulations 1989, banning their use in human food. In particular, PFMA members were advised not to include the following bovine materials of UK origin:

(i) spleen;

(ii) thymus;

(iii) tonsils; and

(iv) any emulsions, forms of ground material or other product containing any material from heads (including the brain) and spinal columns, including the spinal cord.\textsuperscript{605}

8.52 In November 1989, small and large intestines were added to this list so that it accorded with the human SBO ban introduced by the Bovine Offal (Prohibition) Regulations 1989.

8.53 Adoption of the PFMA ban and the changes in policy made previously by manufacturers were voluntary measures. Pet food manufacturers were not subject to the ruminant feed ban, and the PFMA noted that the pet food industry often adopted policies in relation to raw materials which were ahead of legislation.\textsuperscript{606}

8.54 The level of compliance with the PFMA voluntary ban appears to have been high. Members of the PFMA were responsible for the manufacture of at least 95 per cent of all pet food, and the PFMA said that compliance was not difficult for its members as the specified tissues were ‘only in minimal use for quality and quantity reasons’.\textsuperscript{607} While the PFMA was satisfied that its members were observing the ban, it was less certain about observance by non-member manufacturers.\textsuperscript{608} These were likely to be small businesses who were unlikely to have distributed their products nationally.\textsuperscript{609} They were considered to be a mixed group, including ‘small enterprises attached to granaries, abattoirs, knacker’s yards and butcher shops’.\textsuperscript{610}

8.55 By July 1990, the voluntary ban had affected the demand for MBM to the extent that it was described as ‘unsaleable’ as a pet food ingredient.\textsuperscript{611}
The Bovine Spongiform Encephalopathy (No. 2) Amendment Order 1990

8.56 The BSE Amendment Order of 1990 came into effect in September of that year. It extended the ban on the use of SBO to animal feed. Any pet food manufacturers not already complying with the PFMA voluntary ban were now required by law to exclude all SBO from their products.

Alternative sources of raw materials

8.57 The policies of major pet food manufacturers meant that they had been sourcing raw material from outside the UK before the introduction of the PFMA voluntary ban and the 1990 Order. Owing to insufficient UK production, the industry already imported ‘primary offals such as liver, kidney and tripe’. Instead of UK bovine material, it used poultry and porcine material or imported bovine material from outside the UK. Manufacturers had obtained materials from the US, Canada and Australasia, and some had been importing meat meal from Denmark, from as early as June 1988.

Gelatine

8.58 Gelatine is used in a huge number of products, including cosmetics, pharmaceuticals, glue, bone china, photographic chemicals and human food.

8.59 Approximately 60 per cent of gelatine is used in food preparation, 20 per cent in pharmaceutical manufacture, 15 per cent in photographic use and the remainder for other non-food use. Most gelatine used in food is produced by the ‘acid’ process (see below), which utilises soft bones and hides.

Processes involved

8.60 Gelatine is made from the hides and bones of animals, including cattle. Different raw materials receive different initial treatment.

- **Pigskins** are brought directly from the abattoir and kept in cold storage until processing.

- **Calf and cattle hides** are cleansed at the tannery and treated with alkali to separate the undersurface (or ‘flesh split’) from the surface of the hide. The flesh split is almost pure collagen, and is ideally suited to the manufacture of gelatine. The split is preserved with salt or caustic lime and kept until processing.
• **Fresh, chilled bones** are brought directly from the abattoir and processed immediately – they are ground down, washed, degreased with water, dried, classified according to grain size and put into store. Over a period of several days, the resulting bone material is then treated with dilute hydrochloric acid at low temperatures, to release the mineral content. The demineralised bones are neutralised to form a substance called ‘ossein’. The mineral by-product – dicalciumphosphate – is a valuable fodder.\(^{621}\)

8.61 There are two gelatine manufacturing processes, depending on the type of pre-treatment used: namely, the acid process and the alkaline (basic) process.\(^{622}\)

• **Alkaline pre-treatment.** This process is generally used for cattle hides and for bones. The washed splits and the neutralised ossein are treated for up to six months with lime milk. This loosens the cross-links of the connective tissue. The material is then washed and neutralised, and any salts produced are washed out by changing the water up to 20 times.\(^{623}\)

• **Acid pre-treatment.** This method is generally used for pigskins, in which the skin is not so strongly cross-linked and extractability can therefore be achieved more readily. They are treated with acid for one day, followed by neutralising and washing out of the salts by changing the water several times. This method is far quicker and cheaper.\(^{624}\)

8.62 The gelatine is then extracted from the materials produced by these pre-treatment processes. It is dissolved out of the material by mixing with water. This is done in several stages, mixing with successively hotter water, until boiling point is reached. The gelatine produced initially by mixing with warm water has the highest gel strength.\(^{625}\) The next step is purification. The gelatine solution derived during the extraction process is freed from any fat remaining from the raw materials, and from small fibres, in high speed separators. There are a number of other purification steps in which, according to the type of gelatine required, gelatine can be more-or-less completely freed from calcium or sodium ions, acid residue or other salts. The material is then filtered through cellulose plate filters.\(^{626}\)

8.63 The final stages are concentration and drying. The gelatine solution is sterilised by ultra-heating followed by multi-stage vacuum evaporation. The water is gently removed, and the gelatine is concentrated to a honey-like consistency. The viscous solution obtained is then passed again through cellulose plate filters, which are capable of removing even the finest suspension particles.\(^{627}\) The concentrated solution is subjected to a further ultra-heat-treated (UHT) sterilisation cycle, and then cooled and solidified in a freezer. The gelatine is then dried, before being ground to uniform-sized granules. It is ground, sifted and mixed to suit specific applications.\(^{628}\)

8.64 Processing from hides is relatively mild, but the subsequent extraction procedures are likely to cause substantial removal and deactivation of the BSE agent if it is present in the source material. Indeed, the BSE Working Party of the

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\(^{621}\) YB94/0.0/6.2  
\(^{622}\) YB94/0.0/6.3  
\(^{623}\) YB94/0.0/6.3  
\(^{624}\) YB94/0.0/6.3  
\(^{625}\) YB94/0.0/6.3  
\(^{626}\) YB94/0.0/6.3  
\(^{627}\) YB94/0.0/6.3  
\(^{628}\) YB94/0.0/6.3
Committee on Safety of Medicines considered that gelatine could be listed in the lowest risk category of bovine-derived material.\textsuperscript{629} However, as SEAC noted, there was no guarantee that the source material had been kept separate from bovine brain and spinal cord, if it had come from countries with known BSE cases or the prospect of BSE.

\textbf{8.65} Commission Decision 94/381/EC of 27 June 1994 prevented gelatine derived from ruminants being fed to ruminant species.\textsuperscript{630} The EU Scientific Veterinary Committee subgroup on BSE assessed gelatine, and concluded that the risk from trading gelatine for technical use was negligible, regardless of the tissue source. This advice was accepted by the EU, and the subsequent Commission Decision 95/60/EC\textsuperscript{631} excepted gelatine from the general prohibition of feeding ruminants any ruminant-derived protein, as imposed by Decision 94/381/EC.\textsuperscript{632} Gelatine is further discussed in Volume 11: \textit{Scientists after Southwood}.

\section*{Fertilisers}

\subsection*{Introduction}

\textbf{8.66} Fertilisers, which are used to replenish minerals in soil, are supplied to farms and, to a lesser extent, nurseries and domestic gardeners. The Inquiry’s interest in the fertiliser industry lies not in the processes used in its production, but in whether fertilisers with bovine ingredients could be a channel for transmitting the BSE agent to animals or people.

\subsection*{The use of bovine material in fertiliser manufacture}

\textbf{8.67} A number of different ingredients are used in the manufacture of fertilisers, including ammonium nitrate, urea, ammonium sulphate, potash and a variety of phosphate compounds.\textsuperscript{633} At certain times, MBM and bovine blood have also been used. However, according to the Fertiliser Manufacturers’ Association, ‘a little agricultural fertiliser (less than 0.05 per cent) contained a minimal amount’ of MBM.\textsuperscript{634} Mr Brian Rogers, the Chairman of UKRA, confirmed that MBM was used in fertiliser ‘to a very limited extent’.\textsuperscript{635}

\textbf{8.68} Some slaughterhouses sold blood or other waste to farmers or contractors for use as fertiliser. This blood from slaughterhouses was sometimes disposed of by spraying on fields.\textsuperscript{636} This practice is also mentioned in vol. 12: \textit{Livestock Farming}. 

\begin{itemize}
\item \textsuperscript{629} YB89/9.6/10.3
\item \textsuperscript{630} L4 tab 1
\item \textsuperscript{631} L4 tab 5
\item \textsuperscript{632} M72 tab 2 p. 28
\item \textsuperscript{633} M72 tab 2 p. 32
\item \textsuperscript{634} T19 p. 65
\item \textsuperscript{635} YB89/10.02/10.1; YB89/09.07/6.1
\end{itemize}
Legislative changes and developments in the process post-BSE

8.69 Following the introduction of the ban on SBO in animal feed in September 1990, sectors of the rendering industry sought alternative uses for SBO and products derived from it (such as MBM). Before November 1991, since there was no prohibition on the use of SBO in or as fertiliser, some renderers that were processing SBO were spreading MBM made from it on their own land as a cheaper option than landfilling.\(^{637}\) It was proposed, particularly by Northern Ireland operators, that MBM derived from SBO might be utilised in fertilisers.\(^{638}\)

8.70 However, difficulties were perceived with the use of MBM as fertiliser:

Large scale use of meat meal and bone meal as a fertiliser would cause environmental problems, such as a smell nuisance, particularly after rainfall. Its use as a fertiliser would also increase the contact exposure of cattle and sheep and risk further disease. Unless it could be de-natured, there might also be enforcement problems if the ‘fertiliser’ were used as a cheap source of animal feed.\(^{639}\)

8.71 Concerns were expressed about infection of animals grazing on fertilised land and the safety of crops grown in soil treated with fertiliser that contained SBO. Particular concerns arose regarding:

. . . the possibility of the rendered specified bovine offals being sold for use as a fertiliser or for a top dressing material for pastures on which, for example, cattle might graze.\(^{640}\)

8.72 A study by Paul Brown and D Carleton Gajdusek found that it was possible for hamster brain material infected with scrapie at a high titre to remain infective in a soil environment for three years, even though the reduction in titre was over 98 per cent.\(^{641}\) The authors suggested that, based on these results, BSE-infected animals ‘be excluded as a source of bone meal in fertilisers’. MAFF considered that even ploughing MBM derived from SBO into arable land would not remove the risks entirely:

Ploughing in the meat and bone meal would not completely eliminate the possibility that vermin or dogs would locate it by smell and dig it up, particularly if pelleted. And it is possible that there might be a change of use of arable land to pasture or that advice is simply ignored and material put directly on pasture land.\(^{642}\)

8.73 Likewise, at a meeting on 7 March 1991, SEAC advised that ‘on balance it would be better not to use material derived from specified offal as fertiliser’.\(^{643}\) On 10 May SEAC considered the issue again and concluded that ‘for the time
being’ the use of ‘any material derived from specified offals’ as a fertiliser ‘could not be recommended’. 644

8.74 The Bovine Spongiform Encephalopathy Order 1991 came into force on 6 November 1991. It prohibited the use of MBM made from SBO in feed for any animal, but did not explicitly prohibit its use as a fertiliser. 645 Rather, the Order imposed restrictions on movement of SBO-based material, and it was understood that movement licences would be issued only if the material was to be burnt or buried. 646 It did not prohibit using MBM that was SBO-free as fertiliser, but since such MBM could also be used as pig and poultry feed, there was no incentive to do so.

8.75 Although the practice of using MBM as fertiliser never became widespread, on 19 April 1996 the Fertilisers (Mammalian Meat and Bone Meal) Regulations 1996 came into effect. These prohibited the use of MBM as, or in, fertiliser on agricultural land. 647 Its use was still permitted in private gardens and greenhouses, where it was felt that there was no risk of grazing animals having access to it.

644 YB91/5.10/2.2
645 L2 tab 7; YB94/3.25/1.2
646 YB91/9.20/1.2, 1.3 and 1.11
647 L2 tab 20