Transmissible Spongiform Encephalopathies (TSE) in Great Britain 2005 – A Progress Report
Transmissible Spongiform Encephalopathies (TSE) in Great Britain 2005 – A Progress Report
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Editor: Patrick Burke

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I am pleased to present Defra’s TSE Progress Report for 2005. Great Britain’s continued progress on BSE control was marked by the achievement of three key targets: recognition of the British cattle herd’s moderate risk status for BSE, a favourable report on our BSE controls from the EU’s Food and Veterinary Office and the replacement of the Over Thirty Month Rule with a robust testing system for cattle born after July 1996. This progress paved the way for securing EU Member States’ unanimous agreement to lift the ten-year ban on British beef exports. The ban was lifted on 3rd May 2006.

The National Scrapie Plan (NSP) entered its fifth year. By the end of 2005, over two million sheep had been genotyped through the NSP and membership of the Ram Genotyping Scheme continued to increase.

Defra’s continued major funding of TSE controls, monitoring and research in 2005, demonstrated our continued commitment to the protection of public and animal health and to sustainable farming and food.

The United Kingdom held the Presidency of the European Union between July and December 2005 and the Department was closely involved in leading discussions on the European Commission’s TSE Roadmap.

I am proposing that this will be the last in the series of annual TSE Progress Reports. We will continue to report our progress annually in the Departmental Reports and the Reports of the Chief Veterinary Officer. Information on TSEs will also be available on our website at http://www.defra.gov.uk/animalh/bse/index.html which is updated regularly.

My TSE team would welcome your opinions on this report and the proposal that it should be the last in the series. If you have any views, please contact us at:

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Ben Bradshaw
Parliamentary Secretary (Commons)
Department for Environment, Food and Rural Affairs
July 2006
This report provides information about progress made towards eradicating transmissible spongiform encephalopathies (TSEs) in Great Britain in 2005 and the measures that were taken to protect public and animal health. The report is divided into twelve sections.

**Section 1** outlines the roles of key departments in relation to TSE controls.

**Section 2** provides a summary of the bovine spongiform encephalopathy (BSE) situation in 2005. This includes the background to BSE, key events in the epidemic, Government targets for eradicating the disease, BSE cases born after the reinforced feed ban (BARB) cases and BSE in other countries.

**Section 3** covers BSE controls in 2005, including the replacement of the Over Thirty Month (OTM) Rule, the cohort cull, specified risk material (SRM) controls, the feed ban, the offspring cull, cattle identification, animal by-products; the BSE surveillance programme; and the European Commission’s TSE Roadmap.

**Section 4** details the progress of the BSE epidemic from 1986 to the end of 2005. This section contains a number of charts and graphs, highlighting the significant progress in controlling BSE.

**Section 5** covers the progress towards the removal of the EU restrictions on the export of cattle and beef from the United Kingdom.

**Section 6** covers the work being undertaken to eradicate TSEs in sheep and goats in 2005, and identification of these species.

**Section 7** covers trends and research on variant Creutzfeld-Jakob Disease (vCJD).

**Section 8** explains in more detail the role of the Spongiform Encephalopathy Advisory Committee (SEAC) which advised the Government and the Food Standards Agency (FSA) on TSE issues.

**Section 9** covers the extensive TSE research programme that Defra funded in 2005.

**Section 10** provides links to further information on TSEs.

**Section 11** gives a list of abbreviations and acronyms.

**Section 12** is a glossary.

Further information on TSEs is available at http://www.defra.gov.uk/animalh/bse/index.html

This report is also available at http://www.defra.gov.uk/animalh/bse/publications/index.html#progress

Copies of previous editions are available from ahweb@defra.gsi.gov.uk
Roles of Key Departments in 2005

Department for Environment, Food and Rural Affairs (Defra)

Defra’s overarching aim continued to be sustainable development. The goal of sustainable development is to enable all people throughout the world to satisfy their basic needs and enjoy a better quality of life, without compromising the quality of life of future generations.

Defra’s strategic priorities included:

Sustainable farming and food, including animal health and welfare:
- Helping to create a sustainable food and farming supply chain serving the market and the environment; putting in place systems to reduce risks of animal diseases, and being ready to control them when they occur.

Defra’s strategic outcomes included:

Sustainable farming including animal health and welfare:
- More customer focused, competitive and sustainable farming; more competitive and sustainable food industry; further Common Agricultural Policy reform.
- Animal health and the welfare of kept animals improved, and society, the economy and the environment protected from the impact of animal diseases, through sharing the management of risk with industry.

Defra continued to work towards Public Service Agreement targets in relation to TSE control and eradication in Great Britain (GB).

Department of Health (DH)

DH continued to support the Government to improve the health and well being of the population. It was responsible for improving standards of public health.

The main function of DH’s Creutzfeld-Jakob Disease (CJD) Policy Unit continued to be the provision of advice on the science and policy relating to CJD, a fatal neurological disease in humans.

The unit liaised closely with other policy makers across Government as well as the National CJD Surveillance Unit, and care and voluntary organisations. It also provided secretariat support to a number of expert committees, which provided advice to the Government on CJD and BSE issues.
Food Standards Agency (FSA)

The FSA was established by an Act of Parliament in 2000, as an independent food safety watchdog, to protect the public’s health and consumer interests in relation to food.

The FSA continued to provide advice and information to the public and Government on food safety from farm to fork, nutrition and diet. It also protected consumers through effective food law enforcement and monitoring.

The Meat Hygiene Service (MHS), an agency of the FSA, enforced the controls on specified risk material (SRM) in licensed slaughterhouses and cutting plants. The MHS supervised the removal of SRM from carcases before they entered the food chain.

Welsh Assembly Government & Scottish Executive

Agriculture remained a devolved issue and the Scottish Executive and Welsh Assembly Government continued to be responsible for legislation on animal TSE-related issues in Scotland and Wales. Wherever possible, Defra and the Devolved Administrations aimed to adopt similar approaches to transmissible spongiform encephalopathy (TSE) controls throughout GB.

Spongiform Encephalopathy Advisory Committee (SEAC)

SEAC, an independent expert advisory committee, continued to provide independent expert scientific advice to the Government and the FSA on TSEs such as bovine spongiform encephalopathy (BSE), variant Creutzfeld-Jakob Disease (vCJD) and scrapie.
Control of BSE: Summary of Progress

Background

Bovine spongiform encephalopathy (BSE) is a progressive, fatal, neurological disease which typically causes nervousness, exaggerated reactions, unsteadiness and recumbency in adult cattle. BSE was first identified in the United Kingdom (UK) in 1986. The BSE epidemic in Great Britain (GB) peaked with over 36 000 cases per year in 1992 and there were 180 909 cases to 31 December 2005, more than 99.9% of which were born before August 1996. In March 1996, BSE was linked to a new (variant) form of the human disease Creutzfeld-Jakob Disease (vCJD).

Key Events

- November 1986 – Scientists at Central Veterinary Laboratory (CVL), now Veterinary Laboratories Agency (VLA), first identified BSE.
- July 1988 – The feeding of ruminant proteins to ruminants was banned.
- November 1989 – The use of certain specified bovine offals (SBOs) in food was banned.
- September 1990 – The use of SBOs in animal feed was banned.
- November 1994 – The feeding of mammalian protein to ruminants was banned.
- March 1996 – BSE was linked to vCJD. The European Union (EU) banned export of UK beef and cattle. The Government introduced the Over Thirty Month (OTM) Rule preventing cattle aged over thirty months from entering the food or feed chains.
- April 1996 – The feeding of mammalian meat and bone meal (MMBM) to any farmed livestock was banned.
- 1 August 1996 – A recall of feed already in the supply chain was completed and a number of new measures were introduced, notably a prohibition on possession of MMBM on premises where livestock feed was kept. The April 1996 “reinforced feed ban” was considered to be fully effective.
Section 2

- 1 August 1999 – The Date Based Export Scheme (DBES) commenced permitting limited exports of UK beef subject to strict conditions.

- 2 October 2000 – Lord Phillips delivered the report of the BSE Inquiry to the Agriculture Minister and the Secretary of State for Health.

- 1 January 2001 – The EU’s ban on feeding animal protein to ruminants and processed animal protein (PAP) to farmed animals came into force.

- 22 May 2001 – Regulation (EC) No.999/2001 (the EU TSE Regulation) introduced harmonised EU-wide controls for BSE and other transmissible spongiform encephalopathies.

- 1 July 2001 – The EU’s active surveillance programme commenced.

- 1 August 2001 – The EU ban on feeding PAP to farmed animals was implemented throughout Great Britain.

- April 2002 – TSE (England) Regulations 2002 implemented the EU TSE Regulation. (Scotland and Wales implemented legislation separately in May and June 2002 respectively).

- June 2003 – The Government presented its case for recognition of the UK cattle population as ‘moderate risk’ for BSE, to the EU.

- 12 May 2004 – The European Food Safety Authority (EFSA) issued a positive opinion on the UK’s application for moderate BSE risk status and changes to the DBES.

- 1 December 2004 – The Government announced the start of a managed transition towards the lifting of the OTM Rule, subject to the development of a robust testing system.

- 15 March 2005 – EFSA confirmed that the UK cattle population could be considered a ‘moderate risk’ for BSE.

- 6–15 June 2005 – The EU Food and Veterinary Office (FVO) visited the UK to review its BSE controls.

- 15 July 2005 – The EU published the TSE Roadmap which outlined a future strategy for TSE controls.


- 7 November 2005 – The OTM Rule was replaced with a robust testing system for cattle born or reared in the UK after July 1996.
A fuller chronology is available at

Further information is available at

The BSE Epidemic

The BSE epidemic continued to show a steady decline during 2005. This is shown in Table 1.1.

Table 1.1 : The annual percentage change in BSE incidence from 2000 to 2005

<table>
<thead>
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<th>Years</th>
<th>Percentage Change in BSE Incidence</th>
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<tr>
<td>2000 to 2001</td>
<td>-18%</td>
</tr>
<tr>
<td>2001 to 2002</td>
<td>-7%</td>
</tr>
<tr>
<td>2002 to 2003</td>
<td>-47%</td>
</tr>
<tr>
<td>2003 to 2004</td>
<td>-44%</td>
</tr>
<tr>
<td>2004 to 2005</td>
<td>-34%</td>
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The total number of confirmed cases of BSE in GB detected by scanning (passive) surveillance of clinical suspects fell from 82 in 2004, to 39 in 2005, a reduction of over 52%.

The total number of confirmed cases of BSE in GB detected by targeted (active) surveillance fell from 227 (out of 515 507 cattle tested) in 2004, to 164 (out of 547 366 cattle tested) in 2005, a reduction of 28%.

Public Service Agreement (PSA) Targets

Defra’s 2005–2008 PSA targets continued to include a reduction in the number of cases of BSE in GB detected by both scanning and targeted surveillance to less than 60 in 2006, with the disease being eradicated by 2010. Although the 2005 statistics showed an encouraging decline in the incidence of BSE, Defra will slightly exceed its 2006 target unless the current rate of decline increases in 2006. Due to the long incubation period of BSE, this will be determined by past events and will be mainly affected by the longevity of the sub-population of cattle born before August 1996, in which the estimated prevalence of infection is greatest. The Older Cattle Disposal Scheme (OCDS), a three-year intervention scheme for cattle born or reared in the United Kingdom before August 1996, which started in January 2006, is expected to reduce the longevity of this sub-population. However any future increase in targeted surveillance of this sub-population (from 10 000 per year in 2005) may increase the observed prevalence.
BSE Cases Born after the Reinforced Feed Ban (BARBs)

Additional measures to prohibit the feeding of mammalian meat and bone meal to all farmed livestock have been in place in the United Kingdom (UK) since 1 August 1996. This is regarded as the date the reinforced feed ban became effective. BSE cases born after 31 July 1996 are referred to as BARB cases. The main routes of infection for BARB cases are thought to be the persistence of traces of infectious material in contaminated feed produced before August 1996 or traces of infectious material in imported feed ingredients, particularly those imported via other EU Member States before feed rules were tightened in 2001.

By the end of 2005, there were a total of 123 BARB cases confirmed in GB, 29 of which were confirmed in 2005. This was a 32% increase on the 22 BARB cases confirmed in 2004. The increased incidence of BARB cases in 2005 was thought to be due to the proactive culling of cohorts of BSE cases (cattle which consumed the same feed) which resulted in 6 new cases, and an increased number of cattle slaughtered and tested in late 2005 in anticipation of changes to the Over Thirty Month Scheme and emergency slaughter rules in early 2006. Continued or increasing numbers of future BARB cases may also impact on the achievement of the PSA targets referred to above.

Further information on BARB cases is available at http://www.defra.gov.uk/animalh/bse/controls-eradication/feedban-bornafterban.html

BSE Outside Great Britain

This report covers Great Britain. Further details of BSE in Northern Ireland are available at http://www.dardni.gov.uk/econs/snot0033.htm

The worldwide incidence of BSE continued to decline in 2005, although a few countries reported slight increases, usually as a result of increased targeted (active) surveillance. The World Organisation for Animal Health (OIE) continued to monitor the numbers of BSE cases worldwide and details are available on their website http://www.oie.int/eng/info/en_esb.htm

1 These figures do not include 2 confirmed cases of BSE in animals which died in December 2005. These two cases were identified under the compulsory BSE surveillance programme, an aspect of which requires the UK to test all fallen stock cattle aged 24 months or over. The dates of birth of these two animals are unknown although they are likely to have been born after July 1996.
BSE Controls Protecting Public and Animal Health

The Over Thirty Month (OTM) Rule

In March 1996, the Government banned the sale of beef from cattle aged over thirty months at slaughter for human consumption. This followed the discovery of a probable link between bovine spongiform encephalopathy (BSE) and variant Creutzfeld-Jakob Disease (vCJD) and advice from the Spongiform Encephalopathy Advisory Committee (SEAC) that beef from cattle over thirty months of age should be de-boned under official supervision. De-boning proved to be impractical and the OTM Rule was introduced instead. The Meat Hygiene Service (MHS) enforced the OTM Rule at slaughterhouses. Local Authorities and the MHS enforced the OTM Rule in respect of imported beef.

The OTM Scheme was also introduced in 1996. This was an ‘intervention’ scheme designed to assist the cattle industry by providing a market support mechanism for those animals which could no longer enter the human food chain.

Replacement of the Over Thirty Month Rule

In July 2004, the Food Standards Agency (FSA) advised Ministers that a move to replace the OTM Rule by BSE testing would be justified on the basis of the food-borne risk to consumers and proportionality in relation to the cost of maintaining the current rule. The FSA further advised that, given the importance of the effective implementation of BSE testing, Ministers should not change the OTM rule until an independent group had advised that all the necessary arrangements for testing had been put in place. The FSA’s risk assessment was based on pessimistic assumptions. It was subjected to rigorous independent peer review and endorsed by SEAC.

In December 2004, the Government announced the start of a managed transition towards the lifting of the OTM Rule and its replacement with a system of robust testing of cattle for BSE. The Government also announced that replacement would not happen until the FSA had advised that the testing system was robust.

On 15 August 2005, the FSA Board advised Ministers that an effective system to test OTM cattle for BSE before they entered the food chain had been successfully designed and trialled. The Board took into account (a) the report from their Independent Advisory Group; (b) feedback from the European Union’s Food and Veterinary Office (FVO) 2005 inspection of the United Kingdom (UK)’s BSE controls; and (c) the outcome of public consultations.
The FSA Board also identified a number of prerequisites which would need to be met prior to OTM Rule change. These addressed (a) the need to ensure sufficient abattoir capacity and appropriate supervision by the MHS as BSE testing commenced; (b) the issuing of new guidance about the rules on emergency slaughter of animals; and (c) the strengthening of legislation to prevent ineligible animals entering the food chain.

On 15 September 2005, the Government accepted the FSA’s advice that the proposed BSE testing system for older cattle should replace the OTM rule.

On 7 November 2005, the OTM Rule was replaced with a permanent exclusion of cattle born or reared in the UK before 1 August 1996 from the food and feed chains and a BSE testing regime for cattle aged over thirty months at slaughter for human consumption. The Beef Assurance Scheme (BAS) ended too. BAS had permitted cattle aged 30–42 months of age, from approved, specialist, extensively reared, low BSE-risk beef herds to enter the food chain whilst the OTM Rule was in place.

The replacement of the OTM Rule marked a significant step in the year-on-year decline in the BSE epidemic and represented a boost for the food industry and beef farmers who could now enter thirty month old cattle born after July 1996 into the human food chain, subject to them testing negative for BSE. By the end of 2005, 26 abattoirs in GB had been approved to slaughter OTM cattle, and over 18 000 OTM cattle had been slaughtered for human consumption. No animals tested positive for BSE and only twenty samples were untestable.

The OTM Scheme continued to operate throughout 2005. The Older Cattle Disposal Scheme (OCDS), an intervention scheme for cattle born or reared in the UK before 1 August 1996, replaced the OTM Scheme on 23 January 2006. OCDS will operate until 31 December 2008 with a fixed compensation rate that reduces year on year.

Replacement of Over Thirty Month Rule – Abattoir Controls

Abattoirs slaughtering OTM cattle for human consumption required MHS approval. When the OTM Rule was replaced, it became illegal both to slaughter OTM cattle for human consumption in a non-approved abattoir and to consign cattle born or reared in the UK before 1 August 1996, to a fresh meat abattoir.

In order to gain approval to slaughter OTM cattle for human consumption, abattoirs had to meet strict standards endorsed by the FSA. These included a two-day assessment of the abattoirs own controls and agreeing a Required Methods Of Operation (RMOP) with the MHS.

An RMOP is a legally binding agreement between the MHS and the abattoir operator setting out how OTM cattle will be processed. Any amendments to RMOPs must be first agreed between the MHS and plant operator. Breaches of the RMOP are illegal and RMOPs may be suspended or revoked at any time.
OTM cattle had to be processed in batches separate to younger animals and slaughtered in accordance with the RMOP. On receipt of a positive result, the carcase of the test positive animal and the carcases of the one before and two after on the slaughter line had to be identified and removed. These four carcases had to be disposed of by incineration or rendering followed by incineration. All the body parts including the blood and hides of these animals had to be identified and disposed of in the same manner. In the event of a sample being untestable (a 'no-test') the carcases had to be treated in the same way as a positive. The only exception, in relation to a “no test”, was that there was no requirement to destroy the hides from the carcase before and two after.

Further information is available at


www.food.gov.uk/foodindustry/meat/otmreview/

http://www.food.gov.uk/aboutus/ourboard/boardmeetings/

www.seac.gov.uk/

www.food.gov.uk/enforcement/meathyg/mhservice/

BSE Cohort Cull

Regulation (EC) No.999/2001 required that all Member States identify, trace, restrict and cull the cohorts of confirmed BSE cases. Cohorts are cattle which were either:

- born in the same herd as a BSE case, up to a year before or after its birth; or
- reared with a BSE case when both were up to a year old.

Cohort cattle might have consumed the same feed as the BSE case during the first year of their lives. Feed contaminated with the BSE agent is the most important source of BSE infection for cattle. Experts believe that the majority of BSE cases were infected during the first year of their lives.

Until 2005, the United Kingdom (UK) did not cull cohorts aged over thirty months, because the OTM Rule acted as an equivalent measure. Along with the UK’s other BSE controls – the removal of specified risk material and the reinforced feed ban – the OTM Rule provided consumers with equivalent protection from BSE. Before the OTM Rule could be amended, the UK needed to cull all cohorts born after 31 July 1996. This meant culling the existing backlog of cohorts along with the cohorts of new BSE cases.

On 1 March 2005, the State Veterinary Service (SVS) began to cull the backlog of cohorts of BSE cases. The backlog cull was completed by the end of June 2005. The cohorts of new BSE cases were culled as these arose. By the end of 2005, over 3 000 cohorts had been culled in GB. Six of these cohorts tested positive for BSE.
Since the OTM Rule ended, the SVS has restricted the movement of all cattle from any holdings which might have contained cohorts of suspected BSE cases, until the suspect cohorts have been individually identified and restricted.

**Specified Risk Material (SRM)**

Measures to protect public and animal health from the potential risks of BSE were first put in place in 1989. These have been extended and revised over the years in the light of the latest scientific knowledge. SRM controls were estimated to remove over 99% of any BSE infectivity that might have been present. During 2005, the removal of SRM continued to be the main public protection measure against BSE.

**SRM Controls**

SRM continued to include the tissues of cattle, sheep and goats thought most likely to contain the infective BSE agent in the event of the animal being infected. The controls were set out in the EU TSE Regulation (No. 999/2001), which applied in all Member States. This Regulation also laid down more wide ranging rules for the prevention, control and eradication of certain TSEs.

The EU TSE Regulation defined which tissues were SRM and required that they were removed from the carcase at slaughterhouses, or in some cases at cutting plants. SRM could also be removed at some non-food premises approved or authorised in accordance with the EU Animal By-Products Regulation (No.1774/2002). Following its removal, SRM had to be stained and disposed of and was prohibited from entering the food or feed chains.

In October 2005, the FSA consulted on changes to the SRM rules in relation to the potential future lifting of the EU ban on the export of UK beef and the consequential harmonisation of UK SRM controls with those in the rest of the EU. Specific changes consulted upon included:

1. A reduction in the classification of bovine vertebral column as SRM from 30 to 24 months and the use of a potential derogation in the EU TSE Regulation to permit the removal of vertebral column from this age group in authorised butcher’s shops (rather than solely in licensed cutting plants); and
2. The revised classification of SRM permitting the harvesting of bovine head meat and whether head meat removal should be confined to abattoirs, or a potential derogation to allow its removal in licensed cutting plants should be applied.

Table 3.1 shows the list of tissues designated as SRM in GB in 2005.

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2 On 9th March 2006, the FSA Board agreed that, when the EU export ban is lifted, the derogation to allow removal of vertebral column SRM for 24–30 month cattle in Local Authority authorised butchers will be applied in the UK.

3 On 9th March 2006, the FSA Board agreed that, when the EU export ban is lifted, bovine head meat will only be permitted to removed at licensed abattoirs, and that this position will be subject to review.
Enforcement of SRM controls

- The FSA continued to be responsible for enforcement of SRM controls in licensed slaughterhouses and cutting plants in Great Britain.

- The controls were enforced on a day-to-day basis by the MHS. The MHS had inspectors and Official Veterinary Surgeons (OVS) present in all licensed premises. They carried out checks during the slaughter and dressing process, including a detailed final inspection of every carcase to ensure all SRM had been removed.

- Non-food premises such as collection centres and intermediate plants (which included knackers’ yards and hunt kennels) were inspected and authorised by the State Veterinary Service (SVS), in accordance with the EU Animal By-Products Regulation (No. 1774/2002), to ensure the proper disposal of SRM. The SVS checked that the SRM was removed, stained and held in appropriately labelled containers prior to destruction. Local Authorities normally carried out enforcement action at non-food premises.

Occasionally the controls were not correctly applied and a health marked carcase containing SRM left the slaughterhouse. These cases were normally discovered by the MHS when they inspected the carcases on arrival at the cutting plant. The FSA reported a single breach of the SRM controls at a GB abattoir in 2005, involving a sheep carcase. The breach was discovered at the receiving cutting plant. All breaches are reported on the FSA website: http://www.food.gov.uk/bse/facts/uksrmbreaches

<table>
<thead>
<tr>
<th>Table 3.1: Specified Risk Material in 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cattle</strong></td>
</tr>
<tr>
<td>All ages</td>
</tr>
<tr>
<td>• The tonsils and the intestine from the duodenum to the rectum, and the mesentery</td>
</tr>
<tr>
<td>Over 6 months</td>
</tr>
<tr>
<td>• The entire head (excluding the tongue but including the brain, the eyes, trigeminal ganglia), thymus, spleen and spinal cord.</td>
</tr>
<tr>
<td>Over 30 months</td>
</tr>
<tr>
<td>• The vertebral column, excluding the vertebrae of the tail, the spinous and transverse processes of the cervical, thoracic and lumbar vertebrae and the median sacral crest, the wings of the sacrum, but including the dorsal root ganglia – until the OTM Rule was lifted, this requirement only applied to Beef Assurance Scheme animals, as they were the only cattle over 30 months of age permitted to enter the food chain.</td>
</tr>
</tbody>
</table>

| Sheep and goats                           |
| All ages                                  |
| • The spleen and the ileum                |
| Over 12 months (or permanent incisor erupted) |
| • Skull including the brain and eyes, tonsils, spinal cord. |
Imported carcase meats were also subject to SRM controls. SRM should normally be removed in the country of origin. Nevertheless, as a precautionary measure, because of previous breaches of the controls, the MHS inspected every notified consignment of carcase beef. The FSA did not report any breaches of the SRM controls in relation to imported carcases in 2005. All previous breaches are reported on the FSA website: www.food.gov.uk/bse/facts/srm Any imported carcases which have previously been found to contain SRM have been detained and destroyed under official supervision.

Animal Feed Ban

Effective controls on animal feed are the key to the eradication of BSE, and are responsible for bringing about the continuing successful decline of cases in cattle in Great Britain (GB). The original feed ban introduced in 1988 prohibited the use of ruminant protein in ruminant feeds. In 1994 this ban was extended to prohibit the use of mammalian protein in ruminant feed, reflecting EU controls. In 1996, rendered mammalian protein (MMBM) was banned from all farmed livestock feed in the UK, to prevent low-level cross-contamination of ruminant feed both in the supply chain and on-farm. Harmonised EU-wide feed controls implemented in GB in 2001 continued to prohibit the feeding of all processed animal proteins (PAP) and other specified animal-derived products to all farmed animals which were kept for food production with certain derogations. Further information is available at http://www.defra.gov.uk/animalh/bse/controls-eradication/feed-ban.html

The National Feed Audit (NFA)

The NFA programme, conducted by the SVS, audited feed production and handling standards throughout the feed supply chain, including production, transport and storage facilities, and end users on-farm. A risk assessment model, as provided in Commission Recommendation 2004/163/EC, was used to design the NFA programme. This model helped to establish the appropriate level of visits required to premises involved in feed manufacture, handling, storage or use, according to specific risk criteria given appropriate weighting. The programme included taking feed samples at those premises and submitting them to a regional laboratory of the Veterinary Laboratories Agency (VLA) to check for the presence of prohibited animal proteins. These samples were subjected to a range of laboratory tests, including the microscopy analysis test (MAT), by the method stipulated in Commission Directive 2003/126/EC. The compound feed Enzyme-linked Immunosorbent Assay (ELISA) continued to be used in GB to detect heat-treated ruminant, porcine or avian proteins as a backup to the MAT. The programme also covered the investigation of any potential breaches of the ban, and the determination of appropriate protection and enforcement action. The results of the programme indicated wide compliance with the feed controls.

In 2005, Defra established a statutory register of producers feeding fish meal-containing feeds to non-ruminants, and keeping ruminants on the same premises. This register fulfilled the FVO’s requirements and allowed the SVS to prioritise visits to farms to ensure that satisfactory separation procedures were in place. By the end of 2005, over 500 producers had registered.
The SVS’s risk-based inspection programme included inspections of a wide range of premises as shown in Table 3.2.

Table 3.2: National Feed Audit Inspections in Great Britain 2005

<table>
<thead>
<tr>
<th>Premises Type</th>
<th>Number of Inspections</th>
</tr>
</thead>
<tbody>
<tr>
<td>Importer</td>
<td>3</td>
</tr>
<tr>
<td>Store</td>
<td>12</td>
</tr>
<tr>
<td>Feed mills</td>
<td>515</td>
</tr>
<tr>
<td>Home mixers/mobile mixers</td>
<td>302</td>
</tr>
<tr>
<td>Intermediary</td>
<td>38</td>
</tr>
<tr>
<td>Haulier</td>
<td>14</td>
</tr>
<tr>
<td>Farms keeping non-ruminants</td>
<td>41</td>
</tr>
<tr>
<td>Farms keeping ruminants</td>
<td>168</td>
</tr>
<tr>
<td>Farms keeping both ruminants and non ruminants</td>
<td>943</td>
</tr>
<tr>
<td>Total</td>
<td>2 036</td>
</tr>
</tbody>
</table>

Table 3.3 shows the number of feed samples collected during the inspections. None of the livestock feed samples tested, contained evidence of prohibited PAP of terrestrial animal origin.

Table 3.3: National Feed Audit Samples Collected in Great Britain 2005

<table>
<thead>
<tr>
<th>Premises</th>
<th>Number of Official Samples Tested for Processed Animal Protein</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Feed Materials</td>
</tr>
<tr>
<td>At Import</td>
<td>314</td>
</tr>
<tr>
<td>Feed Mills</td>
<td>2648</td>
</tr>
<tr>
<td>Intermediaries/Storage</td>
<td>247</td>
</tr>
<tr>
<td>Home Mixers/Mobile Mixers</td>
<td>779</td>
</tr>
<tr>
<td>On Farm</td>
<td>540</td>
</tr>
<tr>
<td>Fats &amp; Vegetable Oils</td>
<td>44</td>
</tr>
<tr>
<td>Sub-Totals</td>
<td>4 572</td>
</tr>
<tr>
<td>Grand Total</td>
<td>12 570</td>
</tr>
</tbody>
</table>

Further information is available at

BSE Offspring Cull

The BSE Offspring Cull continued to meet an essential pre-condition of the EU’s Decision for the Date Based Export Scheme (DBES). The Decision required that before beef exports could resume under DBES, the UK had to slaughter all surviving offspring born on or after 1 August 1996 to confirmed BSE cases and the offspring of new BSE cases arising after 25 November 1998, without delay. In 2001, the offspring cull was introduced throughout the EU but, other than in the UK, it only applied to cattle born two years before, or any time after, the onset of clinical signs of disease in the dam.

There is evidence that the offspring of cows with BSE are more likely to develop the disease because of maternal transmission, but the risk is now estimated to be much lower than previously thought. The offspring cull removed animals which might have been infected by maternal transmission.

The State Veterinary Service traced the offspring of confirmed BSE cases using the Cattle Tracing System (CTS) and the inspection of farm birth and movement records. When found alive, offspring animals were placed under movement restriction, valued and slaughtered.

<table>
<thead>
<tr>
<th>Total to 31 December 2005 (voluntary and compulsory stages)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 January–31 December 2005</td>
</tr>
<tr>
<td>429</td>
</tr>
</tbody>
</table>

Cattle Identification and Tracing

The tracking of cattle movements continued to be a major factor in the Government’s efforts to control the spread of animal diseases. The Cattle Tracing System (CTS) operated through the British Cattle Movement Service (BCMS), part of the Rural Payments Agency (RPA). During 2005:

- Cattle born after 1 January 1998 should have had a Defra approved eartag in each ear (double tagging). Animals born or imported into GB before 1 January 1998 could continue to be identified by a single tag. Cattle born after 1 July 2000 should have been identified by numeric tags.

- The tag in each ear should have had the same unique number. This unique number, which is issued by BCMS, identifies all animals throughout their lifetime.

- Every keeper should have had a Herd Register which could have been paper or computer based and should have recorded details of births, deaths and movements on to and off the holding.
• All cattle born in or imported into GB since 1 July 1996 should have had a cattle passport. Cattle passports remain with animals throughout their lives. Animals born before 1 July 1996 have been issued with a Certificate of Registration. These documents also act as movement documents.

• All births, movements and deaths were recorded on CTS. The data on this central database was subject to continual monitoring and validation. In line with the Government’s e-business objectives, 53% of notifications to BCMS were made by pre-validated electronic means.

The FVO’s report of an inspection of GB’s BSE controls (June 2005) noted improvements in:-

• the quality of data on CTS and enhancements to the database to give better management information.

• co-ordination of enforcement rules

• crosschecks between CTS information and BSE testing of dead on-farm animals.

Further information on the work Defra is undertaking on identification and tracing of cattle is available at http://www.defra.gov.uk/animalh/tracing/

Animal By-Products

The EU Animal By-Products Regulation (No.1774/2002) contained the rules for the handling of animal by-products in order to protect public and animal health. The EU Animal By-Products Regulation, which applied across the EU from May 2003, introduced stringent conditions throughout the food and feed chains requiring safe collection, transport, storage, handling, processing, use and disposal of animal by-products. It required premises that handle, treat or dispose of animal by-products, to meet specific standards and to be approved. In 2005, the SVS completed the inspection and individual approval of approximately 2000 plants which initially applied for re-approval under the implementing Regulations.

In March 2005, Defra received the final report of the EU’s Food and Veterinary Organisation (FVO) inspection to assess UK progress in applying the EU Animal By-Products Regulation, carried out in October 2004. The issues raised were addressed in an Action Plan.
A number of new EU measures were agreed in 2005, and these were transposed in the new English Statutory Instrument, the Animal By-Products Regulations 2005. These new measures:

- permitted the use of five new methods for treating or disposing of animal by-products;
- permitted the use of some category 1 and 2 material for technical purposes;
- set standards for the processing of fish waste;
- introduced a model commercial document for intra-Community trade; and
- applied controls on milk which is to be fed to livestock.

Additional EU measures that were agreed in 2005 and will come into effect in 2006 are:

- the disposal rules on former foodstuffs of animal origin;
- the simplification of rules on alternative disposal routes such as biodiesel; and
- the rules on organic fertilisers and soil improvers, manure and composting and biogas.

In October 2005, the EU submitted a report to the European Council of Ministers and the European Parliament. The report covered the implementation of the EU Animal By-Products Regulation by EU Member States and possible changes to address problems identified in practice. The report was considered in Council Working Groups of technical experts under the UK Presidency of the Council and was broadly welcomed and endorsed by EU Member States. The EU planned an extensive consultation procedure in the first half of 2006 on proposed changes with a view to coming forward with a co-decision proposal in late 2006 or early 2007.

**National Fallen Stock Scheme**

The National Fallen Stock Scheme had been operating since November 2004. The Government established the Scheme in partnership with industry, with the aim of assisting farmers in their compliance with the Animal By-Products Regulations by reducing their costs of disposing of their fallen stock. By the end of 2005, the Scheme had 34,000 members and had made 200,000 fallen stock collections. The Scheme had generally been successful despite some initial problems and localised collection difficulties during the 2005 lambing season. At the end of 2005, Defra commissioned an independent review of the Scheme. The National Fallen Stock Company will continue to work with local and national farming organisations and the fallen stock collection industry to provide an improved nationwide service in 2006. Further information about the Scheme is available at [www.nationalfallenstock.co.uk](http://www.nationalfallenstock.co.uk)
BSE Surveillance in Cattle

Scanning (Passive) Surveillance

Scanning (passive) surveillance for BSE is designed to ensure detection of animals showing clinical signs of BSE.

During 2005, BSE and other TSEs continued to be Notifiable Diseases. This meant that any person who had in their possession or charge an animal suspected of being affected with BSE should have reported it immediately to the local Divisional Veterinary Manager of the State Veterinary Service. Following notification, a Veterinary Officer (VO) would have visited the farm to examine the animal as soon as possible.

If the VO did not suspect disease at the first visit, they might have considered it necessary to serve the farmer with a movement restriction notice (Form A) and re-examine the animal at a later date. During this time the responsibility for the animal, including treatment, would have rested with the farmer and the farmer's private veterinary surgeon.

If the VO suspected that an animal was affected with BSE they would have served the farmer with a restriction notice (Form A) and a notice of intention to slaughter (Form C). This would have prohibited the movement of the animal from the farm. If the animal was still producing milk, this must not have been sold or supplied for human consumption, or fed to any animal other than the cow’s own calf. The movement of cohorts or offspring (of female suspects) born after July 1996 would also have been restricted. It might have been necessary to restrict entire holdings while the cohorts and offspring were being identified, traced and individually restricted. During 2005, suspect animals were valued for compensation and slaughtered with samples submitted to the Veterinary Laboratories Agency for testing and the remainder of the carcases incinerated.

Table 3.5 shows the result of scanning (passive) surveillance in 2005.

<table>
<thead>
<tr>
<th>Suspects Restricted</th>
<th>Restrictions lifted due to Alternative Diagnosis</th>
<th>Suspects known to have been Slaughtered</th>
<th>Slaughtered suspects in which BSE Not Confirmed</th>
<th>Slaughtered suspects in which BSE Confirmed</th>
</tr>
</thead>
<tbody>
<tr>
<td>186</td>
<td>30</td>
<td>156</td>
<td>117</td>
<td>39</td>
</tr>
</tbody>
</table>

Scanning (passive) surveillance results prior to 2005 are available at

http://www.defra.gov.uk/animalh/bse/statistics/weeklystats.html#pass
Targeted (Active) Surveillance

EU Member States have carried out targeted (active) surveillance for TSEs since 2001 in accordance with the requirements in the EU TSE Regulation (No. 999/2001). During 2005, the following categories of cattle were tested for BSE:

- All cattle over 30 months of age which were slaughtered for human consumption. Prior to the lifting of the OTM Rule in November 2005, this was a small number of Beef Assurance Scheme cattle slaughtered between 30 and 42 months of age;

- All fallen stock over 24 months of age;

- All emergency slaughtered cattle over 24 months of age, including those cattle identified at ante-mortem inspection at abattoirs;

- All healthy cattle slaughtered under the OTM Scheme born after 31 July 1996;

- A random sample of 10,000 animals slaughtered under the OTM Scheme born before 1 August 1996;

- All offspring of confirmed BSE cases, aged over 30 months and born after July 1996; and

- All birth and rearing feed cohorts of confirmed BSE cases, born after July 1996.

Brain stem samples taken from these animals were tested using EU approved rapid tests. All positive or inconclusive samples were re-tested using EU approved confirmatory tests. Table 3.6 shows the results of this testing.

---

4 All cattle over 24 months of age which die or are killed other than for human consumption, must be notified to the TSE Surveillance Helpline for BSE testing (Tel. 0800 525 890).
Table 3.6: Targeted (active) surveillance in cattle in 2005

<table>
<thead>
<tr>
<th>Survey Category</th>
<th>Number Tested</th>
<th>Number BSE Negative</th>
<th>Number BSE Positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fallen Stock &gt;24 months</td>
<td>89 303</td>
<td>89 264</td>
<td>39</td>
</tr>
<tr>
<td>Emergency Slaughter &gt;30 months (OTMS)</td>
<td>138 773</td>
<td>138 669</td>
<td>104</td>
</tr>
<tr>
<td>Ante-Mortem Inspection &gt;30 months (OTMS)</td>
<td>17 792</td>
<td>17 784</td>
<td>8</td>
</tr>
<tr>
<td>Healthy Slaughtered &gt;30 months born after July 1996 (OTMS)</td>
<td>268 125</td>
<td>268 123</td>
<td>2</td>
</tr>
<tr>
<td>Healthy Slaughtered &gt;30 months born before August 1996 (OTMS)</td>
<td>10 045</td>
<td>10 040</td>
<td>5</td>
</tr>
<tr>
<td>Beef Assurance Scheme &gt;30 &lt;42 months (Fresh Meat)</td>
<td>58</td>
<td>58</td>
<td>0</td>
</tr>
<tr>
<td>Emergency Slaughter &gt;24 months (Fresh Meat)</td>
<td>486</td>
<td>486</td>
<td>0</td>
</tr>
<tr>
<td>Ante-Mortem Inspection &gt;24 months (Fresh Meat)</td>
<td>747</td>
<td>747</td>
<td>0</td>
</tr>
<tr>
<td>Healthy Slaughtered &gt;30 months (Fresh Meat) not inc. BAS</td>
<td>18 832</td>
<td>18 832</td>
<td>0</td>
</tr>
<tr>
<td>BSE Offspring</td>
<td>166</td>
<td>166</td>
<td>0</td>
</tr>
<tr>
<td>BSE Cohorts</td>
<td>3 039</td>
<td>3 033</td>
<td>6</td>
</tr>
<tr>
<td>Total for cattle born in 1996/97 cohort</td>
<td>60 847</td>
<td>60 845</td>
<td>2</td>
</tr>
<tr>
<td>Total for other cattle</td>
<td>486 519</td>
<td>486 357</td>
<td>162</td>
</tr>
<tr>
<td>Total for all cattle tested in 2005</td>
<td>547 366</td>
<td>547 202</td>
<td>164</td>
</tr>
</tbody>
</table>

TSE surveillance results prior to 2005 are available at
TSE Surveillance in Sheep and Goats

See Section 6

TSE Surveillance in Other Species

Scanning (passive) surveillance for evidence of TSEs in domestic cats and zoo animals was introduced in the early 1990s, following the diagnosis of disease in some of these species.

In 2005, TSE was detected in an Asian Leopard Cat (*Felis (Prionailurus) bengalensis euptilurus*) submitted by a zoo. The animal was born in 1993 and had historically consumed meat from fallen stock.

Further details of surveillance in cats and exotic species are available at http://www.defra.gov.uk/animalh/bse/statistics/tsestats.html

TSE Roadmap

EU-wide measures have been in place for several years to reduce the incidence of, and eventually eradicate, BSE and scrapie and to reduce potential consumer exposure to BSE. These measures have resulted in a significant reduction in the incidence of BSE. In 2005, the European Commission considered whether changes to the controls might be appropriate, provided that the decline in BSE incidence continues, the changes have a sound scientific basis and consumer protection is maintained. In July 2005, the European Commission published the TSE Roadmap. This outlined the way in which TSE controls may be altered in the future, leading to the achievement of the strategic goals listed below, both in the short to medium and longer terms:

Short to Medium Term Goals: Cattle

1. To ensure and maintain the current level of consumer protection by continuing to assure the safe removal of specified risk material but to modify the list or age based on new and evolving scientific opinion.

2. A relaxation of certain measures of the current total feed ban when certain conditions are met.

3. To reduce the numbers of tests of bovine animals and at the same time continue to measure the effectiveness of the measures in place with a better targeting of the surveillance activity.

4. Simplification of the criteria for the BSE categorisation of countries and conclusion of the categorisation process for Member States and trading partners before 1 July 2007.
5. To stop the immediate culling of cohort and offspring animals after confirmation of BSE. (Such animals could instead be culled and destroyed at the end of their productive lives.)

6. To discuss the lifting of the additional restrictions on exports of beef and beef products from the UK if the pre-set conditions are met.

**Short to Medium Term Goals: Sheep and goats**

7. Review and relaxation of the eradication measures for small ruminants taking into account the new diagnostic tools available but ensuring the current level of consumer protection.

**Long Term Goal**

8. To modify TSE control measures in line with current technology and new evolving scientific knowledge.

The TSE Roadmap is available at


Defra and the FSA launched a joint consultation on the TSE Roadmap in July 2005, and invited comments from SEAC.

Although the Roadmap did not contain detailed proposals, Defra anticipated that discussions would eventually lead to changes in the EU TSE Regulation (No.999/2001). Some of the possibilities mentioned, if turned into proposals, have the potential to impact upon the level of consumer protection against BSE. Defra intends to consult SEAC again as necessary, in order that UK negotiations continue to be informed by an assessment of the level of risk.

The UK Presidency of the European Council of Ministers worked closely with the European Parliament, EU Member States and the European Commission to take forward discussions on the TSE Roadmap to agree a common position. Discussions will continue under the Austrian Presidency in the first half of 2006. The protection of human health remains the Government’s priority, with controls that are soundly based on current science, proportionate, practicable and enforceable. As new proposals emerge from the discussion of the Roadmap, stakeholders will also be consulted again on the possible effects these may have.
Epidemiology of BSE

Progress of the BSE Epidemic

There were 180,909 confirmed cases of bovine spongiform encephalopathy (BSE) in Great Britain (GB) from the start of the epidemic in 1986 until 31 December 2005, of which 179,127 were detected as clinical suspects.

Figure 4.1 shows the epidemic from 1988, when the disease first became notifiable, to December 2005. The decline in the epidemic since the peak in 1992 reflects the considerable impact of the controls introduced in 1988 (ruminant protein to ruminant feed ban) and 1990 (action taken to improve compliance with specified risk material (SRM) controls) to reduce infectivity in animal feed. Figure 4.2, which shows the number of cases by year of birth from 1980, indicates the effectiveness of the 1988 feed and the 1990 SRM controls. During 1995, the SRM controls were enhanced. Then, from 1 August 1996, the total ban on the use of mammalian derived protein for farmed livestock reduced the risk of infection dramatically. A list of the BSE control legislation is available at http://www.defra.gov.uk/animalh/bse/legislation/index.html
Since July 2001, an increasing proportion of the total cases have been detected as a result of targeted (active) surveillance (Figure 4.3). More information on the number of confirmed cases, and method of detection, is available at http://www.defra.gov.uk/animalh/bse/statistics/weeklystats.html – act.
The mean age of onset based on detection of clinical signs for scanning (passive) surveillance or date of death for targeted (active) surveillance has increased since 2001 (Figure 4.4). This represents the period of time that has elapsed since the majority of these cases were exposed to infection. In most cases exposure would have occurred before the 1996 feed ban.
Identification of clinical cases

On average, there were fewer than four clinical BSE suspects restricted in GB each week. BSE was confirmed in 25% of clinical BSE suspects slaughtered, which is comparable to the 2004 confirmation rate of 26% (Figure 4.5). As the incidence of BSE declined, diseases with similar clinical signs (e.g. listeriosis) formed a greater percentage of clinical suspects. Defra and the Devolved Administrations continued their commitment to raising and maintaining awareness of BSE. In 2005, Defra distributed a digital video disk (DVD), produced by the Veterinary Laboratories Agency (VLA), on the clinical signs and diagnosis of BSE\(^5\), to veterinary surgeons in the State Veterinary Service (SVS), private practice and veterinary education. Defra provided an account of the differential diagnosis of BSE to the Spongiform Encephalopathy Advisory Committee (SEAC), which also viewed the DVD.

In the clinical suspects reported since 1988, the confirmation rate has varied greatly with the age of the animal presented. The majority of clinical suspects under three years of age, and 45% of those over ten years of age have not been found to have BSE (Figure 4.6).
During the twelve-month period ending 25 October 2005, GB sampled all healthy cattle slaughtered under the Over Thirty Month (OTM) Scheme and born after July 1996. More cattle were tested through targeted (active) surveillance in 2005 than in previous years. Although the incidence of BSE cases detected by targeted (active) surveillance increased between 1999 and 2002, the percentage of positive animals declined steadily as the number of tested animals increased. This is shown in Table 4.1.

Table 4.1: The percentage of animals testing positive for BSE under targeted (active) surveillance in GB between 1999 and 2005

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Tested under Targeted Surveillance</th>
<th>Number Positive</th>
<th>Percentage Positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>3 951</td>
<td>18</td>
<td>0.46</td>
</tr>
<tr>
<td>2000</td>
<td>10 049</td>
<td>44</td>
<td>0.44</td>
</tr>
<tr>
<td>2001</td>
<td>80 444</td>
<td>332</td>
<td>0.41</td>
</tr>
<tr>
<td>2002</td>
<td>333 064</td>
<td>594</td>
<td>0.17</td>
</tr>
<tr>
<td>2003</td>
<td>394 705</td>
<td>375</td>
<td>0.09</td>
</tr>
<tr>
<td>2004</td>
<td>515 507</td>
<td>227</td>
<td>0.04</td>
</tr>
<tr>
<td>2005</td>
<td>547 366</td>
<td>164</td>
<td>0.03</td>
</tr>
</tbody>
</table>
Geographical Distribution

The Three Phases of the Epidemic

The geographical distribution of cases is remarkably different for:

i. BSE cases born before the introduction of the initial (ruminant protein to ruminant) feed ban in July 1988;

ii. BSE cases born between the July 1988 feed ban and the end of July 1996, after which the reinforced (mammalian meat and bone meal to farmed livestock) feed ban is considered effective; and

iii. BSE cases born after the reinforced feed ban (BARB cases).

The three phases of the epidemic are depicted in Figures 4.7 (a)–(c). They indicate the dramatic geographical changes in risk for cattle and the marked reduction in risk of infection. The adjusted prevalence in Figures 4.7 (a) and (b) is set at cases per thousand cattle, while that in Figure 4.7 (c) is set at cases per million cattle, reflecting the lower prevalence in the population born after July 1996.

The risk of infection for animals born between the 1988 and 1996 feed bans was increased in the east of England, and showed a positive association between the ratio of pigs to cattle in an area and the incidence of BSE. This was due to cross contamination of cattle feedstuffs by ruminant derived protein in feed mills producing large quantities of pig rations relative to cattle rations in the high pig density areas of the country. The risk of infection for BARB birth cohorts is more geographically uniform than for animals born earlier and indicates that these cases are not occurring in previously high incidence areas or herds.
Epidemiology of BSE

Figure 4.7 (a)–(c). Choropleth maps of directly adjusted BSE prevalence for pre-1988 cohort, post-1988 cohort and BARB cohorts

Figure 4.7(a) BSE prevalence (cases per 1000 cattle) for cases born before 18 July 1988.

Figure 4.7(b) BSE prevalence (cases per 1000 cattle) for cases born between 19 July 1988 and 31 July 1996.

Figure 4.7(c) BSE prevalence (cases per 1000000 cattle) for cases born after 1 August 1996.
Geographical Distribution of Cases in the BARB Birth Cohorts

The distribution of cases in four of the BARB birth cohorts is depicted in Figures 4.8 (a)–(d). In general, the incidence of cases was correlated with the cattle population. However, for at least one BARB birth cohort (1996/1997) there was an excess incidence in South-East England. The risk of infection did not persist in this area for subsequent birth cohorts and the 1997/98 birth cohort in South-West Wales had a notably large incidence which also did not persist for the 1998/99 cohort. This geographical distribution phenomenon is the subject of ongoing epidemiological research.
Figure 4.8 (a)–(d): Density of cattle (adults and young stock) expressed as counts per square kilometre, based on the 2002 agricultural census. Location of natal holding of BARB cases shown as points (•).
BSE cases born after the Reinforced Feed Ban

In 2005, Defra confirmed the first BARB cases born in 2001 and 2002. Detailed epidemiological investigations into the single Pembrokeshire herd of origin concluded that these three animals were exposed to feed produced in 1998. There is a cluster of BARB cases born in South-West Wales in 1997/98.

By the end of 2005, two herds of origin had each generated three BARB cases. Nine herds of origin, two of which were closely linked, had each generated two confirmed BARB cases. These findings suggested a common feed source during the first year of life in each of the eleven affected herds. A statistical analysis of the number of multiple BARB cases, carried out in 2005, provided evidence that all BARB cases do not occur by chance.

The SVS carried out detailed epidemiological investigations into most of the herds generating multiple BARB cases. This provided evidence that some of these cases might have been exposed to feed retained on farms. In December 2005, Defra and the Devolved Administrations issued advice to farmers to clean out feed stores regularly.

Figure 4.9 shows the total number of BARB cases confirmed in GB by birth cohort year (1 August to 31 July). Figure 4.10 shows the total number of BARB cases confirmed in GB by surveillance stream.

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**Note:**

1. One case in the 1996/97 cohort confirmed in 2002, was born in Republic of Ireland and imported at 20 months of age

An epidemiological analysis provided evidence of a reduced risk of infection in recent birth cohorts. This was particularly marked in the reduced prevalence between the 1996/97 and the 1997/98 birth cohorts. The three 2001/02 birth cohort cases were excluded from this analysis as epidemiological investigations suggested that they resulted from exposure to feedstuffs produced in 1998. The results are shown in Table 4.2.
In July 2005, Defra published Professor William Hill’s independent review of BARB cases. The review found that the BSE controls in place were soundly based and concluded that elimination of feed borne sources remained the key to the elimination of BSE. Defra prepared a response to Professor Hill’s recommendations. SEAC considered Professor Hill’s review and Defra provided the Committee with regular updates on BARB cases.

Further information on BARB cases is available at http://www.defra.gov.uk/animalh/bse/controls-eradication/feedban-bornafterban.html

<table>
<thead>
<tr>
<th>Birth Cohort</th>
<th>Prevalence* Infected animals/10^6</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996/97</td>
<td>130</td>
<td>80–180</td>
</tr>
<tr>
<td>1997/98</td>
<td>70</td>
<td>40–100</td>
</tr>
<tr>
<td>1998/99</td>
<td>40</td>
<td>20–70</td>
</tr>
<tr>
<td>1999/00</td>
<td>40</td>
<td>20–70</td>
</tr>
<tr>
<td>2000/01</td>
<td>0</td>
<td>0–24</td>
</tr>
</tbody>
</table>

*maximum likelihood estimate

In July 2005, Defra published Professor William Hill’s independent review of BARB cases. The review found that the BSE controls in place were soundly based and concluded that elimination of feed borne sources remained the key to the elimination of BSE. Defra prepared a response to Professor Hill’s recommendations. SEAC considered Professor Hill’s review and Defra provided the Committee with regular updates on BARB cases.

Further information on BARB cases is available at http://www.defra.gov.uk/animalh/bse/controls-eradication/feedban-bornafterban.html

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Beef and Cattle Exports

Progress Towards Lifting the Beef and Cattle Export Ban

Defra continued to make significant progress in its efforts to secure the lifting of the European Union (EU) ban on the export of beef and cattle from the United Kingdom (UK). Following its positive 2004 opinion on the BSE situation in the UK, the European Food Safety Authority (EFSA) confirmed on 15 March 2005, that the UK herd could now be considered a moderate risk for BSE. This was on the basis of updated data provided to EFSA in November 2004 and was one of the two pre-conditions for negotiations on lifting the export ban to commence.

The other pre-condition was the requirement for a satisfactory report on the UK’s BSE controls by the EU’s Food and Veterinary Office (FVO). Defra set up a dedicated project to oversee the development of three major Information Technology (IT) systems and new business processes to address the shortcomings noted in the report of the April 2004 FVO mission on BSE controls. This involved extensive co-operation between Defra, the Devolved Administrations, the Food Standards Agency (FSA), the Meat Hygiene Service (MHS), the State Veterinary Service (SVS), Local Authorities, the Rural Payments Agency (RPA) (including the BCMS), IBM (Defra’s IT providers) and the wider industry. This project encompassed:

- Improvements in data on cattle identification;
- BSE testing arrangements, including the fallen stock testing regime;
- The establishment of an IT supported cohort cull;
- Ensuring the effectiveness of our SRM and feed controls.

BSE testing arrangements and a cohort cull were also essential elements of the preparations for the Over Thirty Month (OTM) Rule change.

The FVO inspected GB’s enhanced procedures in June 2005 and presented a satisfactory report to the EU on 28 September 2005, noting satisfactory progress in most areas. Consequently, the European Commissioner for Health and Consumer Protection, Markos Kyprianou stated that:

“This favourable report means that the two conditions which the European Commission set out in its TSE Road Map for discussions to begin with Member States on lifting the embargo on British beef have now been met.”

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8 The OIE threshold for a country to be considered moderate risk for BSE is set at 200 BSE cases (scanning plus targeted surveillance) over a twelve month period per million adult cattle. i.e. cattle aged over 24 months.
Preliminary discussions on the lifting of the ban took place at EU level. The EU indicated that they did not expect a decision to be made before March 2006 at the earliest. The UK continued to press for as short a timescale as possible between the ending of the OTM Scheme in early 2006 and the lifting of the export ban to reduce any potential for market disruption during the transition period.

In preparation for the lifting of the export ban, Defra and the FSA launched a consultation in October 2005, on the resumption of beef and cattle exports. The consultation also covered new rules on the age of vertebral column removal and use of head meat, which would apply when the export ban was lifted. Defra held discussions with both industry and animal welfare groups to ensure that the transport of cattle for export would be done to the highest standards of animal welfare and continued to work closely with all concerned. 

XAP

The XAP (eXport APproved) scheme for the export from the UK of beef and beef products of non-UK origin was established by Council Decision 98/256/EC of 16 March 1998. Only approved premises operating in accordance with the requirements of this Decision were permitted to export under XAP. At the end of 2005 there were 79 premises in the XAP Scheme, an increase of 10 over the figure at the end of 1994.

Date-based Export Scheme (DBES)

Limited UK beef exports have been permitted under DBES since 1 August 1999. The scheme was established by an amendment to Council Decision 98/256/EC.

Two further slaughterhouses in Great Britain joined the Scheme in 2005, (Scotbeef Ltd and Linden Foods Ltd) bringing the total premises in the Scheme to nine. Most export consignments have gone to EU markets. Although the amounts still remain small in comparison with export levels before the ban, export levels are expected to rise once the beef ban is lifted.

The current XAP and DBES Schemes would cease operation when the beef ban was lifted.

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9 A proposal to lift the export ban was submitted to EU Member States in January 2006, unanimously approved by the EU’s Standing Committee on the Food Chain and Animal Health on 8 March 2006, came into force on 2 May 2006 and was implemented in the UK on 3 May 2006. This does not apply to cattle born or reared in the UK before August 1996, meat and meat products from cattle slaughtered before 15 June 2005 or vertebral column from cattle slaughtered before 2 May 2006.
Sheep and Goat TSEs

TSEs in Sheep and Goats

Classical Scrapie

Classical scrapie is a progressive and fatal neurological disease of sheep and goats. The disease has been reported in many countries, and has been present in British sheep flocks for nearly three centuries (since at least 1732).

Clinical signs of classical scrapie typically include skin irritation, behavioural changes, changes in posture and gait, and eventually weight loss and death. The incubation period is long and affected animals may show some or all of these signs months or years after infection. The disease affects both sexes and many breeds and the age of peak incidence is about three and a half years.

During 2005, scrapie continued to be a notifiable disease, with compulsory slaughter and compensation for suspects. This meant that any person who had in their possession or charge an animal suspected of being affected with scrapie should have reported it immediately to the local Division Veterinary Manager of the State Veterinary Service (SVS).

Defra’s 2005–2008 PSA targets continued to include a reduction of 40% in the prevalence of scrapie infection (from 0.33% to 0.20%) by 2010.

Atypical Scrapie

The targeted (active) surveillance programme for sheep and goats which has operated since January 2002 detected a number of sheep samples which tested positive on the BioRad Enzyme-Linked Immunosorbent Assay (ELISA) screening test, but were not subsequently confirmed using either Western Blot or immunohistochemistry (IHC) tests. The samples were mostly from sheep with genotypes considered to be more resistant to classical scrapie.

By further optimising the IHC method, Veterinary Laboratories Agency (VLA) scientists have since been able to confirm the presence of disease-associated prion protein in these samples. Several other European countries have also reported similar observations.

Although the VLA detected 3 cases of atypical scrapie in sheep through scanning (passive) surveillance, the vast majority of atypical scrapie cases continued to be detected through the targeted (active) surveillance of sheep and goats under the abattoir and fallen stock surveys. Between January 2002 and December 2005 the VLA detected a total of 108 atypical cases in sheep through targeted (active) surveillance.
In 2005, Defra initiated a case-control study, led by the VLA, to investigate these cases further. The first stage of the study was to trace the atypical cases detected at abattoirs back to the flocks of origin. The SVS had almost completed this work by the end of 2005. The VLA will invite these flocks to participate in the study. It is hoped that this epidemiological study will identify any common risk factors for the presence of atypical scrapie in a flock.

In November 2005, the European Food Safety Authority (EFSA) published an opinion on the classification of atypical scrapie. This is available at http://www.efsa.eu.int/science/biohaz/biohaz_opinions/1216_en.html

### BSE in Goats

In 2002 the French Authorities reported laboratory results from a goat, which were similar to BSE. All goats from the herd were culled and no other suspect cases were detected. Material from this suspect goat was subjected to mouse bioassay and at the beginning of 2005 the European Union (EU) reported that experts had confirmed that the sample was positive for BSE. In light of this finding the EU recommended that surveillance across Europe be increased to establish whether BSE was present in the current goat population. The increased targeted (active) surveillance did not detect any further suspect BSE cases in sheep or goats in 2005.

In early 2005, the VLA reported that it had detected a suspect case of BSE in a Scottish goat originally diagnosed as a case of scrapie in 1990. The VLA had reassessed the sample using immunohistochemistry (IHC) and discovered that it showed similarities to experimental BSE in goats. The male goat was born in March 1987 and was sold to another herd in May 1988. The natal herd no longer exists. The purchasing herd had since moved to new premises. The suspect goat had been fed a mix of oats and barley supplemented with concentrates. By the end of 2005, there were some progeny (up to sixth generation) of the suspect goat in the purchasing herd which consisted of six or seven animals but there had been no further reports or suspicion of neurological or wasting disorders in these animals. Cattle or sheep were not present on the holding of the purchasing herd in 1990 (now used for non-agricultural purposes) or were present on this herd’s 2005 holding. No goat meat, milk or milk products are sold into the human food chain from the herd. The sample from this goat has been subjected to mouse bioassay and the results are not due until 2007 at the earliest.

Since 2001, all samples from sheep and goats, which test positive for a TSE, have been subjected to further discriminatory testing to determine the presence or absence of BSE. Discriminatory testing has also been applied retrospectively to samples since 1998. By the end of 2005, almost 3 000 sheep and goat samples had been analysed without detection of BSE.
Scanning (Passive) Surveillance of Sheep and Goats

In 2005, the reporting rate for suspect cases of scrapie was comparable to that in 2004. However the number of animals slaughtered as clinical suspects reduced from about 90% to 70% of those reported. The number of animals slaughtered as clinical suspects, which were confirmed with scrapie, reduced from about 80% to 60%. The continued high level of reporting in 2005 might have been due to a combination of the difficulties in identifying the clinical signs of scrapie, which are often similar to a number of other sheep diseases, and to generous compensation rates.

In the last quarter of 2005, the VLA reported that it had detected atypical scrapie in 3 sheep submitted as clinical scrapie suspects. Changes in locomotion and behaviour were identified but there was a lack of pruritus\(^\text{10}\) in all 3 cases.

Table 6.1 shows the numbers of confirmed classical scrapie cases in GB identified by scanning (passive) surveillance between 1993 and 2005.

<table>
<thead>
<tr>
<th>Year</th>
<th>Positive</th>
<th>Negative</th>
<th>Inconclusive</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993</td>
<td>328</td>
<td>163</td>
<td>3</td>
</tr>
<tr>
<td>1994</td>
<td>235</td>
<td>90</td>
<td>2</td>
</tr>
<tr>
<td>1995</td>
<td>254</td>
<td>56</td>
<td>1</td>
</tr>
<tr>
<td>1996</td>
<td>460</td>
<td>87</td>
<td>3</td>
</tr>
<tr>
<td>1997</td>
<td>508</td>
<td>83</td>
<td>3</td>
</tr>
<tr>
<td>1998</td>
<td>499</td>
<td>99</td>
<td>1</td>
</tr>
<tr>
<td>1999</td>
<td>598</td>
<td>117</td>
<td>2</td>
</tr>
<tr>
<td>2000</td>
<td>568</td>
<td>86</td>
<td>0</td>
</tr>
<tr>
<td>2001</td>
<td>295</td>
<td>57</td>
<td>9</td>
</tr>
<tr>
<td>2002</td>
<td>404</td>
<td>105</td>
<td>1</td>
</tr>
<tr>
<td>2003</td>
<td>378</td>
<td>98</td>
<td>0</td>
</tr>
<tr>
<td>2004</td>
<td>309</td>
<td>124</td>
<td>0</td>
</tr>
<tr>
<td>2005</td>
<td>173</td>
<td>169</td>
<td>0</td>
</tr>
</tbody>
</table>

\(^{10}\) Skin irritation manifested as scratching, rubbing and nibbling at the fleece.
Targeted (Active) Surveillance of Sheep and Goats

Sheep and goat surveillance continued throughout 2005 and the following categories of animals were tested for scrapie:

- A random selection of 10 000 sheep aged over 18 months, and slaughtered for human consumption (sheep abattoir survey);

- A random selection of 10 000 fallen sheep aged over 18 months and notified voluntarily (sheep fallen stock survey);

- A random selection of 1 000 fallen goats aged over 18 months and notified voluntarily. In April 2005 notification became compulsory\(^\text{11}\) and all such animals are tested (goat fallen stock survey); and

- All goats aged over 18 months, and slaughtered for human consumption (goat abattoir survey)\(^\text{12}\).

Table 6.2 shows the results of this testing.

<table>
<thead>
<tr>
<th>Survey Category</th>
<th>Number Tested</th>
<th>Number Negative</th>
<th>Number Classical Scrapie Positive</th>
<th>Number Atypical Scrapie Positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheep Abattoir Survey</td>
<td>11 106</td>
<td>11 078</td>
<td>12</td>
<td>16</td>
</tr>
<tr>
<td>Sheep Fallen Stock Survey</td>
<td>8 271</td>
<td>8 239</td>
<td>26</td>
<td>6</td>
</tr>
<tr>
<td>Goat Abattoir survey</td>
<td>1 282</td>
<td>1 282</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Goat Fallen Stock Survey</td>
<td>1 329</td>
<td>1 325</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Total Sheep</td>
<td>19 377</td>
<td>19 317</td>
<td>38</td>
<td>22</td>
</tr>
<tr>
<td>Total Goats</td>
<td>2 611</td>
<td>2 607</td>
<td>4</td>
<td>0</td>
</tr>
</tbody>
</table>

\(^{11}\) All goats over 18 months of age which die or are killed other than for human consumption, must be notified to the TSE Surveillance Helpline for TSE testing (Tel. 0800 525 890).

\(^{12}\) Member States may substitute up to 50% of their quota for goats slaughtered for human consumption with additional fallen goats. The UK took advantage of this provision by reducing the human consumption target by 20% and increasing the fallen stock target accordingly.
Genotypes of Classical and Atypical Scrapie Cases

Table 6.3 shows the genotypes of both atypical and classical scrapie detected through the targeted (active) surveillance between 2002 and 2005.

<table>
<thead>
<tr>
<th>Genotype</th>
<th>NSP Type</th>
<th>Classical Scrapie</th>
<th>Atypical Scrapie</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNKNOWN</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>ARR/ARR</td>
<td>1</td>
<td>0</td>
<td>15</td>
</tr>
<tr>
<td>ARR/AHQ</td>
<td>2</td>
<td>0</td>
<td>29</td>
</tr>
<tr>
<td>ARR/ARQ</td>
<td></td>
<td>1</td>
<td>13</td>
</tr>
<tr>
<td>ARR/ARH</td>
<td></td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>AHQ/AHQ</td>
<td>3</td>
<td>1</td>
<td>13</td>
</tr>
<tr>
<td>AHQ/ARH</td>
<td></td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>ARQ/ARH</td>
<td></td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>ARH/ARH</td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>AHQ/ARQ</td>
<td>3</td>
<td>3</td>
<td>21</td>
</tr>
<tr>
<td>ARQ/ARQ</td>
<td>21</td>
<td>21</td>
<td>13</td>
</tr>
<tr>
<td>ARR/VRQ</td>
<td>4</td>
<td>31</td>
<td>0</td>
</tr>
<tr>
<td>AHQ/VRQ</td>
<td>5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>ARH/VRQ</td>
<td></td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>ARQ/VRQ</td>
<td></td>
<td>71</td>
<td>1</td>
</tr>
<tr>
<td>VRQ/VRQ</td>
<td></td>
<td>14</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>154</td>
<td>108</td>
</tr>
</tbody>
</table>

The National Scrapie Plan (NSP)

The NSP, a joint initiative of Defra and the Devolved Administrations in GB, was officially launched in 2001. Its aims and objectives have wide support from within the sheep industry, and the NSP continues to be developed in partnership with key interested stakeholders. The NSP entered its fifth year of testing and over 2.1 million sheep had been genotyped under the plan by the end of 2005. The principal objective of the plan was to reduce the risk of TSEs occurring in the national flock by reducing the number of sheep with the most susceptible genotype to classical scrapie (VRQ/VRQ) and to increase the number of sheep with the more resistant genotypes to classical scrapie. This would consequently reduce the theoretical risk to human health arising from the possible presence of BSE in sheep. Since the launch of the NSP, several new initiatives have been introduced. Extensive information on the plan is published at www.defra.gov.uk/nsp.
Ram Genotyping Scheme (RGS)

In 2005, over 2,400 applications were received from farmers with either registered or non-registered purebred flocks. 11,096 flocks have been visited and over 331,000 samples taken. By the end of 2005, the number of participants in the RGS had risen to 12,136.

Compulsory Breeding Programme

In 2004 Defra carried out a fundamental strategic review of the NSP, in light of European legislation, which required all Member States to establish compulsory genotype-based breeding programmes for TSE resistance. Following public consultation, Rural Affairs Ministers announced in January 2005 that the future strategic direction of the NSP would take the form of a Compulsory Ram Genotyping Scheme (CRGS). During the year, Defra and the Devolved Administrations worked together with key stakeholder focus groups to develop detailed rules for this new scheme, and associated draft implementing legislation. The scheme would focus on the removal of the most susceptible (VRQ) ram genotypes, with participation in the scheme a legal requirement for all sheep farmers who owned purebred breeding flocks and, in addition, those who produced and sold crossbred rams for breeding. All male breeding stock used in, or sold from these flocks would have
to be genotyped, and those carrying the VRQ allele would be required to be slaughtered or castrated. It was estimated that this new Scheme would apply to around 32 000 flocks in GB\textsuperscript{13}.

**Consultation on implementing a Compulsory Breeding Programme for Rare Breeds of Sheep**

In November 2005, Defra launched a consultation on the implementation of a compulsory breeding programme for rare breeds of sheep. Commission Decision 2003/100/EC provides specific derogations that may be applied to exempt rare breeds of sheep from the breeding programme. The consultation sought views on a number of options for applying the derogations. The consultation period ended in January 2006.

**Compulsory Scrapie Flocks Scheme (CSFS) (launched in 2004)**

The CSFS implemented an EU requirement. Under these measures, farmers with confirmed scrapie cases on their farms had to have their sheep flocks genotyped so that the more susceptible sheep could be identified and removed. Alternatively in exceptional circumstances, they could have their whole flock disposed of. Goats on affected holdings had to be disposed of. Genotyping in goats was not an option, as goats were not known to possess scrapie resistant genes. Compensation was paid for sheep and goats culled under the measures. A review of compensation rates was carried out in Autumn 2005 with revised rates applying from March 2006.

Up to 31 December 2005 in GB, 294 flocks on 168 unique holdings had been put under compulsory scrapie control measures. The VLA also confirmed the presence of scrapie in 4 fallen goats (3 from one herd). Both herds were placed under movement restrictions and could not supply goats to the food chain. However, they could continue to supply milk for human consumption. Cull animals and fallen stock from these herds continued to be tested for the presence of TSEs.

Towards the end of 2005, the EU initiated a review of compulsory control measures for TSEs under the TSE Roadmap. Defra and the Devolved Administrations continued to put forward the United Kingdom’s view on the revision of compulsory scrapie control measures, to the EU and other Member States.

**Voluntary Scrapie Flocks Scheme (VSFS)**

The VSFS, launched in April 2004, was open to all historically affected flocks – those that had a case reported and confirmed from 1998 until the date the CSFS rules were enforced in GB. Membership contracts ran for up to a maximum of four years. Applications from eligible owners were accepted up until 31 March 2005.

\textsuperscript{13} Proposals to provide for a permanent legal base for breeding programmes have since been agreed by the European Parliament. Defra anticipates that these proposals will be adopted by the Council of Agriculture Ministers in October 2006. Once adopted, these proposals will remove the requirement for the introduction of EU-wide compulsory breeding programmes.
The VSFS was well supported by the GB sheep industry. Out of 568 eligible owners, 188 owners with 348 eligible flocks joined the scheme.

Under both the CSFS and VSFS, farmers receive free genotyping and veterinary advice on breeding for scrapie resistance, which, in the long term, aimed to eradicate scrapie in the national flock.

**Semen Archive**

Autumn 2005 saw the start of the second season of collections for the archive of semen from rams with the more scrapie susceptible genotypes. This UK-wide project will enable the re-establishment of viable breeding populations of these sheep in the future should it prove necessary. Along with research funded by Defra into scrapie genotypes and economically important breed traits it underpinned the NSP strategy of breeding out the most scrapie susceptible genotypes. It was supported by the National Sheep Association, the Rare Breeds Survival Trust and the Sheep Trust who along with UK Agriculture and Rural Affairs Departments provided a strategic oversight through the Semen Archive Management Board (SAMB). By the end of 2005 almost 60 breeds had nominated donor rams and over 140,000 doses of semen had been frozen. With some breeds yet to donate and many more rams to donate from those breeds that have, collections from rams with eligible genotypes (anything other than an NSP Type 1) will continue as planned until 2006/7.

**Field Capability**

By the end of 2005 there were 188 technical field staff trained and certified for NSP work. In addition, some 467 Local Veterinary Inspectors (LVIs) and 46 Veterinary Officers (VOs) had received theoretical and practical training in line with NSP guidelines.

**Shows and Sales**

GB Agriculture and Rural Affairs departments considered it important to communicate the aims and objectives of the NSP to a large audience, and consequently NSP staff were present at a total of 20 events during 2005.
Contingency Plan for BSE in Sheep

During 2005 the Food Standards Agency (FSA) consulted stakeholders on their views on the Contingency Plan for the emergence of naturally occurring BSE in sheep and, more specifically, on a number of risk management options and their proportionality. This was done through a workshop, a report of which is available on the FSA website at http://www.foodstandards.gov.uk/aboutus/ourboard/boardmeetoccasionalpapers/bsecontingencyplan.

The main conclusion of this workshop was that if naturally occurring BSE was identified there should be a thoughtful escalation of responses graduated on the number of BSE cases and whether the confirmed cases were indicative of a wider spread of the disease. This outcome along with suggested changes to the Plan will be presented to the FSA Board for agreement during 2006.
The Scrapie Monitoring Scheme (SMS)

The SMS, also known as the Temporary Scrapie Export Register, aimed to provide producers with a voluntary framework that allowed them to demonstrate that they had met the requirements for intra-community trade in sheep and goats for breeding.

Sheep and goats from participating flocks and herds must not have come into contact with any other sheep or goats not entered into the scheme for at least three years. Until July 2007 at least one brain sample (taken at routine slaughter or culled from adult sheep and goats at a minimum sampling rate of 1 per 100 adult females over 2 years of age in the flock) must be tested for the presence of scrapie each year. All fallen stock over 18 months of age must also be tested.

The scheme which was introduced in 1999 and only had about 340 members at the end of 2005, is scheduled for review which is dependant on the outcome of EU negotiations on the TSE Roadmap.

Food and Veterinary Office Mission on TSE Controls

In October 2005, the EU’s Food and Veterinary Office (FVO) carried out a mission to GB to evaluate the implementation of certain protective measures against TSEs in sheep and goats, as set out in the EU TSE Regulation (No. 999/2001). The FVO concluded that there was a satisfactory level of compliance with EU requirements on control of TSE in small ruminants, although there were minor shortcomings in certain areas to be addressed.

Sheep and Goat Identification

On 17 December 2003 the EU agreed new rules on sheep and goat identification. The UK negotiated considerable concessions from the original proposals.

Among the major concessions won were the removal of the requirement for individual animal recording on paper documents, which was a key concern for the UK’s stratified sheep sector, an extension of the date for mandatory electronic identification from 2006 to 2008, and the provision to allow Member States to retain single tagging provided they comply with EU rules and do not compromise traceability. The latter however is subject to EU audit and the UK was granted a temporary derogation from double tagging until 30 April 2006. The UK waited to learn whether this would be extended until January 2008.
Other amendments which would affect the UK industry were:

- Intensively reared animals to be identified within six months instead of twelve.

- Extensively reared animals to be identified within nine months instead of twelve.

- Some revisions were made to the current national single tagging system in order to satisfy the EU. These included some changes in the way that holdings were defined, the requirement to record certain movements within a holding in the flock register, the discontinuation of temporary marks as an official means of identification, some minor revisions to the movement document and the flock register, the requirement to provide annual inventory information to the competent authority.

The Government continued to maintain its position that the EU should produce a Cost Benefit Analysis (CBA) when it came forward with its progress report on implementation issues by June 2006. In the meantime the Government continued to work on its own version of a CBA for the UK and attempted to persuade the EU that a further delay, at the very least, was necessary for the introduction of mandatory electronic identification.

Further information is available at

Variant Creutzfeldt-Jakob Disease

Cases To The End of 2005

Variant Creutzfeldt-Jakob Disease (vCJD) is a form of transmissible spongiform encephalopathy (TSE) found in humans and is thought to be linked to bovine spongiform encephalopathy (BSE). By 6 January 2006, there were 159 cases of definite or probable vCJD in the UK of whom 153 had died. The Department of Health (DH) sponsored the National CJD Surveillance Unit (NCJDSU) which continued to have responsibility for monitoring the incidence of vCJD in the UK. Further details are available on the NCJDSU’s website: http://www.cjd.ed.ac.uk/

Current Trend

Analysis of the latest quarterly data for deaths from vCJD in the UK continued to show statistically significant evidence that the epidemic was no longer increasing exponentially. The quadratic statistical model suggested that the epidemic might have reached a peak in mid-2000. This analysis was undertaken by the Health Protection Agency and was published on the NCJDSU’s website.

It remained premature to conclude that the epidemic had definitely peaked, and the data could not discount further peaks in the future, including the possibility of epidemics in other genetic sub-populations. The possibility of person-to-person spread via donated blood has been established beyond reasonable doubt. This followed the detection of three instances in which a recipient of blood from a donor subsequently found to have vCJD had either developed the disease (in two instances) or shown signs of infection on examination after death from an unrelated cause.

Research

Creutzfeld-Jakob Disease-related research funded by DH continued to be directed primarily to supporting the DH’s policies for disease control. These policies continued to be designed to estimate the size of the current epidemic, prevent secondary transmission and develop therapeutic agents.

Consequently research proposals in the following areas continued to be invited:

- Epidemiology and surveillance;
- Blood safety;
- Diagnosis and detection;
- Development and assessment of therapeutic drugs; and
- Decontamination.
Spongiform Encephalopathy Advisory Committee

Background

The Spongiform Encephalopathy Advisory Committee (SEAC) is an independent expert advisory committee that provides scientific advice to the Government on spongiform encephalopathies such as bovine spongiform encephalopathy (BSE), variant Creutzfeld-Jakob Disease (vCJD) and scrapie in sheep and goats. SEAC’s remit is wide-ranging, and covers food safety, public and animal health issues. Ministers appoint members of SEAC in accordance with the guidance issued by the Office of the Commissioner for Public Appointments (OCPA).

During 2005, SEAC’s terms of reference continued to be to:

Advisory on TSEs at the request of:

- Department for Environment, Food and Rural Affairs
- Department of Health
- Food Standards Agency
- Scottish Executive
- Welsh Assembly Government
- Northern Ireland Executive

Provide independent scientific advice on food safety, public and animal health issues relating to transmissible spongiform encephalopathies (TSEs) taking account of the remits of other bodies with related responsibilities.

Provide scientifically based assessment of risk from TSEs to public and animal health and food safety taking appropriate account of scientific uncertainty and assumptions in formulating advice. The committee will convey the nature and extent of such uncertainties with the advice.

Advise on important general principles or new scientific discoveries in TSEs to assist in the identification of new or emerging TSE risks for public and animal health and food safety.
Advise on the scientific basis and risks associated with the introduction of new control measures or the reduction, phasing out or withdrawal of current control measures which are in place to protect public health or animal health from TSEs.

Identify where research is desirable to reduce the scientific uncertainty and inform the assessment of public and animal health and food safety risks relating to TSEs.

SEAC Business

SEAC met five times in 2005 to consider a wide range of issues, including:

- Epidemiological and genetic research on BSE cases born after the 1996 reinforced feed ban (BARB) cases as well as an independent review of the origins of BARB cases
- Differential diagnosis of suspect BSE cases
- BSE in goats
- Natural transmission of BSE in an experimental sheep flock
- Research on atypical scrapie in sheep
- Research into the evolution of the sheep prion protein gene
- Distribution of prions in the peripheral nervous system of cattle with BSE
- Research on the effect of inflammation on the tissue distribution of prions
- The age at which vertebral column from cattle is classified as specified risk material
- An exposure assessment of the use of Category 3\(^\text{14}\) animal by-products in fertiliser
- The European Union’s TSE Roadmap
- The implication of recent research on models of the vCJD epidemic
- The epidemiology of sporadic CJD (sCJD) and variant CJD.
- vCJD infectivity in blood

\(^{14}\) Category 3 animal by-products are low risk materials most of which were fit for human consumption but are no longer intended for human consumption.
• A hypothesis on possible human origins of BSE
• Research using transgenic mice to examine human to human transmission of vCJD
• Research on the correlation between abnormal prion protein concentrations and TSE infectivity

The agenda, minutes and discussion papers of meetings as well as SEAC statements and annual reports and more detailed information about the Committee can be found on the SEAC website www.seac.gov.uk. In line with the Government's policy on openness, members of the public may attend SEAC meetings to observe the Committee in action. SEAC open meetings are filmed and the recordings may be viewed via the website at http://clients.westminster-digital.co.uk/seac/onlineEvents/.

SEAC Subgroups

The SEAC ad hoc Epidemiology Subgroup on UK BARB cases met during the year to discuss a case-control study to investigate the possible causes of BARB BSE cases. The Subgroup reported to SEAC during 2005 and the work of this Subgroup was completed.

The joint FSA/SEAC milk working group established to provide advice to the FSA on research to develop diagnostic tests for abnormal prion protein in the milk from BSE infected cattle reported its findings to SEAC during the year. This research project was completed and the working group disbanded.

The SEAC Epidemiology Subgroup was convened in 2005. It met twice during the year to discuss the nature and profile of the vCJD epidemic taking into account new research. The Subgroup produced a statement on the vCJD epidemic which was discussed and endorsed by SEAC.
TSE Research

Introduction

Defra continued to have a research programme on transmissible spongiform encephalopathies (TSEs) that aimed to provide the scientific evidence necessary to support and inform the Department’s policy-makers and enable sound judgement in the application of control measures for TSEs. Defra’s Research Unit developed the research programme in consultation with Defra policy groups. New research was funded after taking into account scientific developments in the field, and recommendations from Defra’s advisory committees.

TSE Research Strategy


Defra’s research strategy continued to complement that of other UK research providers. The UK TSE Research and Development Joint Funders’ Co-ordination Group was established in 1997 to provide a forum for the co-ordination of UK Government-funded TSE research programmes. It aimed to ensure that significant gaps in knowledge were addressed and that unnecessary duplication of research funding was avoided. The group comprises Defra, the Department of Health, the Food Standards Agency, the Medical Research Council (MRC) and the Biotechnology and Biological Sciences Research Council (BBSRC) and representatives from the Devolved Administrations. The group provides a searchable database of all projects funded by UK funders on the MRC website at: http://www.mrc.ac.uk/index/current-research/current-tse_portfolio_search.htm. Details of EU-funded research into TSEs can be found at: http://europa.eu.int/comm/research/quality-of-life/tse/projects_en.html.

Defra continued to monitor and contribute to the relevant projects within the European Union’s TSE research programme under Framework 6. Scientific staff continued to be associated with the Neuroprion group which was funded by the EU to bring together scientists across Europe working on both animal health and public health aspects of TSEs.
Defra’s TSE research programme

A list of all BSE and TSE research contracts funded by Defra can be found on the Defra website at: http://www2.defra.gov.uk/research/project_data/projects.asp?SCOPE=0&M=PSA&V=PI%3A040

In this 2005 report, as in the 2004 report, only key developments from each of the four main research areas – BSE (in cattle), Sheep TSEs (sub-divided into Scrapie and BSE in sheep), TSE Diagnostics and Animal By-Products – are described. New research projects funded in 2005/2006, largely as a result of a research competition, are listed in Table 9.1.

<table>
<thead>
<tr>
<th>Project Code</th>
<th>Project Title</th>
<th>Lead Laboratory</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE0243</td>
<td>Analysis and design of scrapie surveillance strategies in Great Britain</td>
<td>VLA</td>
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<tr>
<td>SE0244</td>
<td>Designing an abattoir survey to determine the PrP genotype profile of the slaughter lamb population in Great Britain</td>
<td>VLA</td>
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<tr>
<td>SE0245</td>
<td>Ovine PrP gene sequences from sheep with complex genotypes</td>
<td>IAH</td>
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<tr>
<td>SE0246</td>
<td>Demographic predictors for scrapie-affected farms</td>
<td>University of Oxford</td>
</tr>
<tr>
<td>SE1793</td>
<td>Disease-associated PrP&lt;sup&gt;Sc&lt;/sup&gt; detection in the blood of scrapie and BSE-infected sheep</td>
<td>VLA</td>
</tr>
<tr>
<td>SE1795</td>
<td>Investigation of TSE phenotype variation in British cattle</td>
<td>VLA</td>
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<tr>
<td>SE1796</td>
<td>Atypical prion proteins in cattle</td>
<td>VLA</td>
</tr>
<tr>
<td>SE1852</td>
<td>Carrier state: do sheep of resistant PrP genotypes become sub-clinically infected when exposed to scrapie? (parts 1 &amp; 2)</td>
<td>IAH</td>
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<tr>
<td>SE1853</td>
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<tr>
<td>SE1854</td>
<td>To test for the potential presence of scrapie PrP&lt;sub&gt;Sc&lt;/sub&gt; and any associated infectivity in naturally exposed and/or experimentally challenged ARR/ARR sheep using biochemical and transgenic techniques</td>
<td>VLA</td>
</tr>
<tr>
<td>SE1855</td>
<td>Investigation of the risk of transmission of scrapie in sheep milk</td>
<td>VLA</td>
</tr>
<tr>
<td>SE1856</td>
<td>Investigation of the sources of TSE infection for the lamb in the prenatal and perinatal period</td>
<td>VLA</td>
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</tbody>
</table>

15 VLA – Veterinary Laboratories Agency; IAH – Institute for Animal Health; CNRS – Centre National de la Recherche Scientifique; CEA – Commissariat à l’Energie Atomique; NIBSC – National Institute for Biological Standards and Control
Section 9

Table 9.1: New Defra-funded research projects – Continued

<table>
<thead>
<tr>
<th>Project Code</th>
<th>Project Title</th>
<th>Lead Laboratory</th>
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</thead>
<tbody>
<tr>
<td>SE1857</td>
<td>Investigation of sheep scrapie transmission via milk from the inflamed mammary gland</td>
<td>University of Zürich</td>
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<tr>
<td>SE2001</td>
<td>Application of the Transient Scrapie Cell Assay (TraSCA) for in vitro detection of ovine and bovine prions</td>
<td>University of Zürich</td>
</tr>
<tr>
<td>SE2002</td>
<td>Development of Neural Stem Cells (NSC) models for the detection and characterisation of ovine and bovine TSE agents</td>
<td>CNRS, France</td>
</tr>
<tr>
<td>SE2003</td>
<td>Ex vivo cell culture methods for the detection and characterisation of ovine and bovine TSEs</td>
<td>VLA</td>
</tr>
<tr>
<td>SE2004</td>
<td>Identification of PrP-associated infectivity in blood and milk from sheep infected with TSE, toward a diagnostic test for live animals</td>
<td>CEA, France</td>
</tr>
<tr>
<td>SE2005</td>
<td>Assessment of candidate secreted surrogate biomarkers for early diagnosis of prion disease in farm animals</td>
<td>University of Zürich</td>
</tr>
<tr>
<td>SE2006</td>
<td>A rapid live animal test for sheep scrapie</td>
<td>Adlyfe, USA</td>
</tr>
<tr>
<td>SE2007</td>
<td>The relationship between TSE test kit outputs and infectivity levels</td>
<td>VLA</td>
</tr>
<tr>
<td>SE2008</td>
<td>Development of rapid pre-mortem tests for TSEs in sheep</td>
<td>ADAS</td>
</tr>
<tr>
<td>SE2009</td>
<td>Detailed characterisation of novel phage antibodies that bind the amino terminus of the prion protein</td>
<td>VLA</td>
</tr>
<tr>
<td>SE2010</td>
<td>A blood test for TSEs</td>
<td>VLA</td>
</tr>
<tr>
<td>SE2011</td>
<td>Enrichment and isolation of abnormal PrP from body fluids</td>
<td>VLA</td>
</tr>
<tr>
<td>SD0245(^{16})</td>
<td>Conformational analysis of proteins. Towards an ante-mortem test for BSE: an ion mobility/MS approach</td>
<td>University of Warwick</td>
</tr>
<tr>
<td>SD0426</td>
<td>Preparation of standard materials from cases of BSE and scrapie</td>
<td>NIBSC</td>
</tr>
</tbody>
</table>

Figure 9.1 gives details of the relative spend and number of active contracts in each research area for the financial year 2005/2006.

\(^{16}\) Funds supplied by Defra’s Science Directorate
Figure 9.1: Relative annual spend and number of contracts active in February 2006 for each section of the Defra TSE research portfolio

**Financial Year 05/06 Costs**

- Animal By-Products (£0.3M)
- BSE in cattle (£1.2M)
- TSE Diagnostic methods (£5.1M)
- Scrapie (£5.1M)
- BSE in sheep (£3.6M)

**Number of Contracts**

- Animal By-Products (4)
- BSE in cattle (8)
- TSE Diagnostic methods (35)
- Scrapie (30)
- BSE in sheep (12)
Research on BSE in cattle

Research into BSE aimed to contribute to scientific knowledge related to the eradication of BSE in cattle, to public health, to changes to statutory controls, risk analysis and to the potential persistence of prions in the environment.

Research results

Although it is known that recycling of infected materials in animal foodstuffs fuelled the BSE epidemic, the origin of the BSE strain itself has not been established. The incidence of BSE in cattle has shown a progressive decline in line with the removal of meat and bone meal (MBM) from animal feed. However, a relatively small number of cases have occurred in cattle born after the reinforced feed ban in 1996 (BARB cases). A project to investigate genetic variation at the prion protein locus (PRNP) in BARB animals has shown that there is no variation in the coding region of this gene that may be linked with BSE. These results were reported at the 30th June 2005 meeting of the Spongiform Encephalopathy Advisory Committee. (http://www.seac.gov.uk/agenda/agen300605.htm)

Results from a Defra-funded project to investigate the relative transmissibility of sheep and cattle BSE in transgenic mice, together with results of other studies funded by the Department of Health and the MRC, will be published in 2006. Surprisingly, the incubation period for BSE, originating from cattle or sheep, was longer in transgenic mice carrying a bovine prion protein than in wild-type mice. No clinical symptoms, vacuolar pathology or PrP\textsuperscript{Sc} deposition was observed when sheep or cattle BSE material was inoculated into transgenic mice carrying different forms of the human prion protein. Since these humanized transgenic mice develop clinical and pathological signs when inoculated with vCJD (work funded by the Department of Health and the MRC), these results suggest that a significant species barrier restricts transmission of BSE to humans.

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Bovine Chromosome 13q17

Figure 9.2: Regions of PRNP sequenced in BARB cases and controls (Project SE0239)

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Results from a Defra-funded project to investigate the relative transmissibility of sheep and cattle BSE in transgenic mice, together with results of other studies funded by the Department of Health and the MRC, will be published in 2006. Surprisingly, the incubation period for BSE, originating from cattle or sheep, was longer in transgenic mice carrying a bovine prion protein than in wild-type mice. No clinical symptoms, vacuolar pathology or PrP\textsuperscript{Sc} deposition was observed when sheep or cattle BSE material was inoculated into transgenic mice carrying different forms of the human prion protein. Since these humanized transgenic mice develop clinical and pathological signs when inoculated with vCJD (work funded by the Department of Health and the MRC), these results suggest that a significant species barrier restricts transmission of BSE to humans.

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New research

The possibility of different (atypical) forms of BSE in cattle has been reported from a small number of cases in Europe over the past few years. In the UK cattle population current and historical evidence indicates a single uniform strain of the disease. With the development of new diagnostic approaches Defra funded two new projects to investigate past and future BSE cases for any variation in disease type or expression.

Research on sheep TSEs

Research in this area of the portfolio supported the Defra policy programme concerned with the National Scrapie Plan (NSP) and also provided information for formulation of contingency plans for BSE in sheep by the Livestock Strategy Division.

Research results

The discovery of an atypical scrapie infection in sheep that are relatively resistant to scrapie required considered re-assessment of TSE control measures such as the NSP. To assist in this, several research projects were funded at the Veterinary Laboratories Agency (VLA) to investigate the nature and biological significance of atypical scrapie reported results, including transmission studies in mice and sheep. The VLA study that demonstrated the presence of a partially protease resistant PrP with atypical banding patterns in sheep with atypical scrapie will be published in 2006\(^{18}\). Atypical scrapie infection is found in sheep carrying combinations of polymorphisms at codons 136, 154 and 171 (AHQ and ARR) that are relatively resistant to classical scrapie. Complete sequencing of the PRNP gene has identified an association between a polymorphism at a fourth codon, 141, in sheep carrying the ARQ haplotype and the presence of atypical scrapie infection.

Sheep were exposed to feed containing meat and bone meal that could have been contaminated with low levels of BSE prior to the ban on its inclusion in ruminant feed. It has been shown experimentally that sheep can succumb to BSE infection and during 2005, the VLA reported natural transmission of BSE in an experimental flock\(^ {19}\). Ewes were challenged orally with BSE and allowed to lamb in conditions that were thought to maximise the potential for infection. Three of the twenty-two lambs born in 2003 developed clinical disease. If such an infection also occurred naturally and was transmitted between sheep, there is a theoretical possibility that the BSE agent may be present at low levels in the UK flock. However, extensive surveillance and monitoring has shown no evidence of the classic BSE phenotype in UK scrapie cases\(^ {20}\).

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As a precautionary measure, tissues believed to be the most likely to carry BSE infection, if naturally present in the UK flock, continued to be removed at slaughter. To check whether the most appropriate material were being removed, Defra funded studies to identify which sheep tissues at early pre-clinical stages carry infectivity after experimental challenge with BSE. Results reported from one study\textsuperscript{21} demonstrated that there was an early widespread involvement of lymphoid tissues in BSE infection in sheep, as has previously been demonstrated for scrapie.

A large collaborative study to evaluate the impact of widespread selection for PrP genotype on production parameters and health in the UK sheep population continued. Initial results indicated no significant association between any of the performance traits and PrP genotype in commercial Charollais flocks or in experimental flocks of Swaledales and Scottish Blackfaces.

**New research**

Accurate and comparable measurement of data from the scrapie surveillance programme was vital to fulfil the Public Service Agreement (PSA) target to reduce scrapie infection by 40\% by 2010. Research was funded to examine and develop the mathematical models used to estimate the prevalence of scrapie infection. A second project was funded to establish a sampling strategy to examine whether the NSP was having the predicted effect on the genotype of lambs at slaughter. Research to identify epidemiological factors associated with atypical scrapie was taken forward by Defra’s Sheep TSEs Division and the Veterinary Laboratories Agency.

Studies to explore the possible existence of an asymptomatic carrier state for classical scrapie in sheep carrying the ARR prion protein haplotype were initiated in 2005. Projects were also funded to investigate factors, including milk, that could theoretically be involved in the transmission of scrapie between sheep during the lambing period.

TSE Diagnostic Methods

This area of research was directed at:

- Developing diagnostic tests that will detect the early stages of the disease before clinical signs are evident
- Improving understanding the infectious agent
- Developing rapid measurement of TSE infectivity
- Understanding and differentiating between the strains of the TSE agent.

Research results

The development of diagnostic tests, particularly for the live animal, remained an important area for Defra-funded research. A project showed that RAMALT (rectal-anal mucosa-associated lymphoid tissue) may provide an easily accessible tissue to diagnose scrapie\(^{22}\). The advantage of this method is the potential for repeat sampling of individual animals. PrP\(^{Sc}\) was detected in RAMALT sampled from 86% of 121 sheep that were healthy but had been exposed to scrapie in comparison with 86–91% of the other lymphoid tissues taken from these animals and in 78% of the central nervous system tissues.

In addition to studies aimed at improving the detection of PrP\(^{Sc}\), Defra funded work to look for other markers of TSE disease. In one project\(^{23}\), some differences were found between the profiles of biochemical markers in the blood and urine of BSE-infected cattle or scrapie-infected sheep and uninfected controls, but the differences were not sufficiently consistent to form the basis of a diagnostic test.

New research

The main focus of new research projects funded in 2005 was the development of a blood test for TSEs in live animals. To address the uncertainties surrounding the precise nature of the TSE infectious agent and the potential impact this may have on identifying all TSE-infected animals, a study was also funded to examine the relationship between the results of standard diagnostic and immunohistochemical tests and levels of infectivity as determined by bioassay in mice.

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\(^{23}\) SE1763: Whole body consequences of TSEs in ruminants
Since mouse bioassays, even using transgenic mice that carry sheep or cattle prion protein genes, take many months to complete, a more rapid method is required to determine if TSE infectivity is present in a sample. Defra therefore funded three projects to explore the adaptation of cell culture assays to analyse ruminant TSEs. The development of such assays continued to be in line with Defra’s policy to minimise the number of animals used in research and testing.

**Research on Animal By-Products**

This research related to the disposal and decontamination of animal by-products in ways that are safe for public and animal health and the environment.

**Research results**

A long-running study to examine the effects of tallow separation and solvent extraction on PrPSc in the rendering process was completed. The rendering process was shown to reduce TSE infectivity in a solvent-extracted meat and bone meal (MBM) fraction known as greaves, with some low-level infectivity being detected in tallow and condensate. European Food Safety Authority (EFSA) considered these results during their deliberations on the safety of tallow and other animal by-products24.

**New research**

No new research was funded last year. The number of BSE cases has fallen dramatically with a concomitant reduction in the average infectivity of animal by-products. However, it is important to provide accurate data for TSE risk assessments and for monitoring the implementation of control measures. Defra is therefore likely to fund additional work in this area in the future.

**Defra TSE research funding mechanisms**

In 2005, a competition for TSE research in defined areas of work was re-introduced and sixteen new projects were funded as a result. Work could also be commissioned directly and this route was employed if there were limited resources for study or specialised facilities were required. Defra also maintained an “open door” policy whereby concept notes or full research applications were received from the scientific community throughout the year and considered for suitability for Defra funding.

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24 Opinion on the assessment of the human and animal BSE risk posed by tallow with respect to residual BSE risk (2005) EFSA Journal 221, 1–45.
All proposals were peer reviewed by experts in the appropriate research area. In 2003, a Defra TSE Research Advisory Group was established to strengthen this written peer review system and to advise on the scope and balance of the existing research programme, as well as on the quality of science of research proposals and their potential contribution to this programme.

In the 2005/2006 financial year, a wide range of institutions were receiving Defra funds for undertaking TSE research as shown in Figure 9.3.

Figure 9.3: Relative spend at Defra's contractors for TSE research
Further Information

Further information on BSE and TSE is available via the following websites. Additional specific sub-links are provided throughout the report.

Creutzfeld Jakob Disease Surveillance Unit website
http://www.cjd.ed.ac.uk/

Department of Agriculture and Rural Development – Northern Ireland
http://www.dardni.gov.uk/index.htm

Department for Environment, Food and Rural Affairs website
http://www.defra.gov.uk/

Department for Environment, Food and Rural Affairs BSE website

Department of Health website
http://www.dh.gov.uk/Home/fs/en

Department of Health CJD website
http://www.dh.gov.uk/PolicyAndGuidance/HealthAndSocialCareTopics/CJD/fs/en

European Food Safety Authority website
http://www.efsa.eu.int

European Commission TSE website
http://europa.eu.int/comm/food/food/biosafety/bse/index_en.htm

Food Standards Agency website
http://www.food.gov.uk/

Food Standards Agency BSE website
http://www.food.gov.uk/bse/

MHS website
www.food.gov.uk/enforcement/meathyg/mhservice/

Neuropriion website
http://www.neuropriion.com/

World Organisation for Animal Health website
http://www.oie.int/eng/en_index.htm
Rural Payments Agency (including British Cattle Movement Service) website
http://www.rpa.gov.uk/rpa/index.nsf/home

Spongiform Encephalopathy Advisory Committee website
http://www.seac.gov.uk/

Scottish Executive website
http://www.scotland.gov.uk/Home

State Veterinary Service website
http://www.svs.gov.uk/index.htm

Veterinary Laboratories Agency
http://www.defra.gov.uk/corporate/vla/

Welsh Assembly Government website
http://www.wales.gov.uk/wag/wag.htm
## Abbreviations/Acronyms

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>AHDO</td>
<td>Animal Health Divisional Office (of SVS)</td>
</tr>
<tr>
<td>BARB</td>
<td>BSE cases Born After the introduction of the Reinforced [Feed] Ban i.e. in cattle born after July 1996</td>
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<tr>
<td>BAS</td>
<td>Beef Assurance Scheme</td>
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<tr>
<td>BBSRC</td>
<td>Biotechnology and Biological Sciences Research Council</td>
</tr>
<tr>
<td>BCMS</td>
<td>British Cattle Movement Service (of RPA)</td>
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<tr>
<td>BSE</td>
<td>Bovine Spongiform Encephalopathy</td>
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<td>CAP</td>
<td>Common Agricultural Policy</td>
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<tr>
<td>CBA</td>
<td>Cost Benefit Analysis</td>
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<tr>
<td>CI</td>
<td>Confidence Interval</td>
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<tr>
<td>CJD</td>
<td>Creutzfeldt-Jakob Disease</td>
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<tr>
<td>CRGS</td>
<td>Compulsory Ram Genotyping Scheme (NSP)</td>
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<td>CSFS</td>
<td>Compulsory Scrapie Flocks Scheme (NSP)</td>
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<tr>
<td>CTS</td>
<td>Cattle Tracing System</td>
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<td>CVL</td>
<td>Central Veterinary Laboratory (now VLA)</td>
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<td>Chief Veterinary Officer</td>
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<td>DBES</td>
<td>Date-Based Export Scheme</td>
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<td>Defra</td>
<td>Department for Environment, Food and Rural Affairs</td>
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<td>DH</td>
<td>Department of Health</td>
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<td>DVM</td>
<td>Divisional Veterinary Manager (of SVS)</td>
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<td>EID</td>
<td>Electronic identification</td>
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<tr>
<td>EFSA</td>
<td>European Food Safety Authority</td>
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<tr>
<td>ELISA</td>
<td>Enzyme Linked ImmunoSorbent Assay</td>
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<tr>
<td>GB</td>
<td>Great Britain (England, Wales and Scotland)</td>
</tr>
<tr>
<td>IHC</td>
<td>Immunohistochemistry</td>
</tr>
<tr>
<td>IBM</td>
<td>International Business Machines® – Defra’s IT provider.</td>
</tr>
<tr>
<td>IT</td>
<td>Information Technology</td>
</tr>
<tr>
<td>LVI</td>
<td>Local Veterinary Inspector</td>
</tr>
<tr>
<td>MAT</td>
<td>Microscopy Analysis Test</td>
</tr>
<tr>
<td>MHS</td>
<td>Meat Hygiene Service (FSA Agency)</td>
</tr>
<tr>
<td>MBM</td>
<td>Meat and bone meal</td>
</tr>
<tr>
<td>MMBM</td>
<td>Mammalian meat and bone meal</td>
</tr>
<tr>
<td>MRC</td>
<td>Medical Research Council</td>
</tr>
<tr>
<td>NCJDSU</td>
<td>National Creuzfeldt-Jakob Disease Surveillance Unit</td>
</tr>
<tr>
<td>NSP</td>
<td>National Scrapie Plan</td>
</tr>
<tr>
<td>OCPA</td>
<td>Office of the Commissioner for Public Appointments</td>
</tr>
<tr>
<td>OCDS</td>
<td>Older Cattle Disposal Scheme</td>
</tr>
<tr>
<td>OIE</td>
<td>World Organisation for Animal Health (Office Internationale des Epizooties)</td>
</tr>
<tr>
<td>OTM</td>
<td>Over Thirty Months e.g. Rule or Scheme</td>
</tr>
<tr>
<td>OVS</td>
<td>Official Veterinary Surgeon (of MHS)</td>
</tr>
<tr>
<td>PAP</td>
<td>Processed Animal Protein</td>
</tr>
<tr>
<td>PRNP</td>
<td>Prion Protein locus (the position of the prion protein coding gene on a chromosome)</td>
</tr>
<tr>
<td>PrP</td>
<td>Prion Protein (PrP&lt;sup&gt;Sc&lt;/sup&gt; is abnormal prion protein associated with TSE disease).</td>
</tr>
</tbody>
</table>
SECTION 11

PSA Public Service Agreement
RAG (FSA) Risk Assessment Group
RAMALT Recto-Anal Mucosa Associated Lymphoid Tissue
RGS Ram Genotyping Scheme (NSP)
RMOP Required Methods of Operation
RPA Rural Payments Agency (Defra Agency)
SBO Specified Bovine Offal
sCJD Sporadic Creutzfeldt-Jakob Disease
SCoFCAH EU Standing Committee On the Food Chain and Animal Health
SEAC Spongiform Encephalopathy Advisory Committee
SRM Specified Risk Material
SVS State Veterinary Service (Defra Agency)
TSE Transmissible Spongiform Encephalopathy (e.g. BSE, scrapie)
UK United Kingdom (Great Britain and Northern Ireland)
vCJD Variant Creutzfeldt-Jakob Disease
(formerly known as new variant Creutzfeldt-Jacob Disease)
VLA Veterinary Laboratories Agency (Defra Agency)
VO Veterinary Officer (of SVS)
VSFS Voluntary Scrapie Flocks Scheme (NSP)
XAP eXport APproved
## Glossary

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal By-Product</td>
<td>Includes animal carcases and parts of animal carcases not intended for human consumption.</td>
</tr>
<tr>
<td>Active Surveillance</td>
<td>See targeted surveillance.</td>
</tr>
<tr>
<td>Allele</td>
<td>One member of a pair or series of genes that occupy a specific position (locus) on a specific chromosome.</td>
</tr>
<tr>
<td>Bioassay</td>
<td>Determination of the biological activity of a sample, by comparing its effects with those of a standard preparation on a culture of living cells or a test organism.</td>
</tr>
<tr>
<td>Bovine Spongiform Encephalopathy</td>
<td>A fatal neurological disease of cattle which typically involves pronounced changes in mental state, abnormalities of posture, movement and sensation.</td>
</tr>
<tr>
<td>Chromosome</td>
<td>See gene.</td>
</tr>
<tr>
<td>Clinical case</td>
<td>Animal which displays the physical signs and symptoms of TSE.</td>
</tr>
<tr>
<td>Cohort</td>
<td>In general terms, this means a group of animals exposed to a risk factor. For the purpose of the cohort cull, BSE cohorts are defined in Section 3. For epidemiological purposes, a birth cohort contains all the animals born in each successive 12–month period following a feed ban.</td>
</tr>
<tr>
<td>Devolved Administrations</td>
<td>Welsh Assembly Government and the Scottish Executive for GB (plus the Department for Agriculture and Rural Development in Northern Ireland for UK).</td>
</tr>
<tr>
<td>Emergency slaughter</td>
<td>Any slaughtering ordered by a veterinary surgeon following an accident or serious illness. This typically takes place outside an abattoir for welfare reasons.</td>
</tr>
<tr>
<td>Epidemiology</td>
<td>The study of the incidence, distribution and control of a disease in a population.</td>
</tr>
<tr>
<td>Fallen Stock</td>
<td>Animals which die or are killed other than for human consumption.</td>
</tr>
<tr>
<td>Gene</td>
<td>The genetic material responsible for encoding the production of a particular protein. The gene is located at a locus on a chromosome. One chromosome from each pair is inherited from each parent.</td>
</tr>
</tbody>
</table>
Genotyping  A test on DNA obtained from blood (tissue or semen) to determine the genetic makeup of an animal. In relation to the NSP, genotyping relates to the genes encoding the sheep’s prion protein.

Greaves  See meat and bone meal.

Haplotype  A group of alleles of different genes on a single chromosome that are closely enough linked to be inherited usually as a unit.

Heterozygote  Possessing two different forms of a particular gene, one inherited from each parent.

Homozygote  Possessing two identical forms of a particular gene, one inherited from each parent.

Incidence  The number of new cases of disease occurring in a population over a specified time period.

Locus  See gene.

Meat and Bone Meal  The solid product of rendering mammalian tissues remaining after extraction of rendered fat (tallow). May also be known as greaves.

Neurological  Pertaining to the nervous system.

Passive surveillance  See scanning surveillance.

Pathogenesis  The study of the origin and development of disease, in particular the sequence in which the tissues of the body become infected and the progression of clinical signs both in experimentally and naturally infected animals.

Prevalence  The number of diseased animals as a proportion of the number of animals (population) at risk of the disease.

Prion Protein  A type of protein found naturally in the body. Transmissible spongiform encephalopathies are associated with the presence of an abnormal form of the prion protein in the brain.


Protease  An enzyme which breaks down protein. The disease associated prion protein is resistant to protease activity.
<table>
<thead>
<tr>
<th>Glossary Title</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rendering</td>
<td>A method of disposal of animal by-products typically involving mincing and heating (possibly under pressure). Also known as processing.</td>
</tr>
<tr>
<td>Ruminant</td>
<td>Hoofed mammals, such as cows, sheep and goats, that digest food in two steps, first eating the raw material and then regurgitating semi-digested material for further chewing.</td>
</tr>
<tr>
<td>Scanning Surveillance</td>
<td>Testing of cattle, sheep and goats suspected of having a TSE. Also known as passive surveillance.</td>
</tr>
<tr>
<td>Scrapie</td>
<td>A fatal neurological disease of sheep which typically involves pronounced changes in mental state, abnormalities of posture, movement and sensation. In recent years scrapie has been differentiated into two main forms – classical and atypical – based upon the results of diagnostic tests.</td>
</tr>
<tr>
<td>Specified Risk Material</td>
<td>Animal tissues most likely to contain BSE infectivity.</td>
</tr>
<tr>
<td>Sporadic Creutzfeld-Jakob Disease</td>
<td>A progressive fatal neurological disease of humans, the cause of which is unknown. Sporadic Creutzfeld-Jakob Disease is the most common form of the disease.</td>
</tr>
<tr>
<td>Targeted surveillance</td>
<td>Testing of specific populations of cattle, sheep and goats which are not suspected of having a TSE. Also known as active surveillance.</td>
</tr>
<tr>
<td>Transgenic</td>
<td>Genetically modified to express the genes of another species.</td>
</tr>
<tr>
<td>Transmissible Spongiform Encephalopathy</td>
<td>A group of neurological diseases which cause a spongy appearance in the brain which is visible when tissue is examined under the light microscope and which can be transmitted, at least experimentally, to other animals of the same or different species.</td>
</tr>
<tr>
<td>Tallow</td>
<td>Rendered fat.</td>
</tr>
<tr>
<td>Variant Creutzfeld-Jakob Disease</td>
<td>A progressive fatal neurological disease of humans believed to be linked to BSE.</td>
</tr>
</tbody>
</table>
Transmissible Spongiform Encephalopathies (TSE) in Great Britain 2005 – A Progress Report