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The Bovine Spongiform Encephalopathy (BSE) Epidemic in the United Kingdom

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The emergence of Bovine spongiform encephalopathy (BSE) in the UK and the handling of the epidemic in British cattle in the late 1980s-early 1990s, especially as regards the risks posed by BSE to humans, is an example of inadequate risk governance. The epidemic resulted in the infection of 170,000 cattle, the killing of 4.4 million cattle as a precaution and the deaths of 164 people to date in Britain from New Variant Creutzfeld-Jacob disease (vCJD), the human form of BSE. It was also disastrous for the UK beef trade.

Overview of the Risk Issue

BSE, commonly known as mad cow disease, is a transmissible, neurodegenerative disease affecting cattle. The disease has a long incubation period ranging from 30 months to eight years, with the infectious agent thought to be a specific type of misfolded protein, called a prion. These malformed prions cause other native prion proteins in the brain to misfold and aggregate, leading to a spongy degeneration of the brain and spinal cord. Transmission between cattle occurs via the consumption of contaminated meat and bone meal in cattle feed, and BSE is fatal, with no known cure or treatment. It is now believed that BSE may be transmitted to humans who consume infected beef or come into contact with other products derived from the nervous tissues of infected cattle. In humans, the disease is known as vCJD [WHO, 2008].

Even now, the nature of the disease is not well understood and the theory of prions as the infectious agent is somewhat disputed [*The Economist*, 2005]. Therefore, at the time of the outbreak, the novelty of the disease meant that nobody knew anything concrete about its pathology, and so decisions had to be made on the basis of guesswork and analogy with scrapie, a well-studied spongiform encephalopathy of sheep, which is known to be non-transmissible to other species [Dressel, 2000] There was also no diagnostic test to identify infected animals that had not yet shown clinical signs of the disease, which made removing infected cattle from the food chain next to impossible, short of slaughtering the entire British herd.

While BSE was first identified in the UK, it quickly spread to at least 28 other countries in Europe, Asia (Japan), the Middle East (Israel) and North America. Half of these countries have only identified a handful of cases, however many Western European countries have reported hundreds of cases (Portugal, Ireland and France were worst affected), with the number of cases in the UK nearing 200,000 [OIE, 2007]. Apart from the obvious impact on animal and human health, BSE has also had a significant impact on consumer confidence in the meat industry and its worldwide trade; government regulatory practices; animal feed manufacturing processes; and, at least in the UK, government reputation and public trust.

Stakeholders Involved

Over the ten year period of the crisis, from 1986-96, the main state actors involved in the assessment and management of risks, both to the cattle industry and to human health, were the

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UK Ministry for Agriculture, Fisheries and Food (MAFF), the UK Department of Health (DH) and its Chief Medical Officer (CMO), the UK State Veterinary Service (SVS) and its Central Veterinary Laboratory (CVL), the Southwood Working Party (the scientific advisory committee formed at the request of the CMO to advise on the implications that BSE may have for human health), and the Spongiform Encephalopathy Advisory Committee (SEAC, a scientific committee formed by the government to advise it on spongiform encephalopathies). These government actors, however, had very different interests in, and perspectives on, the BSE crisis. MAFF's primary responsibility was to look after and promote the interests of agricultural producers and related industries, in this case the cattle farmers, abattoirs and renderers; but it also had a responsibility to protect the public from health risks derived from agricultural products or processes. These conflicting responsibilities made managing BSE-related risks very difficult and probably contributed to MAFF's taking the "most optimistic view" of BSE as a public health risk, in order to avoid hurting industrial interests too greatly [van Zwanenberg & Millstone, 2002:157]. The SVS and the CVL were under the control of MAFF, and thus shared its interests and followed its orders. The DH, its CMO and the working party they created, on the other hand, were most interested in safeguarding public health and thus were in favour of taking precautions to prevent the spread of the disease to humans; a position that put them at odds with MAFF's main purpose. SEAC, independent from obligations to industries or the public health sector, also erred on the side of caution, preferring to publicly acknowledge the risks associated with BSE than to minimise them or even deny them altogether.

Local authorities and, post-1995, the national Meat Hygiene Service were responsible for verifying and enforcing many of the regulations enacted by these government bodies. Their views of the risks associated with BSE were heavily coloured by the government's official position, which was that there was no risk to humans from consuming infected meat, and they acted accordingly, taking a somewhat lax approach to enforcing the regulations. The other major stakeholders involved in the BSE crisis were of course the UK Beef Industry and the public. The beef industry was worth over 650 million pounds a year prior to the crisis, and its farmers, exporters, and abattoirs, as well as the animal feed trade all faced significant difficulties due to closed export markets, low beef prices and the need to adjust to BSE related controls. For these stakeholders, avoiding regulation, or minimising it, was their main objective. As for the public, the overwhelming concern of British citizens was of course for their own health. However, the only information the public received about BSE was what the government chose to release, and thus the public was repeatedly given the impression that BSE was known to be non-transmissible and reassured that it was safe to eat beef. Nevertheless, despite these assurances, as the number of BSE cases grew, public trust and confidence in government policy decreased. When the announcement was made that BSE was likely to have been transmitted to humans, there was a strong public feeling of betrayal and deception. There continues to be "considerable public concern" about BSE in the UK today [UK DEFRA, 2008].

Key events in the BSE outbreak and risk handling process

Nov 1986	The disease is first identified at the Central Veterinary Laboratory
15 Dec 1987	Ruminant derived meat and bone meal in animal feed is hypothesised to be the cause of BSE
21 Apr 1988	The Southwood Working Party is set up to advise on the implications of BSE
21 Jun 1988	BSE is made a notifiable disease

18 July 1988	The ruminant feed ban comes into force (no ruminant proteins in feedstuff)
8 Aug 1988	Slaughter and compensation policy put in place
27 Feb 1989	The Tyrrell Committee on research into spongiform encephalopathies is set up
28 Jul 1989	The EC bans the export of cattle born before 18 July 1988
13 Nov 1989	Ban on specified bovine offal in food for human consumption (SBO ban) is put in place
1 Mar 1990	EC restricts cattle exports to those under 6 months old
3 Apr 1990	Spongiform Encephalopathy Advisory Committee (SEAC) established
9 Apr 1990	EC bans export of SBO and other tissues
10 May 1990	A domestic cat is confirmed to have a transmissible spongiform encephalopathy
24 Sep 1990	Laboratory transmission of BSE to a pig is confirmed
25 Sep 1990	Ban on the use of SBO is extended to cover all animal feed as well
27 Mar 1991	First case of BSE in offspring born after the ruminant feed ban was introduced
4 Mar 1992	SEAC concludes that present measures provide adequate safeguards for human and animal health
14 Jul 1993	The 100,000 th case of BSE in the UK
27 Jun 1994	EC prohibits the feeding of mammalian protein to ruminants throughout the EC
15 Aug 1995	SBO Order 1995 tightens controls and regulations
20 Mar 1996	SEAC announces that the CJD surveillance unit has identified a previously unrecognised and consistent disease pattern (human variant of BSE, vCJD)
27 Mar 1996	EC prohibits the export of a wider range of bovine products from the UK
29 Mar 1996	Beef emergency control order 1996, and following amendments, put stricter regulations on meat for human consumption
22 Dec 1997	Public Inquiry into BSE is announced to review how BSE (and vCJD) emerged and was identified in the UK, and the actions that were taken in response to the outbreak

A much more detailed chronology of events is available from DEFRA at <http://www.defra.gov.uk/animals/Bse/publications/chronol.pdf>. [UK DEFRA, 2004]. What is perhaps most evident from this chronology of events is that regulations were consistently implemented in a reactive, rather than a proactive or a precautionary manner.

Risk Governance Deficits implicated in the BSE outbreak in the UK

A2 Factual knowledge about risks

When BSE was first diagnosed in cattle in 1986 it was a novel disease and risk assessors did not possess adequate scientific knowledge about its epidemiology or pathology to confidently evaluate what sort of risk it posed to animal or human health.

A4 Stakeholder involvement

The committees (Southwood working party, Tyrell committee, SEAC) that were set up to advise the government on various aspects of BSE played an important role in guiding its reaction to the outbreak. However, as evidenced by the outcomes of the BSE crisis, these committees did not effectively fulfil their task of providing advice on risk communication and risk management options. Following the BSE outbreak, fundamental questions have been posed as to the shortcomings of the advisory process in the UK, especially with regards to the composition and remit of such advisory committees. The process via which committees were put together – including requirements that members should not represent extremes of opinion, not produce dissenting opinions and be able to agree with each other – led to the exclusion of many diverse views and interests [Lofstedt & Fairman, 2006:26-7]. The BSE Inquiry later noted that lay persons can play “a valuable role on an expert committee” and also that “potential conflicts of interest should not preclude selection of those members otherwise best qualified, but conflicts of interest should be declared and registered.” [BSE Inquiry, 2000a].

A6 Misrepresenting information about risk

From the very beginning of the BSE outbreak, not only was knowledge misrepresented by the British government, but in some cases it was even withheld. For example, after the initial diagnosis of BSE by the SVS in late 1986, there was an embargo placed on the sharing, or making public, of any BSE-related information that ran until mid-1987. Also, up until at least 1990, outside scientists that requested access to BSE data to conduct further studies were denied, despite the fact the improved scientific understanding of the disease had the greatest potential to minimise the impact of the epidemic. Even government scientists within the CVL have acknowledged that there was a culture of suppressing information, to the point that studies revealing damaging evidence (e.g. that there was a causal link between BSE and the new encephalopathy found in cats) were denied publication permission [Ashraf, 2000].

The withholding of such information allowed the government to publicly assert that BSE was just like another version of scrapie – not transmissible to humans – and that there was “clear scientific evidence that British beef is perfectly safe” [UK House of Commons, 1990].² This was certainly a misrepresentation of the knowledge held at the time, and one that was only possible due to the suppression of some scientific findings and recommendations. Of course, the main reason for this misrepresentation of knowledge was the protection of agricultural and industrial interests – the specific stakeholder favoured in this case was the British beef industry, which stood to lose billions of pounds if a large number of its animals had to be slaughtered, if export bans were put in place, or if costly regulations were implemented.

To protect the interests of the beef industry, the government would assert on many occasions that British beef was safe to eat and that regulatory controls already implemented would prevent any

² This comment was made by the Agriculture Minister to the House of Commons.

contaminated material from entering the food chain. This was also a misrepresentation of knowledge, as the government was fully aware that their measures were not designed to eliminate exposure, but only to diminish the risk [van Zwanenberg & Millstone, 2002:161].

What's more, many uncertainties relating to the transmissibility of the disease were either downplayed or ignored, resulting in an overstatement of certainty that British beef was completely safe to eat and that BSE was not transmissible to humans. The way uncertainty was dealt with in this case was the result of a number of factors, including the desire to protect specific stakeholder interests.

One crucial factor was the underlying element of risk political culture in the UK that linked the identity of the actor to the consistency of his policy positions. This led to consistency of position being prioritised over accuracy [Dressel, 2000], and resulted in the government insisting on the absence of risk to the population, maintaining this public position despite mounting evidence to the contrary. Although aware of them, policy-makers chose not to overtly acknowledge the levels of uncertainty and the complexity of the risks involved with BSE and its spread because the ramifications of these were too great for the interests they were trying to safeguard.

B1 Responding to early warnings

The incorporation of rendered meat and bone meal into animal feed creates a number of risks related to the transmission, recycling and amplification of pathogens. Such risks were recognised well before the emergence of BSE. In the US in the mid-1970s, concerns that scrapie may be linked to CJD (although there is no evidence that scrapie is transmissible to humans) led to some regulations being placed on the incorporation of sheep or goat carcasses into human and animal foods [van Zwanenberg & Millstone, 2002:158]. In the UK, too, the Royal Commission on Environmental Pollution recommended in 1979 that minimum processing standards be implemented by the rendering industries in order to minimise the potential for disease spread [RCEP, 1979]. The incoming Thatcher government withdrew these proposed regulations, preferring to let industry decide for itself what standards to use. In retrospect, the failure to act at this point to mitigate the general risk of disease transmission may have had a crucial impact on the later outbreak of BSE, given that the disease "probably originated from a novel source in the early 1970s" [BSE Inquiry, 2000b].

Early warnings that BSE might be transmissible to humans were, in fact, observed by scientists and government officials throughout the period from 1986 (the time of first diagnosis in cattle) to 1995 (when vCJD was first observed in humans). Such observations are noted in, for example, the minutes of a meeting of the National Institute for Biological Standards and Control in May 1988, where the probability of transmission of BSE to humans is assessed as more than remote. The diagnosis in 1990 of a domestic cat with a previously unknown spongiform encephalopathy resembling BSE indicated that the disease could infect a wider range of hosts. Responses to such early warnings of potential dangers to human health were either too weak or came too late. This may have been partly a result of an 'unwillingness to know' due to the economic harm this knowledge would cause the UK beef industry (related to deficit A6); and partly due to institutional capacities and procedures (related to deficits B5, 9 and 10).

B2 Designing effective risk management strategies

And

B3 Considering a reasonable range of risk management options

In the case of BSE, the two major, and often competing, policy objectives were the protection of public health on the one hand, and the protection of economic interests (beef and related industries) on the other. However, when the decisions about how best to mitigate the risks created by the BSE outbreak were made, it was the economic interests that were given the far greater priority. For example, the specified bovine offal ban (SBO ban) of 1989 was one of the major controls put in place to try to stop the spread of infection. But instead of selecting all the

tissues that carried the greatest risk of infectivity, only those of lowest commercial value were chosen – tissues of higher commercial value, or those that would have been very hard to remove and thus raised abattoir costs, were exempt [BSE Inquiry, 1999:160]. Thus, the risks to public health were traded off against the risks to industry, and the chances of human exposure were not diminished as much as they could have been.

Once the causal relationship between BSE and vCJD was confirmed in the late 1990s, it became clear that the negative consequences of this trade-off could be great and were perhaps not properly considered at the time. Economically, losses have been substantial, despite the government's policy priorities (the policies cost 4.2 billion pounds, plus 25 million pounds for the inquiry and 1.15 billion in economic losses for the affected industries) and the total cost of this action is unknown, as compensation to vCJD victims will continue to be paid and it is not known how many people have been infected, but not yet diagnosed [BSE Inquiry, 1999:164].

B5 Implementing and enforcing risk management policies

Two of the most important regulations introduced during the outbreak were the ruminant feed ban and the specified bovine offal ban (SBO). These banned, respectively, the incorporation of ruminant protein in animal feed (to stop the spread of BSE among cattle) and the incorporation of specific types of cattle offal in human food (those types deemed most likely to carry the infectious agent).

The feed ban, while an effective measure, was not implemented as swiftly or effectively as it could have been. Although the measure was passed by the 'BSE Order 1988' on 14 June, 1988, it was not implemented until 18 July - a five week delay that allowed many thousands more animals to become infected. This delay had been granted on purpose to allow the animal feed industry a grace period to clear their stocks. This was partly a consequence of the government's ignorance of the high infection rates.

The SBO ban of November 1989 was an even worse example of implementation and enforcement failure. Because there was a "failure to give proper thought to the terms of this measure when it was introduced" [BSE Inquiry, 2000b], the ban was all but unenforceable and, as such, was widely disregarded by industry. Enforcement was lax until 1995 when unannounced visits by enforcement officers to abattoirs found that 48% were not complying with the SBO regulations [van Zwanenberg & Millstone, 2002:162]. Only following this revelation was a rigorous enforcement campaign launched.

B8 Balancing transparency and confidentiality

As explored under A6, there was a disproportionate focus on confidentiality with regard to all data on BSE, which allowed the government to misrepresent its knowledge of the situation in order to protect key industrial interests. The lack of transparency about how the outbreak was being handled and how decisions were being made played a large part in destroying public trust in the government.

Also, throughout the risk governance process for BSE, the UK government sought advice from expert working parties and advisory committees that it had created specially (SEAC and the Southwood Working Party). Here, too, there was an inadequate balance between transparency and confidentiality, this time with respect to how the government used the findings of these expert groups. Due to the lack of transparency, there was no impetus to carefully review the recommendations made by expert committees (as should have been done), and policy-makers were able to simply read the conclusions in the most convenient way for them, given the interests at stake. Key actors thus had too much discretion and were able to make decisions via a process that was not at all transparent – two important aspects of risk governance were therefore ignored.

B10 Dealing with dispersed responsibilities

The way that responsibilities for public health, animal health and agricultural interests were divided between ministries of the UK government caused a number of difficulties when it came to mitigating the risks related to BSE. Dispersed responsibilities and divergent interests were the cause of communication failures and costly delays.

MAFF was responsible for protecting the economic interests of the agricultural community – in this case the cattle farmers, abattoirs and renderers – as well as dealing with matters related to food safety. In this case, with the heavy influence of the industries involved, risk management would have been more successful had these two responsibilities been separated. As it was, MAFF could not effectively implement measures in the name of food safety without hurting industrial interests – this goes some way towards explaining its initial “unwillingness to know” about the extent of the problem and its weak policy response [Dressel, 2000]. This important contradiction in the ministry’s tasks was addressed following the BSE crisis by way of the creation in 2000 of a separate agency, the Food Standards Agency, to deal with food-safety risk to public health [van Zwanenberg & Millstone, 2002:165]. Overall, the failure to separate risk assessment and risk management for issues of food safety in the UK had an important, and negative, impact on the handling of the BSE crisis, and this has since been recognised by the BSE Inquiry and the May Review [Lofstedt & Fairman, 2006:26].

Also, the way that responsibilities for risk mitigation and regulation were shared between government and industry in the UK had an important impact on the course of action taken. The intimacy between government and industry in Britain was very costly in the BSE case for two main reasons. Firstly, the notion in UK political culture of “industry knows best” had led to very weak government regulation in, for example, the rendering industry, which may have contributed to causing the outbreak. It also contributed to the government’s reluctance to impose strict regulations once the outbreak occurred [Dressel, 2000]. Secondly, the normal practice of conducting consultation processes with industry slowed down the implementation of key regulations, such as the human SBO ban, by nearly a year and led MAFF to focus on dialogue with industry instead of with DH – as an example of poor communication and the priority accorded to industry, DH learned about the SBO ban first from the Guardian newspaper, rather than from MAFF [Dressel, 2000].

NOTE: Although the deficits have been presented here as separate, distinct entities, this has been done for illustrative purposes and it should be noted that there are, in fact, important interactions and interlinkages between deficits. For example, stakeholder involvement – notably the weight of industrial interests and the political pressure they were able to exert – was one of the reasons for the lack of transparency shown by government ministries and was certainly a motivating factor for them to misrepresent information. This lack of transparency, in combination with the way responsibilities were dispersed between ministries, may then have negatively affected the ability of decision-makers to design effective risk management strategies, and also to implement them.

BSE in Germany: Lessons learned from the UK experience?

As of 2007, there have been 415 cases of BSE identified in Germany. The first case was isolated and appeared in 1992. This was followed by 3 cases in 1994 and 2 more in 1997 [OIE, 2008]. All of these cases occurred in cows that had been imported from either the UK or Switzerland, and thus were not deemed to signify an outbreak of the disease in Germany.

Although the German Health Minister at the time, Horst Seehofer, did suggest to the European Commission in 1994 that they ban the import of all British Beef; in light of other actions the German government had taken with regards to BSE-related risks, the motivation for this move

was almost certainly political rather than scientific or precautionary [Abbott, 1994]. For example, whilst the UK had banned the use of meat and bone meal (MBM) in all animal feed in 1988 as an effort to halt the disease's spread, Germany did not go so far in its precautionary measures and only banned its use for cattle, allowing MBM to continue to be fed to poultry and pigs [Abbott & Schiermeier, 2000]. Indeed, Germany was proud to declare itself "BSE free" due to its superior testing, its tighter controls and stricter standards for the treatment of animal feedstuffs. The fact that German farmers had not traditionally fed their cattle on MBM was one of the reasons for the certainty of the government in declaring itself immune [Abbott & Schiermeier, 2000].

On 24 November 2000, however, the first case of native BSE was identified in Germany. When this occurred, there was a very strong public reaction, with many heavily criticising the government for being complacent in its approach to risk management with regards to the spread of BSE, and beef consumption falling 75% over the next few months. The reaction in Germany was even more intense than that in the UK, and suggests that the government, when formulating its response to BSE, had failed to properly gauge the public sensitivity to health and environmental threats [Imort, 2001] (A3).

Despite its failure to observe early warnings (A1) and its over certainty that it would not be affected by the epidemic (only one week prior to the discovery of the first BSE case, the Agriculture Minister had publicly declared himself "absolutely convinced" that Germany was immune to BSE), the government's reaction once native BSE had been discovered was swift and far-reaching:

24 Nov 2000	First case of native BSE discovered
25 Nov 2000	Emergency measures to fight BSE agreed by German officials (including an immediate ban on the use of MBM in all animal feed)
25-30 Nov 2000	<p>Federal Minister of Agriculture announces creation of a new department devoted to food safety</p> <p>The Bundesrat asks the government to push the EC for a Europe-wide ban on British beef</p>
1 Dec 2000	The Bundesrat passes the bill banning the import, export or use of MBM in animal feed – one of the fastest pieces of legislation enacted in Federal Germany [BBC News, 2000]
4 Dec 2000	EC puts a temporary ban on the feeding of processed animal proteins to farmed animals kept for food production (Germany had pushed for this measure)
Jan 2001	<p>Andrea Fischer (Federal Health Minister) and Karl-Heinz Funke (Federal Agriculture Minister) resign over allegations that they mismanaged the BSE crisis [Hooper, 2001]...the Ministries are then rearranged.</p> <p>The Ministry for Food Agriculture and Forestry becomes the Ministry of Consumer Protection, Food and Agriculture (consumer protection was formerly a responsibility of the health ministry) and the new Minister is neither a farmer nor a member of a large political party, so as to lessen the influence of the agricultural lobby. Within this Ministry, there is a whole department created to handle BSE [Abbott, 2001].</p>

Introduction of compulsory BSE testing for all cows 24 months or older.

31 Jan 2001	Government approves the slaughter of 400,000 cows over 30 months to help stabilise the German beef market (EU's purchase for destruction programme)
Spring 2001	27 million DM of federal money is earmarked for BSE research (despite budget cutbacks in other areas)

The great advantage that Germany had over the UK when dealing with BSE was that, by the time the disease reached Germany, its pathology was well known and the risks it posed to humans were better understood.

On the one hand, the improved knowledge of BSE, its spread across Europe, and the discovery that it had probably been transmitted to humans should have prompted Germany to take more serious measures to prevent the disease reaching it. Perhaps in an effort to protect its industries (Germany is one of Europe's largest beef producers) [EC, 2000b], Germany, like the UK before it, had prioritised economic interests over public health (B2/B3). Warnings from Brussels in March 2000 that BSE was likely to reach Germany went unheeded, and the European Commissioner for Health and Consumer Protection criticised Germany for consistently opposing EU legislation to reduce the risks of BSE [EC, 2000a].³

On the other hand, Germany's quick move to make fundamental changes to the structure and competencies of its health and agriculture ministries may reflect a recognition of some of the problems encountered between ministries in the UK. Distancing the ministry further from the agricultural lobby was designed to avoid problems relating to the promotion of special interests (which can be one reason for the occurrence of deficit A6); and creating a separate department to deal with BSE would lower the probability of implementation failures (B5) and help eliminate problems stemming from dispersed responsibilities (B10). Allocating large amounts of funding to BSE research also helps to remedy any problems arising from (A2) lack of knowledge about the physical facts, so as to better inform future policy responses.

Overall, the situation in Germany was very different to that in the UK. The reactions of these two governments must not be compared without keeping in mind that there were important differences between the two cases which would have strongly influenced any actions taken: differences in political culture, values and perceptions, scientific knowledge about BSE at the time of outbreak, and the scale of the problem. Nevertheless, the fact that Germany, despite its different culture and circumstances, experienced (or identified, in trying to avoid them) many of the same risk governance deficits as the UK points to the importance of these distortions in the risk governance process and the need to find ways to avoid them in future.

³ In 1997, Germany, along with Spain, opposed the banning from the food chain of all parts of the animal likely to carry infection (brain, spinal cord, etc.). Due to support from other member states, the legislation came into effect on 1 October 2000.

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