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Public Administration, Science, and Risk Assessment: A Case Study of the U.K. Bovine Spongiform Encephalopathy Crisis

The bovine spongiform encephalopathy (BSE) outbreak in the United Kingdom is regarded as one of the worst public policy crises the British government has experienced during the postwar era. In material terms, it has led to the slaughter of 3.3 million cattle and estimated economic losses of £3.7 billion. In administrative terms, the crisis brought about the dissolution of the Ministry of Agriculture, Fisheries and Food. This article examines the institutional context in which decisions about the scientific evidence on BSE were made. The authors argue that a centralized system in which government agencies control science for government is inherently vulnerable to alliances of experts and interest groups that undermine the credible assessment of public health and safety risks. Specific societal conditions may encourage risk-opportunistic behavior among policy makers that is conducive to delays and inaction until such time as the evidence of a health risk becomes overwhelming.

Introduction

The recent outbreak of bovine spongiform encephalopathy (BSE) in the United States highlights the ongoing vulnerability of modern societies to food scares and hazards (USDA 2004). Although this outbreak appears to have been handled expeditiously, the U.K. BSE crisis during the late 1980s resulted in sustained damage to public confidence and severe economic losses to the food and farming industries in the United Kingdom (DTZ Prieda Consulting 1998, 15).

This article is concerned with the question of why U.K. government agencies failed to convince the public during the BSE crisis that health and safety concerns were being given priority over commercial interests and failed to develop a coherent strategy for managing these risks. In public statements, both U.K. politicians and government scientists have shouldered the blame for this failure. However, hitherto no credible explanation has yet been put forth as to why these shortcomings occurred.

This article provides an analysis of the BSE crisis that evaluates government officials' failure to manage the crisis effectively in relation to the nature of the scientific information available, the handling and dissemination of that information, and the institutional framework through which

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key decisions were made. The article is structured in three parts. The first part introduces the key concepts of risk, risk communication, and policy networks, which provide the background for the analysis. The second part gives an overview of the unfolding and maturation of the BSE crisis, with a special focus on key decision points, at which evolving scientific evidence was analyzed and policy responses were decided. The final part provides an analysis of the underlying decision-making processes that seeks to explain why competing evidence was systematically suppressed and why government action lagged public demands and expectations. We conclude that a centralized system in which government agencies control science for government is inherently vulnerable to expert–interest group alliances, which undermine the potential for credible assessment and management of public health and safety risks. Furthermore, we suggest that specific environmental conditions may foster risk-opportunistic behavior among policy makers that is conducive to delays and inaction until such time as evidence of a health hazard is paramount.

Risk, Risk Communication, and Policy Networks

Risk

The BSE crisis in the United Kingdom represents a dramatic incident of a risk-management failure. In part, this failure relates to the incomplete understanding of the nature of risk and a lack of maturity in risk management as a discipline (Beck 2004). Interest in risk management has become widespread in the United Kingdom only during the last two decades. One explanation for this increased interest in risk assessment and management relates to the perceived high level of threats associated with the natural and social environment, as well as new challenges posed by unprecedented scientific and technological advances (Beck 1992; Clarke and Short 1993).

At present, there is no single universally accepted definition of risk. What most definitions of risk have in common is that they refer, in one way or another, to uncertainty (Chapman and Ward 1997; Dickson 1991; Grey 1995). Often, specific definitions of risk focus on unexpected events that have the potential to jeopardize the successful completion of a certain action, venture, or project. Such events may have an impact on events at a personal, organizational, or societal level. Examples of personal risks include events that threaten individual health, safety, emotional or material security, welfare, or status. Organizational risks may jeopardize an organization's existence or the achievement of organizational aims and objectives. Societal risks, such as a nuclear accident, may affect large groups or communities.

The risk literature, being relatively novel, has not yet been able to develop a single, integrating risk theory. This is partly a result of the fact that the understanding and treatment of risk is affected by an inherent level of subjectivity (Adams 1995; Holton 2000). In line with other social scientists, risk theorists have tended to substantiate their analyses by adopting methodologies that are derived primarily from positivistic science (Starr 1969; Starr and Whipple 1980). In the context of public policy, these approaches have proven themselves to be of limited value, primarily because many relevant risks cannot be precisely measured or unambiguously quantified.

Addressing the issue of quantification, Hood and Jones (1996) classify risks as either objective or subjective. Objective risks are risks that have a finite number of outcomes and lend themselves to precise scientific measurement. For objective risks, independent risk evaluations through different methods should produce identical results (Hood and Jones 1996, 101). By contrast, the assessment of subjective or perceived risks is affected by the criteria and assumptions utilized by researchers in their analysis. Subjective risks may have an infinite number of outcomes, and their evaluation may reflect individual or group preferences, with estimates of the same risk yielding different results.

Hood and Jones (1996) suggest, moreover, that sometimes apparently rigid quantitative approaches, such as those related to risk modeling, reflect external pressures and yield biased risk estimates. In many cases, when performing risk calculations, experts utilize probability estimates that are based on historic information. Therefore, the availability of reliable historical data has a direct effect on the accuracy of the risk estimates. Furthermore, Hood and Jones (1996) question the appropriateness of quantitative methodologies for risk assessment on the grounds they were initially developed under the assumption of closed systems. Their application to open systems with an unlimited and unpredictable number of options, such as humans or organizations is, accordingly, bound to produce unreliable results. Arguing along similar lines, Fischhoff, Watson, and Hope (1991) suggest that public opinion is capable of carrying elements of objectivity, whereas, in some cases, expert opinions may include implicit biases.

The mechanisms guiding individual attitudes toward risk are not completely understood. It is often assumed these mechanisms vary across different risk categories. However, it is unclear how stable these relationships are, either across cultures or across time. Douglas and Wildavsky (1983) found that individuals preferred not to be seen as rushing into presumably important risk decisions. When pressed for answers, many individuals tended to rely on expert and seemingly objective opinions. Expert opinions are, of course, based on current levels of knowledge, and often they cannot answer all of the relevant risk-related ques-

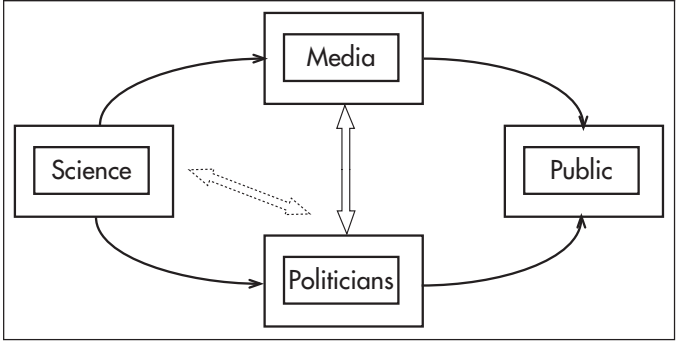
tions. Expert judgment, moreover, may contain embedded subjective elements in the form of informed assumptions, which can mirror personal bias.

Risk Communication and Policy Networks

The dissemination of expert opinions is crucially affected by established societal patterns of communication. For the purpose of simplification, the communication processes underlying the assessment of new public health risks can be described in terms of a stylized risk-communication model (figure 1). This model assumes that all risk-relevant information about a disease is held initially by a group or several groups of experts. Before this information reaches the public, it is filtered either through channels of designated government officials or, more directly, through the media (Clarke and Short 1993).

Beamish (2002) argues that, because of their unique regulatory and executive power, government organizations have a decisive, arbitrational function to determine what constitutes an acceptable level of societal risk. However, as Beamish (2002) suggests in connection with the Guadalupe oil spill of 1993, government agendas may become confused when faced with unprecedented disasters. In such instances, government officials often adhere to conventional response patterns, which may cause them to fail to react to the novel risks and challenges in an appropriate and innovative way. One of the main consequences of this behavior is that agents occupying lower ranks in the hierarchy are unable to take appropriate corrective action. According to Denis Smith (2002, 56), discrepancies between the "assumed reality" and the inadequate policy response can generate new "adverse events" that exacerbate the initial problem. If this results in prolonged periods of indecisiveness and public risk exposure, public expectations are likely to be frustrated to a degree that government officials lose credibility and standing.

Figure 1 Societal Risk-Communication Model



Apart from these organizational problems, risk communication can also be hampered by the ad hoc creation of political alliances. When risk-relevant information is communicated, policy makers and the administrative agencies that host "official science" often collaborate with external interest groups through horizontal, decentralized relationships (Kenis and Schneider 1991). The interaction among these groups frequently leads to the creation of relatively closed structures that have been referred to as "bargaining networks" or "policy communities" and are characterized by close interpersonal (often informal) relationships among an exclusive set of members (Wildavsky 1974). In Britain, for instance, the creation of closed bargaining networks was aided by a legacy of agricultural policy that, up until the 1980s, almost unambiguously favored high levels of subsidies and production (Smith 1990, 57). In the context of these policies, groups commanding significant resources were often in a position to exercise major influence over the articulation and communication of risk (Smith 1990). Even though priorities in agricultural policy making changed during the 1990s, when greater emphasis was placed on curbing overproduction and integrating environmental protection into farm support (Lowe and Ward 1998, 469), these policy networks stayed largely intact.

In an ideal scenario, policy networks improve the stability of the policy-making process and increase the likelihood that a policy objective will be achieved because risk information reaches the public only after its potential impact has been assessed and the information has been modified accordingly. Policy communities, however, may also impose constraints on the way pertinent scientific information is communicated or acted on. One of the obvious drawbacks that can arise in this context is that the prefiltering of scientific information by established policy communities may deliberately distort or excessively simplify that information (Hillgartner 1992). When the distribution of the burden of proof among parties is skewed, this situation can be aggravated to a degree that "unofficial" science is largely ignored, irrespective of its merit or relevancy (van den Belt and Gremmen 2002). By the time a message is eventually received by the public, initial scientific evidence may be either completely ignored or severely distorted. The following section explores the unfolding and the maturation of the BSE crisis, with a specific focus on decision points at which risk information was processed and policy responses were formulated.

The Anatomy of the BSE Crisis

Beginnings

According to current thinking, BSE is a relatively new, incurable, neurological disorder affecting cattle. Public concern with BSE is related to its human version, a fatal degenerative brain disease, mainly affecting young people, known as variant Creutzfeldt-Jakob disease (vCJD). It is widely accepted that the BSE agent is transmitted through the food chain (Ebringer et al. 1998). Accordingly, the ori-

gins of BSE can be traced to processed meat and bonemeal that was added as a protein supplement to cattle feed (DOH/MAFF 1989, 36; *Economist* 1998, 22; Ford 1996, 20). Wilesmith et al. (1988) have argued that, in the United Kingdom, cost-lowering technological rationalizations to meat and bonemeal production during the 1970s reduced the processing temperature and increased the probability that BSE agents could survive. It has been alleged that the conditions of the meat and bonemeal production process concentrated contagions, causing genetic mutations and, in turn, modifying the disease and increasing its infectivity (Kimberlin 1993). Although some experts suspect that BSE has been present among British cattle herds from the 1940s onward (P. Brown 1998a, 252), the first case of the disease was officially recorded by the Central Veterinary Laboratory in 1985 (Wells et al. 1987). This incident was followed by similar cases, initially in two separate herds and, by mid-1997, in four herds (Wilesmith et al. 1991).

Throughout the BSE crisis, the main body responsible for conducting scientific research and advising the government was the Ministry of Agriculture, Fisheries and Food (MAFF). The ministry was in charge of responding to questions regarding the disease and handled the public and press in the context of the first government-commissioned inquiry, the Southwood Report of 1989. A chronological review of the events surrounding the BSE crisis indicates that MAFF established a pattern of restricting access to information (see table 1). In 1986 and the first half of 1987, MAFF passed on little or no information to veterinarians across the country. According to the Phillips Inquiry report (2000), before the general elections in June of 1987, MAFF made no discernable effort to warn practitioners about BSE. Indeed, in mid-1987 MAFF sent a circular letter to veterinary investigation officers in England and Wales that instructed them not to communicate any BSE-related information to universities and the research community without official clearance. Meanwhile, pathologists from the Central Veterinary Laboratory who attempted to publicize findings related to BSE were instructed not to do so. Likewise, MAFF-supported researchers were advised not to conduct any analysis that attempted to relate BSE to the incidence of scrapie. On the whole, it is likely this policy created significant obstacles to both the early and timely assessment of the BSE epidemic and efforts to control its spread.

After the elections, during the second half of 1987, MAFF officials became more willing to provide information on BSE to the specialized veterinary and agricultural press. However, their efforts were soon overtaken by other events. When it became known that the number of new cases had reached 137 by the end of the year, reports about the BSE epidemic surfaced in the national press. On December 29, 1987, an article in *The Times* noted that BSE had been detected in British cattle herds and gave reassur-

Table 1 Chronological Events During the BSE Crisis in the United Kingdom

Events and actions during the BSE crisis in the United Kingdom	
1986	In November, the Central Veterinary Laboratory identifies the first BSE-infected cattle in Britain.
1988	MAFF establishes a consulting body led by Richard Southwood. This committee states that BSE poses no danger to humans.
1988	MAFF introduces its first program of compulsory slaughter of infected animals, which involves the payment of compensation to farmers.
1988	The use of ruminant-derived protein in meat and bonemeal for animal feed is prohibited. The number of cases of BSE doubles from one year to another.
1989	Bans are imposed on the use of specified bovine offal for human consumption, as well as on meat from infected animals.
1989	Following the creation of the Tyrrell Committee in 1989, the Spongiform Encephalopathy Advisory Committee is established by the British government to advise MAFF. This committee confirms earlier statements that U.K. beef is safe.
1989	The Southwood Working Party publishes its report, which asserts that BSE does not pose a risk to human health.
1989	In July, the European Union introduces its first restrictions on British beef exports.
1990	In May, the Creutzfeldt-Jakob Disease Surveillance Unit is established to monitor the disease.
1990	The first known cases of the transmission of BSE across species is detected, first in cats, and later in pigs.
1992	The number of officially registered cases of BSE in the United Kingdom reaches its peak.
1994	The Meat Hygiene Service is established as an executive agency of MAFF to monitor the implementation of BSE- prevention measures.
1995	The U.K. government decides to slaughter suspected BSE cases and bans their usage for human consumption and animal feed.
1995	In April, the regulation of slaughterhouses is transferred from local authorities to the Meat Hygiene Service in an attempt to control the spread of the disease.
1995	Following advice from the advisory committee, the government announces a ban on the use of specified bovine offal from mechanically recovered meat.
1996	In March, the government admits for the first time that BSE is the likely cause of vCJD. A ban on the use of cattle older than 30 months is imposed.
1996	With 10 vCJD patients registered in the United Kingdom, the situation is characterized as "dramatical" by the advisory committee.
1996	The European Union member states introduce a collective ban on all U.K. beef exports to European Union members and to other countries.
1997	The total number of recorded BSE cases reaches 179.087 in the European Union, of which 99.5 percent are in the United Kingdom.
1997	In December, the Beef Bones Regulation is approved in the United Kingdom, banning bone-in beef and beef bones.
1998	U.K. enforcement of control measures leads to first steps toward lifting the total ban.
2000	The government sets up the Food Standard Agency as an independent body for monitoring food risks.
2000	The publication of the Phillips report, the first detailed inquiry on the government's shortcomings during the BSE crisis.

ing statements that there was no evidence the disease could spread to other species. In May 1988, the BBC broadcasted the first program documenting the presence of "mad cow" disease in British cattle.

The first expert group to assess the risks posed by BSE was established by MAFF as late as May of 1988. (Table 2 lists the composition of expert groups that were formed during the unfolding of the crisis.) This group, later known as the Southwood Working Party, included high-profile specialists from such fields as zoology, neurology, virology, and veterinary medicine. Its objective was to conduct an expert risk assessment that would identify any threats the disease could pose to human beings. The party was also charged with guiding overall government policy on BSE-related issues. Three meetings of the Southwood Working Party took place, and the group's final report was presented in February of 1989 (DOH/MAFF 1989). The recommendations made in that report recognized the implications of BSE for cattle production, as well as its link to meat and bonemeal, but they failed to address the possibility of any threat to humans. Moreover, acting as an advisory rather than a policy-making body, the group did not propose any strategy for managing the risk of infected cattle, without clinical signs, entering the human food chain.

Recent analyses suggest the Southwood Working Party's identification of BSE as an animal disease had far-reaching implications for future investigations, in that it "effectively closed the door on further research into the human health risks of infected beef" (Crace 2001). The Southwood Working Party had produced a contradictory report: Although it gave an evidence-based assessment of animal related threats, it categorically ruled out the possibility of the disease posing a threat to humans (DOH/MAFF 1989). Despite the growing unorthodox scientific opinion (Almond, Brown, and Gore 1995; Ford 1996; Lacey 1994, 1998), the Southwood Working Party and subsequent committees largely adhered to an "approved" view. Among its most important conclusions, it determined that cattle were a "dead-end host" for BSE. This finding, however, stood in clear contrast to its own recommendation to exclude high-risk material from baby food.

Interestingly, before the actual publication of the report, MAFF's civil servants held detailed discussions with Department of Health representatives that centered on the possibility the report could cause a public scare. Ultimately, despite the resistance of some cabinet ministers, it was decided the recommendation to exclude high-risk material from baby food would be published, with the explanation that it was a measure of extreme caution. Predictably, perhaps, subsequent discussions in the media focused on the implications of the baby food recommendation, thus defeating MAFF's attempt to stem a future BSE panic (Phillips Inquiry 2000). Apart from the exclusion of high-risk material from baby foods, the report included a number of less controversial recommendations, such as the urgent introduction of a ban on infected animals entering the human food chain and the creation of an expert body with the responsibility of directing future BSE research (DOH/MAFF 1989). Strikingly, an initial draft, which had identified the use of contaminated meat and bonemeal for herbivores as the likely cause of the disease, was censored because of its potential implications on the meat-processing industry and the export of British beef.

The publication of the Southwood Report in February of 1989 caused a media storm that reflected commonsense public concerns about human safety and health. As a consequence, MAFF decided that infected animals (with clinical signs) should be destroyed, with compensation paid to farmers.[1] Following continued public pressure, in June of

Table 2 Composition of the Scientific Committees Established during the BSE Crisis

Committee	Members and their responsibilities at the time	General comments
Southood Working Party	Sir Richard Southwood, professor of zoology, Oxford University; Professor Antony Epstein FRS, virologist; Professor Sir John Walton, neurologist; Dr. William Martin, veterinarian	All members were high-profile scientists, but not narrow experts in the field.
Tyrrell Committee	Dr. David Tyrrell, microbiologist and director, MRC Common Cold Unit; Dr. William Watson, director, Central Veterinary Laboratory, MAFF; Professor John Bourne, director, Institute of Animal Health; Dr. Robert Will, consultant neurologist, Western General Hospital, Edinburgh; Dr. Richard Kimberlin, ex–acting director, Neuropathogenesis Unit, and head, Scrapie and Related Diseases Advisory Service	Expert consultative committee
Spongiform Encephalopathy Advisory Committee	Dr. David Tyrrell, microbiologist and director, MRC Common Cold Unit; Dr. William Watson, director, Central Veterinary Laboratory, MAFF; Professor John Bourne, director, Institute of Animal Health; Dr. Robert Will, consultant neurologist, Western General Hospital, Edinburgh; Dr. Richard Kimberlin, ex–acting director, Neuropathogenesis Unit, and head, Scrapie and Related Diseases Advisory Service	In April 1990, the Tyrrell Committee was reconstituted as the Spongiform Encephalopathy Advisory Committee, with Dr. David Tyrrell, chairman of the existing Tyrrell Committee, as chairman.

Source: Phillips Inquiry (2000), vol. 1, 11.

1988 the government introduced a ban on the use of ruminant-derived protein in the form of meat and bonemeal in cattle feed. This rule still allowed the use of meat and bonemeal as feed for other animals such as cats, sheep, and poultry (HMSO 1988; Maxwell 1999). At that time, there was no test to identify the infective agent in animal feed, and it must be assumed that a certain amount of it continued to be fed to cattle, especially as farmers had stockpiled contaminated feed. Until 1994, MAFF representatives sought to quell public fears about contaminated animal feed through claims that only large amounts of infected material could transmit the disease. These statements were based on virtually no scientific evidence and were eventually proven wrong on the basis of experimental research.

In line with the earlier recommendations by the Southwood Working Party, the Tyrrell Committee was created in 1989, with the objective of providing further advice on BSE to MAFF and the Department of Health. The Tyrrell Committee was given the task of analyzing leading research and identifying what future research may be required. The committee published its report within a couple of months of its formation. The report emphasized the need to develop scientific knowledge in a number of areas and cautiously noted that no reliable conclusions could be drawn about the spread of BSE to humans because the incubation period of Kuru[2] could exceed 30 years (HMSO 1994). Recommendations for additional research were initially not followed up, and funding was delayed until the beginning of the next year. The committee's credibility was further questioned when Dr. Tyrrell, the head of the committee, stated in the mid-1990s that "British beef can be eaten by everyone" (Maxwell 1999).

In 1989, opposition leaders accused the government of complacency in the face of a potentially fatal disease. Growing public fears about the disease were expressed in public forums such as the Conservative Women's Conference and the Women's Farming Union. Meanwhile, MAFF insisted there was no need for additional precautions. However, in June of 1989, in response to escalating public concerns, the government initiated a ban on high-risk material—specified bovine offal—from entering the human food chain. This measure again contradicted the official scientific advice given by MAFF, which had categorically stated that bovine offal posed no relevant risk to human health (HMSO 1989). Following fears that the use of specified bovine offal could result in a complete ban on meat and bonemeal, the U.K. Agricultural Supply Trading Association introduced a voluntary ban on the substance in 1989. Much later, in November of 1995, the government announced its own ban on specified bovine offal from mechanically recovered meat. Neither ban was officially monitored, and it is not clear to what extent the rules were followed.

In April of 1990, a new committee, the Spongiform Encephalopathy Advisory Committee was established to provide scientific underpinning for future government policies. During the following years, the government largely adhered to the Advisory Committee's instructions. The committee itself produced two reports. The first was an "Interim Report on Research" (1992), which endorsed further measures for handling BSE. The second report, "Transmissible Spongiform Encephalopathies: A Summary of Present Knowledge and Research" (1994), was aimed at providing a complete account of knowledge on BSE. In addition, to ensure a closer monitoring of the spread of the disease, the government established a vCJD surveillance unit in May of 1990.

The Aggravation of the Epidemic

Having accepted a range of measures, government officials felt confident that BSE risks were now under control. Accordingly, the first Advisory Committee report concluded that all necessary steps had been taken to ensure the protection of human and animal welfare.[3] This confidence was subsequently undermined by three developments. First, the rate of infection proved to be higher than initially estimated. Second, credible scientific confirmation emerged of the possibility of a transfer of BSE to other species. Third, a series of cases of the human variant of BSE were recorded from 1992 onward.

The prevailing scientific opinion assumed that BSE had an incubation period of about five years. If a calf did not contract the disease after that period, it was believed to be disease free (Maxwell 1999). Based on this rationale, it was thought the 1988 ban on meat and bonemeal in cattle feed would lead to a visible reduction in BSE cases and the gradual extinction of the disease by mid-1993. In reality, the number of newly reported cases peaked at 3,000 per month between the second half of 1992 and the first half of 1993 (P. Brown 1998b; Harris and O'Shaughnessy 1997). Moreover, in March 1991, evidence emerged that cattle born after the 1988 ban had been infected with BSE. The number of known post-ban cases grew dramatically to 300 by the end of 1991 and to 30,000 by 1997 (Collee and Bradley 1997). These events indicated there was either a higher cattle-to-calf rate of transmission than had previously been understood, or that the consumption of infected feed had continued. In either case, it was likely that a large number of infected animals without clinical signs had entered the human food chain.[4]

Public confidence in the government's handling of BSE eroded further when it emerged that BSE could be transmitted across species. The first incident of such a transmission occurred in May of 1990, when a cat was diagnosed as having died from BSE (Wyatt et al. 1991). This was followed by four additional instances that implicated

contaminated cat feed. Although they did not publicly admit to any inconsistencies in their view that cattle were the BSE end hosts, MAFF representatives secretly consulted the Advisory Committee on BSE transferability. The committee conducted an experiment in which a pig received injections of BSE-carrying material into its brain. This experiment confirmed the transferability of BSE across species and suggested that the ruminant feed ban of 1988 may have had little effect on the spread of the disease because of other transfer mechanisms. In the face of this evidence and advice from the Advisory Committee, MAFF finally decided to ban meat and bonemeal derived from specified bovine offal for animal feed. Interestingly, MAFF initially withheld the results of the pig experiment to ensure that disclosure of the finding would coincide with the introduction of the new legislation. The legislation, passed without the customary consultation period, imposed a statutory ban on the usage of specified bovine offal in animal feed in September of 1990 (HMSO 1990a, 1990b).[5]

The Human Version of the Disease

Public fears that BSE could affect humans gradually found confirmation by the early 1990s. The first publicized case of vCJD occurred in mid-1992, when the surveillance unit reported to the Department of Health that a 60-year old farmer had been infected. Following the farmer's death, the surveillance unit's spokesman stated that the case was an outlier and that there was no evidence for a causal link between BSE and vCJD (Sawcer et al. 1993). This view was maintained during a subsequent publicity campaign in which government officials reiterated the view that the two diseases were unrelated. More recently, the Phillips Inquiry (2000) suggested there were earlier cases of vCJD in 1989 that had remained concealed from the public on account of MAFF's denial of a link between the two diseases. Following the death of a second farmer in 1993, official sources continued to emphasize there was "insufficient evidence to draw definite conclusions" (Davies et al. 1993). When several farmers whose herds were infected with BSE died from vCJD, evidence mounted that the farmers had contracted the disease from the contaminated environment (Smith et al. 1995). This was followed by the death of younger victims from the mid-1990s onward, which the press took as evidence of an escalation of the disease.[6]

In the light of these events, government officials continued to emphasize the safety of British beef. Similarly, the Advisory Committee, at its meeting in September of 1995, concluded there was insufficient evidence to link the BSE outbreak to the occurrence of vCJD. In the meantime, outside government circles, scientists were expressing their concern over the spread of the infection (Lacey 1994). During the subsequent public debate, government officials maintained their position about the "absolute" safety of beef and proved unwilling to discuss the possibility of a threat to humans. According to the Phillips Inquiry (2000), MAFF officials actively encouraged government scientists to maintain the party line in answering public questions. Even at its February 1996 meeting, MAFF refused to give due consideration to the objections raised by some committee members with regard to the threat posed by BSE.

By March of 1996, with about 30,000 suspected cases of infected cattle and 10 reported vCJD cases in young people, the government's view had become impossible to sustain. The Advisory Committee finally concluded there might be evidence of a threat to humans, and it conducted emergency discussions that focused on policy measures that would suitably accompany the government's recognition of human risks. On March 20, the Advisory Committee was forced to speed up its proceedings to preempt press announcements. When the committee issued a statement recognizing that vCJD was most likely caused by BSE, the government immediately announced that cattle of more than 30 months (which were assumed to carry the highest risk of BSE) had to be deboned and that meat and bonemeal could no longer be used in animal feed.

Contrary to government expectations, these measures did not quell public concerns and, following protests and plummeting beef sales, a complete ban on cattle of more than 30 months was introduced (Hornsby 1998). As a result, between 1996 and 1999, 3.3 million cattle were destroyed, and European Union legislation prohibited all British cattle and beef exports. (Table 1 gives an overview of the restrictions and eradication programs that were imposed in the United Kingdom and the European Union).[7]

The Phillips Report

Following the reversal of the official government line on BSE/vCJD, the new Labour government announced that an inquiry into the crisis, to be chaired by Lord Phillips, would commence as early as December of 1997. This inquiry, which lasted nearly two years, produced a comprehensive analysis of the crisis and a detailed review of the scientific evidence on animal and human health.[8]

Without explicitly blaming individual decision makers, the Phillips report heavily criticized the way the BSE/vCJD crisis was handled and commented on the (arguably) preventable mistakes the government had made. In this context, special attention was given to failures in risk communication, including time delays, secrecy regarding scientific research, and the paternalistic attitudes of some ministers. In providing this analysis, the report did not attempt to identify the causes of these failures. This was understandable, both on account of the goal of the report and the fact that such an analysis would necessarily have involved some

degree of speculation and conjecture. Insofar as the Phillips report sought to account for the behavior of government officials, it relied heavily on the view that decision makers were led by fear of public overreaction. Thus, volume 8 of the report stated that "throughout the BSE story, the approach to communication of risk was shaped by a consuming fear of provoking an irrational public scare" (Phillips Inquiry 2000).

Regarding the key protagonists of the crisis, the Phillips report was, on the whole, highly critical of the behavior of government agencies. A much more lenient attitude characterized its views of experts whose recommendations can, in hindsight, be thought of as insufficient or hesitant (such as the Southwood Working Party and the Tyrrell Committee). This differentiation was grounded in the view that government officials should have created a consistent risk-communication and management strategy rather than relying on containment strategies.

In providing this analysis, the Phillips report left many questions unanswered. Nonetheless, it highlighted the lack of a proactive strategy. Although this lack explained why certain conclusions and policies were not drawn in a timely manner, it did not explain why government decision makers stubbornly maintained a specific and highly controversial scientific position in the light of contrary evidence.

Analysis

BSE and Risk-Opportunistic Policy Makers

In the case of the BSE crisis, one outstanding characteristic of official communication was that, despite the availability of a growing body of contrary nonorthodox scientific opinion (Almond, Brown, and Gore 1995; Ford 1996, 92–107; Lacey 1994, 1998), views alleging potential human health risks were virtually ignored. During the Phillips Inquiry, key protagonists of the crisis explained this phenomenon as a fear of potential political repercussions "if the truth were known." However, if, as the chief medical officer (1983–91) noted, officials were under pressure to issue misleading statements out of fear (Hornsby 1998), then the question arises, why were no efficient self-correcting mechanisms able to alter the charted course?

Explaining this phenomenon is difficult. One obvious explanation is that decisions about risk were made on a short-term basis under the assumption that a monopoly over risk-relevant information could be maintained, which would prevent the pertinent information taking on its own dynamic. Evidence for this pattern of behavior exists: On a number of occasions, officials gave clear priority to vested interests over those of public safety. This was perhaps most discernable in the early actions of MAFF, when decisions were guided by attempts to protect the economic and financial interests of the farming community.

Another interpretation suggests that risk communication was fatally skewed, not because official preferences for one or another interest group, but rather because of a shared cultural preference for nonintervention among government officials and politicians. This hypothesis was proposed by Rawnsley (1998), who has argued that the underlying cause of the government's failure to respond to relevant information on the human risks of BSE can be traced to its commitment to free-market dogmatism and its deregulation agenda. Rawnsley's analysis potentially explains much of the early events surrounding the BSE crisis. However, it is much more difficult to attribute the later stages of the crises, when substantial compensation was offered to owners of infected cattle, to an adherence to neoliberal views.

In a slightly more complex narrative, the same pattern of behavior has been attributed to an aversion to risk bearing by government officials and their concomitant presumption that the private sector is composed of responsible risk takers. This hypothesis was developed by Wilson (Wilson 2000; Wilson and Wilson 2001), who argues that New Labour has adopted a sophisticated version of the older Conservative belief in the need for individuals to retain risks created by the market economy. Wilson's hypothesis can be related to the last stages of the crisis. According to this hypothesis, New Labour's preference is not for unrestrained markets, but rather for the assumption that government policies should activate "responsible risk takers" in the private sector. If we apply this hypothesis to the BSE crisis, we would expect government officials to have treated BSE/vCJD as a primarily scientific problem, which would have required adequate scientific investigation before any action was taken. In doing so, government actions would, above all, have given the private sector an opportunity to muster its own initiatives, which in any case would be assumed to be superior to government action. The private sector did fail to take any relevant measures on its own. The wait-and-see approach, therefore, proved itself to be inappropriate. Ultimately, however, the lack of timely intervention was grounded in an explicit rejection of the view that BSE posed a risk to humans, not the expectation of the industry's ability to respond appropriately.

A third explanation for the government's hesitancy to accept the human risks of BSE relates to the concept of the risk-opportunistic policy maker. This concept is related to the rich literature on short-term and opportunistic policy making, which argues that as long as issues are sufficiently complex, politicians are able to adopt attitudes that opportunistically favor special interests without their behavior being detected (Lowi 1979). Using a similar concept in the context of scientific and technological research, Lowi (1992) has argued there is an inherent compatibility between the modern bureaucratic state and science, which is

conditioned by the opportunistic behavior of both sides and results in the establishment of different forms of alliances. According to Lowi (1992), such alliances involve, at the outset, "a commitment to government for science" and, next, "a commitment to government by science."

Extending Lowi's argument, it could be argued that when opportunistic policy makers are able to pick from a number of possible and potentially equally credible scientific explanations of a phenomenon, they will choose an explanation that best serves their own interests or those of their network or peer group. Given that the underlying problem is sufficiently complex to prevent this view from being quickly discredited, risk-opportunistic policy makers then have an incentive to center their efforts on maintaining this view. This is often done at the expense of investigating alternative viewpoints, even when these viewpoints have become more convincing over time. As part of this strategy of selectively supporting certain types of analysis of an existing risk, peer-group members buttress their preferred interpretation of the facts by gaining, through inducements of various kinds, support from respected, neutral, or sympathetic members of the scientific community. This strategy has several advantages: Initially, credibility is added by scientists who are friendly to the preferred interpretation of the facts in relation to a potentially hostile public or media. However, as time passes and further research findings are brought to the fore, the co-opted members of the scientific community find it problematic to revoke their stance; their initial commitment to the mainstream view makes it difficult for them to exit without reputational damage. As a consequence of this dynamic, alliances between the state and expert interest groups may be stable for some time, even as scientific evidence progresses, provided the preferred version of the facts does not inform policies that are openly detrimental to the public interest.

According to our analysis, the early handling of BSE (before the national elections of 1997) was characterized by a strong alliance between policy makers and agricultural interests. During that time, the Conservative government had to operate in an environment of uncertain parliamentary majority in which Euroskeptics and a strong agricultural lobby (with more than a hundred rural votes in the House of Commons) played an influential role. This political environment reinforced the ongoing trend toward centralized decision making and "prime ministerial" government (Taylor 2003), which entailed an increased reliance on expert advisers on all crucial issues, including the handling of the BSE crises. Although there is little evidence that MAFF's decisions were dictated outright by agricultural groups (Lobstein 2001), it is likely that MAFF's policy of placating these interests by underplaying the BSE crisis was welcomed by senior Conservative politicians, who were only too willing to reward complacent civil servants.[9] As long as there was no serious external threat to the position maintained by government-friendly scientists, predictably risk-averse civil servants, in turn, had every incentive to support ministers in maintaining this alliance.

Both of the Conservative prime ministers who presided over the BSE crisis, meanwhile, sought to legitimize their policies by emphasizing the need for categorical scientific proof and rejecting claims that BSE represented a danger to the public.[10] This position proved sustainable for a limited period of time, during which official power holders appeared to be able to effectively frame the ongoing debate. In this context, the existing alliance of policy makers and agricultural interest groups benefited from the fact that when impartial scientists tried to convey the risk information in a probabilistic manner, they often appeared to convey significant levels of uncertainty, which undermined the public credibility of their statements. When public and scientific criticism of the handling of the BSE crisis mounted, MAFF acted very much in line with the model of a risk-opportunistic policy maker by expanding its core of friendly scientists who actively supported its earlier policy decisions.

Eventually, however, the attempt to create government-sponsored science failed on two grounds. First, the initial expert body set up by the government, the Southwood Working Party, accepted blatantly incorrect conclusions about the possibility of transfer across species. Second, the measures it suggested were contradictory, combining a "no-risk assertion" with measures to eliminate BSE from baby food. The second expert body appointed by MAFF, the Tyrrell Committee, also failed to tackle existing public fears. In this case, attempts to create science for government by withholding relevant information from external scientists, the media, and the public broke down because of disastrous medical developments. MAFF's failure to support an open debate was highlighted by the Phillips report, which, although it otherwise accepted that officials had assessed scientific information in good faith, drew attention to several aspects of the conduct of these committees that adversely affected their assessment of risks (Little 2001). The report also criticized the distribution of BSE-related research funding, which had emphasized value for money and "near-market-research" (Phillips Inquiry 2000, vol. 2, part 1) and noted that greater attention should have been given to the proper utilization of scientific research.[11] Interestingly, in the course of the BSE crisis, the two key ministries—MAFF and the Department of Health—did not have chief scientific officers, which is also likely to have deprived these organizations of the required leadership.

Extensive media coverage of the first human victims of the disease ultimately made it impossible for MAFF to

utilize references to scientific uncertainty to control the debate on BSE as a human health risk. In stifling the debate, MAFF was able to establish some level of independence as a policy maker. However, by the time the Labour government was elected, it could no longer rely on the unambiguous support of the cabinet or of a large group of members of Parliament. MAFF's gradual downfall, however, cannot be attributed to a change of political masters alone. Rather, having lost its credibility in managing BSE and, later on, foot-and-mouth disease, MAFF's demise was a more or less inevitable event that, cynically speaking, involved no more that the routine culling of an agency that had become a major reputational liability.

Policy Lessons

The Phillips Inquiry identified more than 20 relevant areas of policy recommendations related to different aspects of the BSE crisis. Its main suggestions included the need to create proper procedures for the appointment of scientific advisory committees; accurate formulation of statements on risk produced by scientific bodies; strategic considerations in the allocation of research funds; the timely provision of an adequate policy framework and guidance to the scientific community; the precedence of issues related to the public good over other concerns; and the facilitation of scientific information exchange combined with a balanced consideration of nonmainstream scientific opinion (Phillips Inquiry 2000, vol. 1).

Expanding on the recommendations of the Phillips Inquiry, the British science policy analysts Lobstein, Millstone, Lang, and van Zwanenberg (2001) have proposed several measures for improving the management of health risks. First, they suggest that responsibility for judging the proportionality or cost of intervention with respect to potential commercial losses should be made solely by elected representatives, not by scientists. Second, they argue that appointments to government advisory committees should be conducted on the basis of clear and open criteria. Third, they propose that government officials who set up framing assumptions that define the scope of scientific risk assessment should be accountable for their choices. Fourth, Lobstein et al. argue that government officials should adopt a proactive policy stance that anticipates risks rather than reacts to them. This would involve a process whereby concepts such as "substantially equivalent" and "generally regarded as safe" would be replaced by requirements to demonstrate safety before a new product or process is introduced. Failing this, there should be a requirement to demonstrate public good or social need, as opposed to purely economic benefit. Lastly, Lobstein et al. suggest that animal diseases that threaten the food supply should be jointly assessed by veterinary and public health agencies from the beginning.

Risk-opportunistic decision making in the context of health crises can be, as Lobstein et al. (2001) imply, constrained by requirements for openness, transparency, and accountability in the handling of scientific information. However, when the preconditions favor opportunistic decision making, whether it is on account of the strength of certain interest groups or a legacy of historical alliances, there is every possibility that reliance on open communication is not enough. Effective opposition to government science requires the existence of credible alternative research, and this research is only likely to exist when research funding is not driven by the interests of government or its supporters. Equally, the dissemination of alternative research relies crucially on the existence of credible neutral or alternative information channels. Allying scientific research and the communication of science closely with government, therefore, carries unique risk, particularly where human safety is at stake. The possibility of risk-opportunistic decision making is aggravated by institutional frameworks that foster centralized information gathering and decision making. In some cases, therefore, the avoidance of future health crises depends as much on the creation of transparent, decentralized institutional structures as it does on the open and truthful communication of risk-relevant information.[12]

Conclusion

When evidence of uncertain public health risks (such as those associated with BSE) materializes, there is an expectation that the state will retain an overall responsibility for the management of these risks. In managing these risks, states typically rely on scientific experts (Brint 1990; Gianos 1976). One goal of involving these experts is to reduce uncertainty in decision making. This reduction of uncertainty typically relies on the creation and identification of a credible scientific consensus view that will guide policy decisions. In an idealized but uncommon scenario, where risks closely mirror what Hood and Jones (1996) describe as objective risks, there is a possibility that a relatively clear-cut consensus view will emerge quickly. When these preconditions do not exist and the assessment of risks depends on certain criteria and assumptions, it can be difficult for a consensus or mainstream view to be established or maintained. Nonetheless, Douglas and Wildavsky's (1983) analysis of individual risk perception suggests that mainstream views, which are vulnerable in terms of their scientific underpinning, can be sustained for some time if they are supported by influential experts.

The BSE crisis presented MAFF with unanticipated challenges and risks, including a new, large-scale, and difficult-to-detect epidemic, a high risk profile, and rapidly changing scientific knowledge. During the course of the

BSE crisis, MAFF enjoyed a lengthy period during which support by government-friendly experts, centralized decision making, and external political support allowed it to give priority to commercial interests with little public criticism. Once this situation was threatened, MAFF sought to bolster its position by broadening its network of supportive scientists. Ultimately, this network of friendly scientists probably did more to undermine MAFF's position, both because of their contradictory recommendations and the proximity of their views to MAFF's original stance. As Lowe and Ward (1998) conclude, MAFF's short-sighted adoption of unsustainable, myopic policies created a crisis of confidence that ultimately had excruciating effects on the U.K. agricultural community.

Seen against this background, the handling of the BSE episode provides credible evidence that, in such circumstances, short-sighted attempts to misdirect public opinion through the creation of "science for government" are not feasible. The BSE crisis, therefore, was more than the communication disaster caused by unforeseen exogenous factors that the Phillips report made it out to be. It was, at root, a governance failure that had little to do with the choice of appropriate or inappropriate techniques for communicating risks. Sadly, much of this is lost in the Phillips report and other assessments of the BSE crisis, which only too readily blame the crisis on the inexperience of its protagonists or the presence of unforeseen events.[13] Public health risks, such as those posed by BSE, are neither new nor unique. Therefore, it may be argued that the main factor that turned the BSE episode into a major crisis was the fact that key government officials had become risk-opportunistic decision makers who had both the willingness and opportunity to disengage from open and responsible policy making.

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Notes

1. The amount of compensation was initially determined at two levels, both subject to a ceiling: for confirmed cases, 50 percent of the market value, and for negative cases within a BSE-infected herd, full value. Because the 50 percent compensation for confirmed cases with clinical signs acted as a disincentive for the farmers to report the BSE cases, this two-tier structure was abolished in February of 1990, fixing compensation for all confirmed cases at 100 percent (Phillips Inquiry 2000). Cogent observers noted the ban on the usage of infected animals in the human food chain did not provide a reliable means for the removal of the threat, both because of the long incubation period of the disease and because of the lack of reliable tests for detecting BSE in a living organism.
2. A disease similar to BSE that occurred among a cannibal tribe in Papua New Guinea.
3. The Advisory Committee, however, lacked reliable information about the pace and scale of the spread of BSE prior to the ruminant feed ban, and therefore it was unable to evidence the effectiveness of its measures.
4. This possibility was confirmed by later studies, which estimated that about 710,000 infected cattle were eaten before 1996 (*Economist* 1998). Consecutive scientific analyses suggested that a small portion of BSE cases born after the ban were attributable to varying incubation periods, whereas the majority of them were caused by contaminated animal feed that had remained in the supply chain. This view was supported by two observations: first, there was evidence for breaches of the animal specified bovine offal ban (Phillips Inquiry 2000), and, second, research findings indicated that very small quantities (about 1 gram) of infective material are sufficient to transmit the disease to cattle (Collee and Bradley 1997).
5. The new legislation replaced a 1988 ban on ruminant feed with a stringent ban on all specified bovine offal in animal feed in the United Kingdom, as well as its export to the European Union. In 1991, the ban was extended to third countries amid allegations that U.K. companies continued to export these substances to Asia and Eastern Europe.
6. Government officials, nonetheless, categorized the first case of vCJD in a 16-year-old (1994) and two further deaths of teenagers (1995) as sporadic vCJD. This contradicted the mainstream medical view that sporadic vCJD appeared only in older persons at the extremely low rate of one person per one million population per year.
7. Despite the incidence of BSE cases in other European nations, the United Kingdom has continued to record vastly greater rates of BSE infections. Until February 2001, there have been 180,903 cases in the United Kingdom and 1,924 cases in the European Union (EU Food Safety 2001). There have been 99 recorded vCJD victims in the European Union, of which 85 resided in the United Kingdom (Meikle 2000). Meanwhile, estimates of the cost of the BSE crisis also indicate the United Kingdom has been the hardest hit by far,

with as much as £3.7 billion spent in connection with the crisis (*Independent* 2000).

8. The inquiry commenced its work in early 1998 and lasted for two and a half years, producing a 16-volume report published in October 2000.
9. Even a former health minister and a chief medical officer reported difficulties in communicating BSE risks with MAFF during the Phillips Inquiry.
10. John Major stated at the following inquiry, "As I have no scientific or medical background, I relied on the independent experts to provide authoritative and reliable advice" (D. Brown 1999).
11. Specifically, the report stated that "the proper functioning of the customer/contractor system in government depended upon Departments being able to act as 'intelligent customers'" (Phillips Inquiry 2000, vol. 2, part 1, para. 6.33).
12. An interesting example of such a review is the removal of the authority for offshore health and safety from the U.K. Department of Energy to the country's health and safety executive following the Piper Alpha disaster of 1988.
13. As a contemporary footnote, and consequent to this article's conclusion, we can now see a very close analogy between these conclusions on BSE and what is now in the public domain concerning the 2001 foot-and-mouth disease outbreak in the United Kingdom.

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