

# Chapter 4

## Good Arguments During the BSE Inquiry

### 4.1 Introduction

At this stage of discussion, we have all the raw materials in place to construct a model of scientific reasoning that is adapted to contexts of uncertainty. At the conceptual heart of this model is presumption. Through its unique features of defeasibility, context sensitivity and much else besides, presumption, it was argued, is equipped to handle the full range of demands that uncertainty imposes on investigators during scientific inquiry. But presumption could not act alone in this endeavour. Several argument forms that have traditionally been characterized as fallacies became the vehicle through which presumption was given effect in a model of reasoning. These argument forms, it was contended, served to facilitate scientific inquiry when widespread uncertainty threatened to halt inquiry in its tracks. The purpose of this chapter will be to demonstrate in quite specific ways how certain of the fallacies achieved this facilitation in the case of scientific inquiry into BSE. The presumptive analyses of fallacies that have been advanced to date have certainly served to reveal rational features of the fallacies. These features have been largely obscured from view under traditionally dominant deductive and inductive conceptions of argument. To this extent, these analyses have helped to move the fallacies a bit further along the road towards full integration within cognitive rationality. But there are lingering suspicions amongst theorists that these argument forms, despite their demonstrated practical and other benefits in inquiry, may still not somehow fully warrant the type of rational legitimacy that routinely attends deductive and inductive modes of reasoning. In this chapter, I aim to dispel those suspicions once and for all by arguing in support of a clear role for the fallacies within cognitive rationality.

To the extent that presumption is at the heart of the analytical framework that we are using to examine the reasoning of BSE scientists, normative considerations that are more or less directly related to this concept will assume significance in our analysis of particular episodes within that reasoning. On some occasions, it may be helpful to think of the rational merits or weaknesses of a piece of reasoning in terms of the (in)correct application of burden of proof. On other occasions, it may assist us to evaluate an extract of reasoning in terms of the cognitive or practical gains it bestows on inquiry or in terms of certain epistemic goals that it allows investigators

to achieve. On still other occasions, the premises in scientists' reasoning may be evaluated as lacking plausibility while conclusions may be judged to have insufficient presumptive warrant. All these dialectical, epistemic, cognitive and pragmatic criteria relate in one way or another to the concept of presumption and reveal, yet again, the multi-faceted nature of this concept. Their role as normative criteria in an assessment of the rational acceptability of the reasoning of BSE scientists necessarily takes us well beyond traditional deductive standards of truth, validity and soundness in an assessment of that reasoning, so much so in fact that the various arguments we will examine do not satisfy these deductive standards. However, as we argued in [Section 3.1](#), this failure to satisfy deductive standards is only a problem for our account of scientific reasoning if it is assumed that deduction is the only (or even dominant) mode of reasoning in scientific inquiry. And this particular assumption, it was contended, is less tenable now than at any point in the past. The reader can therefore expect in the evaluative analyses that follow to be exposed to all sorts of reasoning patterns, strategies and standards that would offend the sensibilities of the deductive logician.

The evaluative analyses in the current and subsequent chapters will be facilitated by drawing a distinction between an argumentative strategy on the one hand and component arguments on the other hand. As used in the present context,<sup>1</sup> an argumentative strategy describes an overarching structure that embodies features such as the goals of reasoning and how reasoners are undertaking to fulfil those goals. This structure can be consciously teased out at the onset of inquiry or it can develop organically, without much forethought, as inquiry proceeds. An argumentative strategy will span an entire sequence of argumentation, rather than individual arguments within this sequence. It is thus something of long duration that can persist in inquiry, often over a number of years, despite rejection or revision of the individual arguments that constitute the strategy. This said, an argumentative strategy should not be entirely insensitive to revisions that occur in the arguments that constitute its sub-structure. When these revisions are sufficiently wide-ranging, there should be a corresponding reformulation of the argumentative strategy itself. If this reformulation does not occur, the argumentative strategy has become divorced from the individual arguments that are its rational basis. At this stage, the argumentative strategy has been misappropriated by certain reasoners for their own ends, which could include personal interests such as political and commercial gain. We will see that this distinction between argumentative strategy and component arguments has very direct relevance to the scientific inquiry into BSE. The overarching argumentative strategy in that inquiry was to argue that BSE would not transmit to humans and that beef was safe to eat. At least initially, this strategy had a rational basis in a number of arguments that were advanced by scientists. However, as inquiry proceeded and it became apparent that this strategy could no longer be defended, its persistence became a source of fallacious arguments during that inquiry.

The arguments that were subsumed by the argumentative strategy of the BSE inquiry were often among the standard list of so-called informal fallacies.<sup>2</sup> In this way, we will see examples of *ad ignorantiam* reasoning, question-begging argument, *ad verecundiam* argument, faulty analogy and much else besides. But the

whole thrust of the analyses to follow serves to undermine the idea that there exists some invariant list of fallacies that are inherently problematic. For a start, many of the fallacies on the standard list will be shown to be anything but fallacious when we consider them within their particular contexts of use. We will see, for example, that *ad ignorantiam* conferred significant gains on inquiry into BSE, particularly in the early stages of that inquiry. Furthermore, although this standard list includes the most commonly encountered fallacies, it is by no means exhaustive of the many ways in which reasoning can be found to be lacking. Accordingly, we will see in subsequent chapters a number of novel fallacies that have not been discussed in the literature to date. At least one of these fallacies – failure to use authority – involves an extension in the traditional analyses of what can go wrong with appeals to authority. With so many fallacies in the standard list not fallacious within particular contexts of use, and other arguments not included in the list but which are still evidently weak, it is clear that the standard list is something of a fallacy theorist's fiction. In saying this, I am not making the altogether stronger claim that there is no such thing as the fallacies.<sup>3</sup> However, what I am challenging is the idea that there is just something inherently problematic with certain argument forms and that a theory of fallacy must proceed to legislate against those forms.

A few further comments are in order before we embark on the main business of the chapter. During the BSE inquiry, policy decisions were often taken and health pronouncements made by government ministers. These decisions and pronouncements were the outcome of an extensive (but not always efficient) consultation process that involved civil servants at the Department of Health and the Ministry of Agriculture, Fisheries and Food on the one hand and scientists from a range of medical and veterinary disciplines on the other hand.<sup>4</sup> Scientists often delivered their advice and opinions, not as individuals, but as a group of experts that met under the auspices of several expert scientific committees or working groups. These bodies were convened to offer expert scientific advice on specific aspects of the BSE problem, which were usually specified in explicit terms of reference for the committee or working group in question. In this way, the BSE Working Group was established in 1989 '[t]o advise the Section 4 Committees<sup>5</sup> on the implications of BSE to human medicinal products' (BSE Inquiry Report, Volume 7: 135). In the evaluative analyses of this chapter and subsequent chapters, it is important to make a distinction between the scientific advice that went forward from these expert groups and the health advice that government ministers subsequently released to the general public. As will be seen in [Chapter 7](#), the content of this latter advice cannot simply be assumed to accurately reflect the advice that was issued by scientific experts. More often than not, the scientific advice that went forward from expert advisory groups was tainted by political, commercial and other influences which had the effect of altering the nature of that advice. To the extent that we are evaluating the reasoning of BSE scientists, it is important to use as premises and conclusions in that reasoning only those propositions that were actual claims of these scientists.

In examining the reasoning of BSE scientists, we are constantly reminded of the acutely difficult epistemic conditions under which these scientists were compelled to operate. Decisions about the risks that BSE posed to human health often had to be

made before the results of experimental studies were available. Pre-existing knowledge of TSEs was at best an indirect guide as to how BSE would behave. By virtue of the risk assessments that scientists were required to make, they were often forced to pass judgement on matters that took them beyond their particular areas of expertise. By any standard, the situation confronting scientists charged with handling the BSE crisis was not an easy one. In full cognizance of this fact, we must employ a principle of charity in our consideration of the reasoning of these scientists. As used by argumentation theorists, this principle describes how one should proceed to add statements to the premises of an argument during the task of argument reconstruction. Johnson and Blair (1994: 34) state that ‘your objective is to add to the stated premises the most plausible statement (consistent with the rest of the passage and likely to be believed by the arguer and used in addressing that audience) needed to make the whole set of premises relevant to the conclusion’. This simply stated principle precludes a number of activities on our part that could be reasonably described as being unfair towards the scientists whose reasoning we are examining. We cannot attribute premises to these scientists that they could not possibly have known given the state of knowledge present at a particular point in time. Nor can we criticize the reasoning upon which scientists based decisions using evidence that emerged at a subsequent point in inquiry. And we are definitely not permitted to expect scientists to revise or relinquish beliefs that were ultimately shown to be incorrect when those beliefs were supported by the best evidence available at the time they were formed.

In recognition of the importance that we are attributing to the temporal context in which inquiry into BSE was conducted, I want from the outset to demarcate three phases in that inquiry. The first phase (‘the early years’) marks the period between the emergence of cases of BSE in 1986 and the introduction of the first significant measure designed to protect human health, the human Specified Bovine Offal ban of November 1989. The second phase (‘the middle years’) charts the time following the introduction of the human SBO ban until the discovery in June 1994 that the pathogenesis of BSE was significantly different from that of scrapie. The third phase (‘the final years’) marks the time between the release of the results of the CVL’s pathogenesis experiment and the announcement in British Parliament in March 1996 that BSE was responsible for a new variant of CJD in a number of young people. Any attempt to mark out distinct phases in the scientific inquiry into BSE is necessarily problematic. By its very nature, scientific reasoning is a continuous process that is coextensive with the entire duration of the inquiry into BSE. However, these phases are not entirely arbitrary either; rather, they are each mediated by quite distinct evidential considerations. In this way, the first phase is noteworthy for its evidential bereftness which found scientists making decisions relating to the protection of human health on the basis of very scarce evidence indeed. The second phase is distinguished by a marked increase in the evidence that was available to scientific investigators. Specifically, experimental studies and natural transmission of BSE began to reveal certain anomalies in the dominant scientific view of this disease during this phase of inquiry. The third phase is noteworthy for how scientists responded to the burgeoning contrary evidence that began to emerge in the second phase of inquiry.

## 4.2 The Early Years: 1986–1989

Most of the reasoning that will be examined in this chapter falls within a period of the BSE inquiry that is marked by considerable scientific uncertainty. That period spans the time from the emergence of the first cases of BSE in 1986 to the introduction of the human SBO ban in November 1989. This was a phase of inquiry in which it became clear to investigators that they were confronting an increasingly serious animal health problem. From the initial identification of BSE in diseased cattle from two herds at the end of 1986, the situation had escalated to 10,091 confirmed cases of BSE by the end of the period we are considering.<sup>6</sup> If the animal health problem was serious, it was matched only by a growing concern about the risks that this new bovine disease posed for human health. On 16 February 1988, Mr Cruickshank of the Animal Health Group in the UK's Ministry of Agriculture, Fisheries and Food (MAFF) gave expression to this concern when he wrote 'we do not know whether [this disease] can be passed to humans. The last point seems to me the most worrying aspect of the problem. There is no evidence that people can be infected but we cannot say there is no risk' (BSE Inquiry Report, Volume 1: 44). During this same period, stories about this new bovine disease began to appear in the broadcast and print media. The *Daily Telegraph* (25.10.1987), *The Times* (29.12.1987) and the *BBC News* (30.10.1987) all picked up on the announcement of this new disease in the 'Short Communications' section of the British Veterinary Association's journal the *Veterinary Record* (Reilly and Miller 1997: 240). This was the slow start<sup>7</sup> to what was to become an unprecedented level of media coverage of the BSE affair, coverage that generated public anxiety and public understanding in roughly equal measures.

Against this backdrop of human and animal health concern, scientists were to undertake deliberations that would lead to the two most significant disease control measures during the BSE crisis.<sup>8</sup> Those measures were the introduction of the ruminant feed ban on 14 June 1988 (which took effect on 18 July 1988) and the human SBO ban in November 1989. The ruminant feed ban was enacted through Article 7 of the Bovine Spongiform Encephalopathy Order 1988 which stated that 'No person shall knowingly sell or supply for feeding to animals any feedingstuff in which he knows or has reason to suspect any animal protein has been incorporated. No person shall feed to an animal any feedingstuff in which he knows or has reason to suspect that any animal protein has been incorporated'. The introduction of this ban was directly motivated by the findings of John Wilesmith's early epidemiological investigation of BSE cases and specifically his claim that cattle had developed BSE as a result of consuming scrapie-infected sheep tissues in feedstuffs.<sup>9</sup> The introduction of the human SBO ban was an altogether more haphazard affair. Following the publication of the Southwood Report, a number of influences came together to encourage MAFF to introduce a ban on the use in human food of those types of offal that were most likely to contain BSE infectivity. (It should be noted that the Southwood Report itself stated that beyond the ban on offal in baby food, no other measures were justified to prevent others from eating offal from sub-clinical animals). These influences included the public reaction to the report (particularly the recommendation banning offal in baby food only), newspaper stories that urged a

more widespread ban on offal and concerns expressed by the pet food industry about the use of bovine raw materials in pet food.

In this emergent phase of the BSE inquiry, we can make a number of statements about the reasoning strategies that scientists are likely to employ. The primary concern of scientists will be to embark on inquiry, regardless of the risks – principally, the risk of error – that may be incurred by investigators at this stage. To the extent that just ‘getting started’ on inquiry is a more pressing concern to scientists than ‘being right’, we can expect a corresponding adjustment in the burden of proof at this initial stage of inquiry. Specifically, this burden must be lowered to allow investigators to forge ahead tentatively on the basis of rather limited evidence. It is in this context that presumptive reasoning strategies come to the fore. These reasoning strategies give investigators an early epistemic foothold on inquiry when a requirement for knowledge and certainty would serve only to foreclose inquiry. But these strategies must do more than merely launch investigators into inquiry. They must also work at closing the knowledge gaps that confront scientists and at resolving the uncertainty that these gaps create for investigators. Such closure and resolution may be achieved in a variety of ways. Some of these ways concern direct knowledge generation, as when investigators concluded that scrapie had not transmitted to humans because there was no evidence in 250 years of the disease that transmission had occurred. The use of the argument from ignorance in this case generated a proposition (scrapie is not a zoonosis<sup>10</sup>) that was then used by BSE scientists in their further deliberations. Other ways involve putting in place the conditions that make knowledge generation possible. We will see subsequently how the argument from ignorance was also used by BSE scientists to remove questions from inquiry that could not be addressed in the short or longer term, thus ensuring most effective use of cognitive and practical resources during the investigation into this disease. Through a combination of these reasoning strategies, scientists achieved a robust means (at least initially) of confronting uncertainty during inquiry into BSE.

### ***4.2.1 Argument from Analogy***

In [Chapter 2](#), we examined the evidential basis of an aetiological claim that was advanced by John Wilesmith and his colleagues at the Central Veterinary Laboratory. That claim sought to relate BSE to scrapie, a TSE in sheep, in the sense that the former disease was caused by the latter disease. Although the proponents of this claim could not have been aware of it at the time, this claim was to have a profound influence on the subsequent development of scientific inquiry into BSE. The effect of this claim was felt in two ways in inquiry. The first of these ways was that it had an early impact on the emerging argumentative strategy that was to shape risk assessments and official health pronouncements for most of the duration of the BSE crisis. The claim that BSE was similar to scrapie in sheep led investigators to believe that this new bovine disease would have few, if any, implications for human health. It achieved this reassuring conclusion by means of the following argument from analogy:<sup>11</sup>

MAJOR PREMISE: BSE is similar to scrapie in sheep.

MINOR PREMISE: Scrapie is not a zoonosis.

CONCLUSION: Therefore, BSE will not be a zoonosis.

We described in [Chapter 2](#) how the major (analogical) premise of this argument had the status of a presumption. We saw in that chapter how it derived some tentative warrant from the histopathological, molecular and epidemiological evidence that was adduced in support of it. Yet, this evidence still fell some way short of the evidence that could establish if BSE had been caused by transmission of scrapie to cattle. The only evidence that could address this question was the results of strain-typing studies, which were not available when Wilesmith and his colleagues were undertaking their early epidemiological investigations. Lacking the validation of this altogether stronger evidence, this major premise, it could be argued, was something of a faulty analogy<sup>12</sup> or at least not a particularly strongly warranted one. (It was established in 1987, before Wilesmith et al. produced their aetiological claim in 1988, that scrapie was not a zoonotic condition. So the minor premise of the above argument is essentially warranted<sup>13</sup>). To the extent that the proposed similarity between BSE and scrapie could not be conclusively established, a charge of fallaciousness could quite legitimately be levelled against this analogical argument. But to do so would have had the effect of foreclosing inquiry and with it any prospect of definitively addressing the question of the relationship of BSE to scrapie. By holding this analogical premise as a weakly warranted presumption, investigators were at least able to move forward in inquiry on a rational basis. During the course of inquiry, this particular presumption may be found to be wanting (as indeed it was). Once discovered to be problematic, investigators are obliged to remove this presumption from further inquiry. But until such times as this rejection becomes necessary, the analogical premise of the above argument and the particular conclusion that this premise warrants served to legitimate an emerging argumentative strategy that would see investigators consistently arguing that BSE would not transmit to humans.

There was a second way in which Wilesmith et al.'s aetiological claim influenced early inquiry into BSE. As well as serving to establish the argumentative strategy that spanned most of the duration of the BSE crisis, Wilesmith et al.'s claim was also the basis of several other analogical arguments that were used by scientists to warrant a range of decisions. Most of these decisions related to measures intended to protect human health. The introduction of the human SBO ban in November 1989 was one such measure. Considerable deliberation preceded the introduction of this ban, as scientists attempted to establish a rational basis for including some bovine tissues in the ban, while excluding other tissues. Analogical argument based on scrapie was used extensively during this deliberative process. For example, the decision to exclude tissues from calves less than 6 months old from the ban was motivated by an analogical argument based on scrapie as was the decision by Dr Richard Kimberlin<sup>14</sup> to seek the exclusion of thymus from the ban:

Analogy with scrapie research suggested that infectivity would not reach the brain or spinal cord of cattle in the first six months of life (BSE Inquiry Report, Volume 1: 116).

**MAJOR PREMISE:** BSE is similar to scrapie in sheep.  
**MINOR PREMISE:** In scrapie, infectivity does not reach the brain or spinal cord in the first 6 months of life.  
**CONCLUSION:** In BSE, infectivity will not reach the brain or spinal cord in the first 6 months of life.

[Dr Kimberlin]...said that he was not overly concerned about the thymus because scrapie research indicated that thymus was lower risk than other LRS [lymphoreticular system] tissues (BSE Inquiry Report, Volume 1: 117).

**MAJOR PREMISE:** BSE is similar to scrapie in sheep.  
**MINOR PREMISE:** In scrapie, the thymus is lower risk than other LRS tissues.  
**CONCLUSION:** In BSE, the thymus will be lower risk than other LRS tissues.

The protection of the food chain was not the only concern to scientists whose task was to assess the risk of BSE to humans. Bovine tissues were used in an extensive range of human medicinal and surgical products, including vaccines and catgut sutures. An assessment of the risk that some of these products posed to human health was made by one of the [Section 4](#) committees, the Committee on the Safety of Medicines (CSM).<sup>15</sup> The CSM was chaired by Professor Sir William Asscher, who presented the following justification to Lord Phillips and his team of the committee's decision not to take licensing action against oral medicinal products in which bovine material had been used. An argument from analogy based on scrapie was again integral to the reasoning of this committee:

The CSM was ... aware of the issues involving CJD and human growth hormone at this time and of the occurrence of CJD following dura mater implants. They had come to our attention in the course of considering product licenses for dura mater. These experiences made us particularly wary of parenteral, as compared to oral, medicinal products. At the time, the fact that scrapie had not transmitted to man also gave us reassurance that BSE was unlikely to be acquired by the oral route (BSE Inquiry Report, Volume 7: 73).

**MAJOR PREMISE:** BSE is similar to scrapie in sheep.  
**MINOR PREMISE:** Scrapie has not transmitted to humans via the oral route.  
**CONCLUSION:** BSE will not transmit to humans via the oral route.

As well as warranting decisions relating to the human SBO ban and human medicines, analogical argument was the basis of early research into BSE. In December 1988, Mr Bradley of the Central Veterinary Laboratory produced an updated paper on the CVL's research and development programme, in which he outlined the aims of the CVL programme, the work that was already taking place and proposed work. Five experiments were already in progress, addressing questions in the areas of epidemiology, clinico-pathological studies, transmission, molecular biology and molecular genetics. In all five areas, research was predicated upon similar investigations that had been conducted into scrapie. Epidemiological studies, for example, sought to establish the natural transmission routes of BSE, both from dam to offspring (vertical or maternal transmission) and from animal to animal (horizontal or lateral transmission). Both routes of transmission were known to occur in scrapie, which became a primary motivation for similar transmission studies in cattle:



The possibility that maternal transmission played a role in transmission was considered early in the epidemic. There was evidence of maternal transmission of scrapie in sheep but not in other TSEs such as kuru, non-familial CJD and transmissible mink encephalopathy (TME). It was therefore essential to determine if it occurred in cattle, as procedures put in hand for arresting the epidemic depended on maternal transmission not being an important factor. Lateral transmission was also considered since this, too, had been identified as a transmission route for scrapie (BSE Inquiry Report, Volume 2: 95).

- MAJOR PREMISE:** BSE is similar to scrapie in sheep.  
**MINOR PREMISE:** There is maternal and lateral transmission of scrapie in sheep.  
**CONCLUSION:** There will be maternal and lateral transmission of BSE in cattle.

Mr Bradley also discussed in his paper the BSE transmission studies to other species that were in progress by December 1988. Hamsters (and calves) had been inoculated at the Central Veterinary Laboratory; marmosets had been inoculated at the Medical Research Council/Clinical Research Centre laboratory; mice, sheep and goats had been inoculated at the Neuropathogenesis Unit and plans to inoculate mink at the CVL were at a fairly advanced stage. By 1988, these species were known to be susceptible to scrapie, as had been shown in a series of experiments that commenced in 1965 and terminated in the demonstration of transmission of scrapie to marmosets in February 1988 (see [Section 1.2.4](#)). That these same species were first to be investigated by scientists in relation to BSE was evidence, once again, of the force of the analogy with scrapie. That analogy can be captured as follows:

- MAJOR PREMISE:** BSE is similar to scrapie in sheep.  
**MINOR PREMISE:** Scrapie has been transmitted to marmosets, mink, goats, mice, sheep and hamsters.  
**CONCLUSION:** BSE will be transmitted to marmosets, mink, goats, mice, sheep and hamsters.

The analogical arguments examined above are by no means exhaustive of the use of this argument form in the early phase of the BSE inquiry. But they do demonstrate the significant contribution of analogical reasoning to the deliberations of scientists on a number of issues relating to BSE. These arguments provided essential presumptive warrant for many of the decisions that were taken to protect public health. These decisions required scientists to engage with issues at the cutting edge of science,<sup>16</sup> to address questions before experiments could produce the evidence that would provide answers. Indeed, scientists could not even await the results of these experiments, many of which would take years to complete on account of the long incubation periods of TSEs. At the same time, public health decision-making had to proceed apace to address the risk that this new bovine disease may pose to human health through the food chain and medicinal and surgical products. A policy of inaction was not an option for investigators and, indeed, represented a potentially dangerous stance in the face of uncertainty about this disease. Analogical argument, even weakly warranted analogical argument (as these arguments were), represented scientists' best and only prospect of addressing the difficult public health decisions

that confronted them. This was reasoning based on *faute de mieux* considerations,<sup>17</sup> in which scientists acknowledged that if they rejected analogical argument, there would be nothing to replace it. Yet, in saying there was nothing better than analogical argument, we are not saying that this argument was not somehow good enough. For through analogical reasoning, scientists were able to initiate a number of measures that were to prove vital in containing the transmission of BSE to humans. This reasoning strategy was thus an important cognitive instrumentality that warranted decisions in the practical sphere when pervasive uncertainty otherwise threatened an effective, early scientific response to BSE.<sup>18</sup>

If the protection of human health was a pressing early concern of scientists, it was matched only by the need to establish a programme of research into BSE. Even if implemented with the greatest of urgency, experimental studies of BSE could take many months and possibly years to complete. So a framework for research was an early priority for scientific investigators. The generation of research questions about any newly emerging infectious disease is by its nature a protracted and difficult affair. A large range of possibilities could be considered within an explanation of the origin, transmission properties and pathological features of such a disease. Some means needs to be found of reducing this large number of possibilities to those that can be practically investigated by scientists using the resources available to them in inquiry. A rational strategy for limiting the possibilities that scientists need to investigate is to establish an analogy between the new disease and a pre-existing (and better known) disease. Such a strategy was achieved by BSE scientists when they forged an analogy between BSE and scrapie. The experience of scrapie told scientists that certain lines of inquiry could be productively pursued. In this way, the diagnostic significance of scrapie-associated fibrils and prion proteins was already established by the time Mr Bradley was devising his BSE research and development paper. Through Patricia Merz's early electron microscopy work, it had been established that scrapie-associated fibrils (SAFs) were to be found in all combinations of strain of scrapie agent and strain or species of host examined (Merz et al. 1981). Prusiner et al. (1983) subsequently identified that the aggregation of prion proteins was responsible for the abnormal structures that Merz had been attempting to characterise. Later work by Kasczak et al. (1986) revealed distinct Western blot profiles for SAFs isolated from animals that had been infected with different strains of the scrapie agent. Here was a well-established research framework which made it eminently reasonable for investigators to pursue the type of studies that Mr Bradley summarised within the molecular biology component of his research and development paper:

Work in progress, which was aimed at determining whether the BSE agent was identical to the natural scrapie agent or a modified scrapie agent, and whether there were multiple BSE strains, included assembling a lesion/SAF/PrP profile for brains, which might correlate with the agent strain (BSE Inquiry Report, Volume 2: 187).

Earlier scrapie studies provided scientists with a ready-made template for research into BSE. This had the effect of priming certain research areas for BSE scientists. The identification of SAFs in bovine brain tissue was one such area. The

experience of scrapie had taught scientists that distinct SAF profiles occurred in specific strains of the scrapie agent. If one or more of these profiles could be established in bovine brain tissue, then this was an indication that the agent causing BSE was related to the scrapie agent. The question of the origin of BSE subsumed a large range of investigative possibilities for scientists,<sup>19</sup> one of which (the identification of SAFs) assumed epistemic prominence<sup>20</sup> on the basis of an analogy with scrapie. The discovery of SAFs in bovine brain tissue would be a discovery of considerable significance for investigators. These abnormal structures were not only known to be unique to TSEs (thus confirming the classification of this new bovine disease as a TSE), but they also had the potential to address the question of the origin of the causative agent of BSE (if a SAF profile, that was recognisable from work on scrapie, was observed to occur in bovine brain tissue, here was evidence in support of a scrapie origin for BSE). The identification of SAFs was therefore a productive line of investigation for scientists who could use the presence of these structures to address significant questions relating to the nosology and origin of BSE. Analogical reasoning based on the findings of prior scrapie studies thus had the effect of directing cognitive and practical resources during inquiry to those questions that held most significance for BSE scientists. This reasoning provided scientists with an effective means of determining areas of research priority for BSE and, in so doing, reducing the number of investigative possibilities that needed to be actively pursued during inquiry.

### 4.2.2 *Argument from Ignorance*

The argument from ignorance was used extensively during the BSE crisis. The ‘no evidence’ claims upon which this argument is based became the mantra of the BSE story, as everyone from scientists, government ministers, industry representatives and health officials sought to reassure an alarmed public about the human health risks of BSE. The most common manifestation of the argument had a ‘no evidence’ claim<sup>21</sup> as its premise. This premise is evident in the question-answer exchange below:

On 15 October [1987] Mr. Suich circulated information in Question and Answer form to enable press officers and others to answer queries about BSE. This included:

Q. Can it be transmitted to humans?

A. There is no evidence that it is transmissible to humans.

(BSE Inquiry Report, Volume 3: 123).

The conclusion of the argument, that BSE is *not* transmissible to humans, was more often implied than directly stated. However, this was an implication that the proponents of this ‘no evidence’ claim understood would be drawn by the public. Moreover, they were content to let this implication stand, despite repeated opportunities to correct it<sup>22</sup>:

PREMISE:            There is no evidence that BSE is transmissible to humans.

CONCLUSION:      BSE is not transmissible to humans.

According to the standard account of this argument, its fallaciousness consists in the attempt to prove that a proposition is true (false) on the grounds that it has not been proved (there is no evidence) that it is false (true). Lack of proof, evidence or knowledge of the truth (falsity) of a proposition, it is argued, is a weak basis indeed for concluding that a proposition is false (true). A proposition may well be true but we may be unable to establish that this is so and any inference to this proposition's falsity simply prejudices the matter: 'If some proposition has not yet been proved true, we are not entitled to conclude that it is false. Many true propositions have not yet been proved true, of course, just as many false propositions have not yet been proved false. The fact that we cannot now be confident rarely serves as a good reason to assert knowledge of falsity, or of truth. Such an inference is defective; the fallacy is called the *argument from ignorance*, or the argument *ad ignorantiam*' (Copi and Cohen 2009: 142; italics in original). It would seem that the charge of fallacy is even more strongly levelled in a scientific context, where various factors militate against investigators obtaining the evidence they require to establish the truth of a proposition. As Copi and Cohen (2009: 142) remark:

The fallacious appeal to ignorance crops up in science when plausible claims are held to be false because evidence of their truth cannot be provided. There may be good reason for its absence: In archaeology or in paleontology, for instance, that evidence may have been destroyed over time. In astronomy or in physics, the evidence desired may be so distant in space or in time that it is physically unobtainable. The fact that some desired evidence has not been gathered does not justify the conclusion that an otherwise plausible claim is false.

Copi and Cohen's caution about drawing conclusions in science on the basis of a lack of evidence is particularly pertinent in the case of the above argument from ignorance. In that argument, a lack of evidence of BSE's transmissibility to humans is taken as grounds for the claim that BSE is not transmissible to humans. But when Mr. Suich of MAFF's Animal Health Division prepared this question and answer brief in October 1987, scientists had only known about the existence of BSE for some 11 months. Given the lack of knowledge that surrounded BSE at this time and what was known about the lengthy incubation periods of TSEs in general (see [Chapter 1](#)), no evidence of BSE's transmissibility to humans could possibly have been obtained by investigators by this date. A claim of 'no evidence' thus carried little, if any, evidential weight under these circumstances. To this extent, it would appear incontestable that Mr Suich had made use of a fallacious argument from ignorance. However, as I will argue below, not every occurrence of this argument form was fallacious in the context of early scientific inquiry into BSE. To demonstrate this claim, I will examine how scientists used this argument to achieve certain epistemic gains during the early phase of this inquiry. One use of this argument permitted scientists to derive a conclusion about the non-transmissibility of scrapie to humans. This conclusion was then used as a minor premise in an analogical argument to derive the conclusion that BSE would not transmit to humans. Although the capacity to generate propositions for use in subsequent reasoning was an important gain for scientists, it was by no means the only beneficial employment of this argument in the early phase of BSE inquiry. We will also see that the argument from

ignorance played a significant role in prioritising research questions during inquiry by removing those questions that could not be addressed in the short or longer term.

Between 1986 and 1989, scientists made various pronouncements about the lack of risk that BSE posed to human health based on the absence of an epidemiological link between scrapie and CJD. In this way, Richard Kimberlin, an independent TSE consultant, submitted a paper in June 1989 to the *Canadian Journal of Veterinary Research* in which he stated ‘the absence of an epidemiological link between scrapie and CJD suggests that even if scrapie could infect humans, usually it does not. For this reason alone, BSE is unlikely to be a major threat to humans’ (Kimberlin 1990: 35). In a letter dated 13 March 1989 to Dr Helen Grant, a neuropathologist at the Middlesex and Charing Cross hospitals, Sir Richard Southwood, the Chairman of the Southwood Working Party, remarked: ‘The evidence to date seems to indicate that the BSE agent is very similar to scrapie and of course we have lived with scrapie for 200 years, and most of us have at some time or other eaten sheep offal – though the incidence of CJD remains low’ (BSE Inquiry Report, Volume 4: 56). A reconstruction of the reasoning of these extracts results in the following argument sequence, in which the conclusion of an argument from ignorance (scrapie is not transmissible to humans) forms the minor premise in a subsequent analogical argument:

***Argument from ignorance:***

PREMISE:           There is no evidence in 200 years that scrapie has transmitted to humans.  
 CONCLUSION:      Scrapie is not transmissible to humans.

***Analogical argument:***

MAJOR PREMISE:   BSE is similar to scrapie in sheep.  
 MINOR PREMISE:   Scrapie is not transmissible to humans.  
 CONCLUSION:        BSE will not be transmissible to humans.

The warrant that attends the conclusion of the above analogical argument rests on the strength of this argument’s minor premise. However, in order to establish the strength of this premise, we must first conduct a rational appraisal of the argument from ignorance that generated this particular proposition. To the extent that any argument from ignorance is based on a lack of evidence or knowledge, such an argument is always going to fall short of a deductive proof.<sup>23</sup> But even as we admit the tentative, presumptive nature of the conclusion of an ignorance argument, it is clear that this conclusion can be more or less strongly warranted. The key factors in a determination of this warrant are (i) the completeness of the knowledge base upon which the ‘no evidence’ claim of the argument is based and (ii) an exhaustive search of that base. The first of these factors amounts to a requirement for epistemic closure (see note 43, Chapter 3). In the argument from ignorance at the start of this section, such closure could not be assumed – in October 1987, scientists had little or no knowledge of this new bovine disease and studies to establish this knowledge had yet to be initiated. The conclusion of this ignorance argument, that BSE

was not transmissible to humans, was thus largely unwarranted. However, a quite different level of warrant is present in the above argument from ignorance. Here, scientists operated on the assumption that the epidemiological knowledge base that could address the question of a link between scrapie and CJD in humans was indeed closed. To the extent that this knowledge base lacked evidence of an epidemiological link between scrapie and CJD, scientists could quite legitimately conclude that scrapie was not transmissible to humans. We consider this argument further below.

Scientists who argued from a lack of evidence that scrapie transmits to humans to the conclusion that scrapie does not transmit to humans did so non-fallaciously, I am claiming. Some consideration of the different components of this argument reveals why this is the case. A claim of ‘no evidence’ only carries evidential weight if the knowledge base to which that claim belongs can be fully circumscribed and if an exhaustive search of that base can be undertaken. In the case of the present argument from ignorance, these two requirements amount to a complete collation of all the evidence relating to the epidemiology of scrapie and CJD (a complete knowledge base) and a thoroughgoing review of this evidence by scientists who are qualified to assess its significance (an exhaustive search). Clearly, these requirements were satisfied by scientists who addressed the question of the transmissibility of scrapie to humans. Brown et al.’s (1987) review of world literature considered all studies that had examined if there was an epidemiological link between scrapie and CJD in humans.<sup>24</sup> To the extent that these studies failed to reveal such a link, scientists were justified in claiming that scrapie is not transmissible to humans. This claim then acted as a premise in further reasoning (in this case, a minor premise in an analogical argument) from which a range of additional propositions were derived. It was therefore directly facilitative of other processes of reasoning during the BSE inquiry. One such process involved decision-making relating to measures to protect human health. The recommendations of the Southwood Working Party, for example, were based in large part on the thesis that scrapie was not transmissible to humans.<sup>25</sup> The deliberations of Southwood scientists, amongst others, were thus possible because of presumptive claims that issued from ignorance arguments.

Through its generation of presumptive theses, the argument from ignorance made a significant contribution to the early phase of the inquiry into BSE. This argument transformed a lack of knowledge into a positive epistemic resource from which presumptive claims emerged. It was thus less a fallacy of reasoning than a rational strategy for managing uncertainty at the outset of inquiry. But something more needs to be said about the logical and epistemic features of this argument that underpin its capacity to generate presumptive theses. Specifically, these features involve the combined operation of a complete knowledge base and an exhaustive search process. A complete knowledge base contains all the evidence in a particular domain or relating to a specific topic or question. While this sounds like an unattainable requirement for evidence, we have already seen how this requirement can be met in mundane as well as in expert contexts (see notes 44 and 45, [Chapter 3](#)). The claim that a knowledge base is complete or closed is the basis of the major premise in the following modus tollens inference:

MAJOR PREMISE: If  $p$  were true (where  $p$  is a proposition), then  $p$  would be in the knowledge base.

MINOR PREMISE: But  $p$  is not in the knowledge base.

CONCLUSION: So  $p$  is not true.

The minor premise of this inference is established by means of an exhaustive search of the knowledge base in question. Applied to the current case, this inference allows scientists to reason as follows: if it were true that scrapie is transmissible to humans, then the proposition ‘scrapie is transmissible to humans’ would be in the epidemiological knowledge base; but this proposition is not in the epidemiological knowledge base, so it is not true that scrapie is transmissible to humans. The logical features of the argument from ignorance are none other than the logical features of modus tollens inference. But the argument from ignorance contributes a unique epistemic twist to this deductively valid inference pattern. For the content of the premises of this argument relates to a knowledge base and not to an external state of affairs. The reasoner who argues from ignorance is thus turning his epistemic resources into a productive source of presumptions for use in inquiry.

It emerges that BSE scientists made non-fallacious use of the argument from ignorance when they addressed the question of scrapie’s transmissibility to humans. However, this was not the only non-fallacious use of this argument during the early phase of inquiry into BSE. To examine a second, and quite distinct, use of this argument, we must return to the argument from ignorance presented at the start of this section and repeated below:

PREMISE: There is no evidence that BSE is transmissible to humans.

CONCLUSION: BSE is not transmissible to humans.

This argument was repeatedly used by government officials and ministers, particularly during media briefings, to reassure the public that BSE presented little or no risk to human health. Like analogical argument (see Section 4.2.1), argument from ignorance was an integral part of the argumentative strategy that saw key protagonists during the BSE crisis consistently arguing that BSE was unlikely to transmit to humans. While the contribution to that strategy from analogical argument had certain rational merits, it is less clear that the same can be said of the role of the argument from ignorance in that strategy. The latter argument was intended to create an understanding on the part of the public that BSE was not transmissible to humans on the grounds that there was no evidence that BSE was transmissible to humans. But we have already seen that this ‘no evidence’ premise carried little, if any, evidential weight given that an inadequate period of time had elapsed in which to gather evidence about this new bovine disease. The BSE knowledge base was anything but complete and any attempt to base a conclusion on this incomplete base was inevitably problematic. As an argument that was designed to inform the public about the human health implications of BSE, the argument from ignorance was an inherently weak, fallacious form of reasoning. But this same argument assumed quite different rational properties when it was used by scientists during the early stage of the BSE inquiry.<sup>26</sup> In that context, the argument from ignorance served the important epistemic function of prioritising questions during inquiry. One question

in particular, the question of the transmission of BSE to humans, was effectively removed from inquiry through the use of ignorance argument. We consider how and why this occurred further below.

The question of BSE's transmissibility to humans presented scientists with certain insurmountable barriers to direct investigation. Ethical constraints on the use of human subjects in scientific experiments obviously precluded the use of inoculation and oral transmission studies that had previously established susceptibility to specific TSEs in other species. In the absence of a direct attempt to address the question of BSE transmission to humans, scientists could investigate the occurrence of natural transmission of BSE to humans. This was, in effect, the purpose of the CJD Surveillance Unit which was established in May 1990.<sup>27</sup> But even natural transmission would only likely manifest itself after a number of years, given what was known about the lengthy incubation periods of TSEs. For ethical and other reasons, the single most important question of the BSE crisis was effectively beyond the investigative reach of BSE scientists in the short and possibly longer term. Under these circumstances, scientists had to find some means of removing this question from inquiry in order to give priority to other questions that could be addressed. A question can only be removed from further consideration in inquiry if it has been definitively addressed, that is, the proposition at issue in the question (in this case, that BSE is transmissible to humans) has either been confirmed or disconfirmed. If the proposition remains unconfirmed,<sup>28</sup> it must continue to be actively tested and investigated by scientists until such times as its confirmation or disconfirmation can be achieved. The argument from ignorance made it possible for scientists to characterize the proposition 'BSE is transmissible to humans' as disconfirmed (i.e. BSE is not transmissible to humans), thereby excluding this proposition from further deliberation during inquiry. With the question of transmission effectively isolated from inquiry, scientists could then direct their cognitive and practical resources to matters that could be addressed through experimental investigation. This use of the argument from ignorance is examined further in Cummings (2002b).

In this section, we have seen a number of ways in which the argument from ignorance was put to work by scientists and others during the early stage of the BSE inquiry. At least one of these ways involved the fallacious use of this argument – in various media briefings about the risk that BSE posed to human health, government officials and ministers fallaciously argued that BSE was not transmissible to humans on the grounds that there was no evidence that it was transmissible to humans. We will examine fallacious uses of *ad ignorantiam* further in [Chapter 5](#). But by far the most interesting uses of this argument for our present purposes are those that found scientists employing the argument from ignorance to secure various epistemic and other gains in a context that was characterized by pervasive uncertainty. This argument was used to generate presumptive claims which could then participate in other processes of reasoning (e.g. decision-making). This use of the argument from ignorance saw specific, appropriately constrained knowledge bases active in the generation of presumptions during inquiry. As well as generating propositions for use in inquiry, the argument from ignorance also served



to remove certain propositions from consideration during inquiry. Not every question that BSE scientists wished to address was directly amenable to experimental investigation. By virtue of ethical prohibition and practical limitations, some questions had to be set aside by scientists in preference for other questions for which there was a realistic prospect of obtaining answers. The argument from ignorance became the mechanism by means of which these questions were excluded from ongoing, active consideration during inquiry. Where the former use of *ad ignorantiam* concerned the generation of propositions in BSE inquiry, the latter use achieved the regulation of propositions in this inquiry. The argument from ignorance was thus an important instrumentality of cognitive rationality in the initial phase of inquiry into this new bovine disease.

### 4.2.3 *Question-Begging Argument*

Also known as *petitio principii* or circular argument, question-begging argument has had a long history in philosophical discussions of the fallacies. Typically, this argument is taken to consist in the attempt to use as a premise in an argument the very conclusion that the argument is intended to prove or a premise that otherwise depends on the conclusion for its proof. It thus represents, it is claimed, a subversion of normal probative ground rules in which we argue from premises that are better known than, or more established than, the conclusion to be proved (premises cannot possibly fulfil this condition<sup>29</sup> if they depend on the conclusion, or if they are the conclusion in a somewhat different guise). Almost without exception,<sup>30</sup> theorists have sought to characterize this argument as an inherently weak, fallacious form of reasoning. Thus, in the contemporary literature<sup>31</sup> on question-begging argument, we find Sanford (1972: 198) characterizing this argument as a failure ‘to increase the degree of reasonable confidence which one has in the truth of the conclusion’. According to Biro (1984: 239), the problem with question-begging argument is that it is ‘epistemically non-serious’, where epistemic seriousness describes an argument in which the premises are more knowable than the conclusion. For Rescher (1977: 11), circular sequences in disputation must be blocked since they ‘frustrate the aim of the [dialectical] enterprise’ which is ‘to deepen the grounding of the contentions at issue’.<sup>32</sup> Regardless of the particular conception of question-begging argument at work in these various views of the fallacy, the same message emerges from each – *petitio principii* is an essentially unproductive form of argument that attempts to bypass the task of grounding the conclusion or question-at-issue. However, as I will argue below, this is not the full story about question-begging argument.

As question-begging argument began to be submitted to a more systematic treatment in a post-Hamblin era of fallacy analysis, it soon became apparent to analysts that arguments with a distinctly circular form were not all inherently fallacious. Indeed, many such arguments were merely reflecting certain natural cyclical processes at work in fields such as economics, mathematics,<sup>33</sup> geology, paleontology and even epistemology (Walton 1985; Cummings 2000). The decisive factor in an evaluation of question-begging argument was now less the structure of these

arguments than the purpose(s) for which they had been advanced. If that purpose included a requirement to argue from better known, or more established, propositions to less well known, or less established, propositions, then the circular structure of question-begging argument is clearly problematic. If there is no such requirement for evidential or epistemic priority in a particular context of argument, an accusation of fallacy against the proponent of a circular argument is altogether less tenable.<sup>34</sup> At the outset of scientific inquiry, particularly inquiry into a newly emerging infectious disease, there are few well known, established theses at the disposal of investigators. To insist that scientists fulfil a priority requirement at this stage of scientific inquiry is to misrepresent the epistemic standing of the propositions that are available to scientists in this context. A more sensible epistemic policy is to suspend this priority requirement until such times as a knowledge base of well established propositions is available to investigators. In the interim period, it is quite legitimate for scientists to use a proposition as a premise in argument that is no better established than the conclusion to be proved. We will examine the basis of this claim by considering how question-begging argument was used by scientists in the early stage of inquiry into BSE.

On the recommendation of the Southwood Working Party, it was announced in February 1989 that a committee had been established to advise on research in relation to BSE.<sup>35</sup> Known as the Tyrrell Committee, it was chaired by Dr David Tyrrell (a virologist who was the Director of the Medical Research Council Common Cold Unit) and had a membership consisting of Dr Watson (Director of the CVL), Professor John Bourne (Director of the Institute for Animal Health), Dr Robert Will (a clinical neurologist and expert in CJD) and Dr Richard Kimberlin (an independent TSE consultant). One of the areas recommended for research by Sir Richard Southwood and his team was an oral transmission experiment in which scrapie-infected meal would be fed to cattle. This study, it was argued, would serve to test the hypothesis that scrapie was the origin of BSE. Its importance was such that it was one of the recommendations made by Southwood scientists following their first meeting on 20 June 1988:

We believe that tests should be undertaken on cattle and appropriate laboratory animals with meal known to be infective with scrapie to test the current hypothesis that this is the origin of the disease (BSE Inquiry Report, Volume 4: 9).

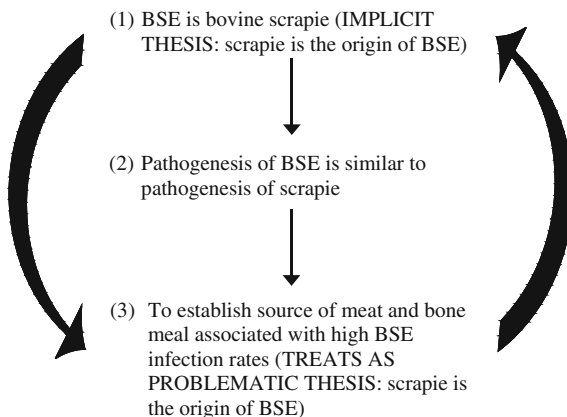
It is clear from an Interim Report produced by the Tyrrell Committee and presented to the government on 10 June 1989 that David Tyrrell and his committee members treated the question of the origin of BSE as something that was yet to be definitively established. The scrapie hypothesis of the origin of BSE was thus something to be investigated and established rather than simply assumed from the outset. This is evident from the following comments in the Interim Report:

We need to be sure that the disease really came from sheep and to know whether it is likely to establish itself long-term in bovines (BSE Inquiry Report, Volume 1: 56).

However, even though the scrapie origin of BSE was one of the Southwood priorities for research, the scrapie transmission experiment to cattle was not recommended by the Tyrrell Committee.<sup>36</sup> Indeed, this action as well as views expressed by members of the Tyrrell Committee suggested that these scientists had already accepted that scrapie was the origin of BSE, even though this was a thesis that they were charged with attempting to establish. For example, Professor John Bourne reported to Lord Phillips and his team that the task of the Tyrrell Committee was ‘to go forward specifically on two major research fronts, one to increase the epidemiological work, and the other, to put in a much stronger science base relating to an understanding of the pathogenesis of the disease based upon the mouse and sheep model’.<sup>37</sup> For Professor Bourne at least, scientific research into BSE was to proceed *on the basis that* scrapie was the origin of this new bovine disease. The thesis to be proved – that scrapie is the origin of BSE – was something assumed at the outset of the committee’s deliberations rather than something that was established by means of those deliberations. But to establish that the Tyrrell Committee was arguing in a circle, it is necessary to go beyond merely relating what should have been a research priority for Tyrrell and his colleagues – the confirmation or disconfirmation of the scrapie origin of BSE – with an assumption on the part of these scientists at the outset of their work. For these components must be shown to be propositions in an (extended) argument in which the thesis that scrapie is the origin of BSE functions as both a premise and a conclusion. Just such a demonstration can be given, I believe.

The two major research fronts that Professor Bourne expected the Tyrrell Committee to develop were premised upon an understanding that the pathogenesis of BSE would be similar to that of scrapie. The thesis that ‘the pathogenesis of BSE is similar to the pathogenesis of scrapie’ is only rationally warranted on the assumption that BSE is bovine scrapie (i.e. scrapie is the origin of BSE). The dependency relation between this scrapie origin claim and the pathogenesis claim is shown in Diagram 4.1 as a logical relation between propositions (1) and (2), in which (1) provides a rational basis for the thesis in (2). The similarities in pathogenesis of BSE and scrapie were to be used, according to Professor Bourne, ‘to increase the epidemiological work’ and ‘to put in a much stronger science base’ on BSE. Yet, an examination of the research priorities recommended by the Tyrrell Committee to achieve these aims reveals that the thesis that ‘scrapie is the origin of BSE’ is held as something which is contested and subject to proof. One of the epidemiological research priorities proposed by Tyrrell and his colleagues included a ‘more detailed examination of the source of meat and bone meal associated with high BSE infection rates’ (BSE Inquiry Report, Volume 11: 23). This particular priority was nothing other than the attempt to establish if scrapie had been orally transmitted to cattle via feedstuffs. In other words, this epidemiological research priority was an attempt to address the question if scrapie was the origin of BSE. To the extent that this research priority is treating as problematic the very scrapie origin thesis that is assumed at (1), Tyrrell scientists may be seen to be arguing in a circle. The circular dependency relations in this argument can be clearly demonstrated in the following diagram:

**Diagram 4.1** Circle in the reasoning of the Tyrrell Consultative Committee on research



CIRCLE: The epidemiological research question at (3) treats as problematic the thesis which is implicit in (1)

So we have seen that in assuming the very thesis that the Tyrrell scientists were to treat as problematic and hence subject to investigation, these scientists have effectively argued in a circle. But such circular argument need not be fallacious and, in this particular case, almost certainly is not. The Tyrrell Committee was tasked with investigating the scrapie model of BSE. This model, which had hitherto been the dominant analogy in scientific reasoning, was itself to be treated as the subject of investigation.<sup>38</sup> However, at this early stage of inquiry into BSE, there was no independent knowledge base on BSE that scientists could use to test the validity of the scrapie analogy (indeed, if there had been such a knowledge base, there would have been no need for the scrapie analogy in the first place). For example, there were no results available from pathogenesis studies on BSE to show which bovine tissues carried infectivity, the titres of infectivity in these tissues, etc. Scientists had little option but to proceed to test the validity of the scrapie model *from within* the model itself. This required that investigators first assume that scrapie was the origin of BSE. This assumption allowed scientists to generate theses about the behaviour of BSE, theses which could then be tested using experimental studies of the type recommended by the Tyrrell Committee. To the extent that the scrapie analogy was the only rational basis available to scientists for generating research priorities for BSE at this early stage of inquiry, circularity was an inevitable feature of the reasoning of Tyrrell scientists. Circular argument in this case was not a feature of flawed or defective reasoning on the part of scientists. Rather, it was a consequence of the need to develop research priorities for BSE when the only available rational basis for doing so was the scrapie analogy that was itself to be investigated as part of these priorities.

The reasoning of Tyrrell scientists took the form of a circle in which scientists assumed that scrapie was the origin of BSE even as they were attempting to prove this proposition by means of the establishment of research priorities. However,

the circular reasoning of these scientists was anything but fallacious, it is argued, because these scientists were compelled to develop research priorities for BSE upon a rational basis and the only rational basis available to scientists at this initial stage of inquiry was the scrapie model of BSE (a knowledge base that was independent of this model was not available to investigators at this time). The circularity at issue in this case was thus an inevitable consequence of the requirement to validate the scrapie model of BSE when this model was the only framework available to scientists for posing research questions about BSE. The inevitability of this pattern of circular reasoning, however, does not in itself make this reasoning rationally acceptable. Certain merits must attend this type of reasoning for scientific inquiry in order for circular reasoning to have any rational standing in this inquiry. By engaging in circular reasoning, Tyrrell scientists were effectively pulling themselves up in inquiry by their own bootstraps.<sup>39</sup> Lacking evidence that was independent of the conclusion-to-be-proved at the outset of inquiry, scientists subscribed to the view that scrapie was the origin of BSE. This view allowed scientists to generate multiple presumptive theses about the behaviour of BSE. The epistemic fate of these theses in inquiry was to determine the wisdom of the decision to adopt scrapie as a model of BSE. But even in those cases where theses were shown ultimately to be problematic, their generation nonetheless permitted scientists to forge ahead in inquiry until such times as independent lines of evidence became available to investigators. Circular reasoning thus facilitated inquiry into BSE by licensing progression in inquiry until such times as scientists were able to develop an independent knowledge base on BSE.

### 4.3 Summary

In this chapter, we have described a number of ways in which scientists used traditionally fallacious modes of reasoning to achieve certain epistemic gains in the early stage of scientific inquiry into BSE. What these forms of reasoning had in common was their capacity to circumvent the uncertainty and lack of knowledge that characterized early inquiry into this new bovine disease. Their means of achieving this circumvention, however, differed with each form of argument used. Some reasoning strategies served to generate plausible theses for consideration during inquiry. They were thus a productive source of theses at a time in inquiry when little was known about BSE. Other strategies had a regulative function in that they achieved a prioritisation of the questions that could be addressed through inquiry. Cognitive and practical resources could then be appropriately assigned to those questions which had the best prospect of being addressed by scientists. Still other strategies facilitated inquiry by enabling it to progress in the absence of evidence that is independent of the conclusion-to-be-proved. Such a strategy allowed scientists to embark on inquiry in the expectation that as independent lines of evidence emerged, they would supersede the conclusion-dependent evidence that had carried investigators to a particular point in their deliberations. Each of these reasoning strategies

represented a considerable divergence from traditionally dominant, deductive forms of argument and embodied instead a type of reasoning based on presumption. In this concluding section, we summarize the features of each of these reasoning strategies as they were employed by BSE scientists at the outset of inquiry. The stage will then be set to develop this model of scientific reasoning further in order to accommodate the unique epistemic circumstances of, and reasoning strategies employed in, later stages of inquiry into BSE.

*Argument from Analogy:* Analogical argument was used extensively by scientists in the early weeks and months of the inquiry into BSE. Its influence was particularly keenly felt in the developing argumentative strategy that was to span the entire duration of the inquiry. This strategy represented the ‘public face’ of the scientific and other deliberations that were taking place about BSE. It was therefore less a vehicle for the transmission of objective scientific information about BSE than it was a tool for the political presentation of this information through various media outlets. When analogical argument was being used to construct this strategy in the initial months following the emergence of BSE, this argument reflected the type of reasoning that was increasingly evident in scientific deliberations about BSE. To this extent, the argumentative strategy at this initial stage of inquiry into BSE was rationally warranted (we will see in [Chapter 5](#) that this was not always the case). The scientific arguments that motivated this strategy were based in large part on a somewhat tentative analogy with scrapie in sheep. As well as licensing decisions relating to the protection of human health, analogical reasoning based on scrapie generated several productive lines of inquiry for investigators. This reasoning strategy thus bridged the lack of knowledge and uncertainty in early inquiry into BSE by (1) warranting decisions in the practical sphere when there was an inadequate evidential base for these decisions and (2) generating research questions for investigation that represented the best prospect for scientists of addressing gaps in scientific knowledge. Analogical reasoning emerged as a productive epistemic resource for scientists who were confronted with the uncertainty that pervaded early inquiry into BSE.

*Argument from Ignorance:* Like analogical argument, the argument from ignorance operated at two related levels during the BSE crisis. This argument was also instrumental in establishing the argumentative strategy that was to find scientists, politicians and others consistently arguing throughout the course of the BSE affair that this bovine disease presented little or no risk to humans. And like analogical argument, the contribution of ignorance argument to this argumentative strategy was rationally motivated at least at the outset of inquiry. This is because ignorance argument was shown to perform a couple of important epistemic functions in the absence of knowledge of BSE. Firstly, this argument served to generate plausible theses for use in inquiry at a time when little was known about BSE and most experimental studies into this disease had yet to be initiated. Secondly, ignorance argument served to exclude from ongoing consideration during inquiry those questions for which there was little prospect of obtaining answers in the short and longer term. With such questions effectively excluded from inquiry, scientists were able to direct scarce cognitive and practical resources towards those questions that were

amenable to experimental investigation. It thus emerged that as well as generating theses for use in inquiry, ignorance argument achieved the regulation of theses through its prioritisation of the questions to be addressed in inquiry. This reasoning strategy demonstrated how when certain knowledge bases were appropriately constrained during inquiry into BSE, even an absence of knowledge could be used to derive tentative (presumptive) conclusions about this bovine disease. Once again, a traditionally fallacious mode of reasoning had demonstrable epistemic benefits for inquirers who were confronting uncertainty at the outset of scientific inquiry.

*Question-Begging Argument:* It is perhaps a sign of the resourcefulness of presumptive frameworks that even a circular pattern of argument had demonstrable benefits for inquirers in the early stage of inquiry into BSE. Almost universally rejected as an unproductive form of argument, circular reasoning enabled Tyrrell scientists to progress in inquiry using evidence that was dependent on the conclusion-to-be-proved until such times as independent lines of evidence could be established. Even if this conclusion-dependent evidence was shown during the course of inquiry to be lacking in some respect, circular reasoning had nevertheless succeeded in opening inquiry up to investigators in ways that were capable of yielding useful evidence. The objector who demands that inquiry set out only on the basis of conclusion-independent evidence is not only asking investigators to incur an unacceptable delay in the initiation of inquiry (an imprudent course of action when investigators are dealing with an infectious disease), but is also seeking to institute the evidential standards of a later phase of inquiry at the very outset of inquiry. This misapplication of evidential standards is tantamount to the attempt to apply deductive standards to the evaluation of non-deductive forms of argument, a tendency in argument evaluation that finds the circular and other forms of argument examined in this chapter condemned as fallacious.<sup>40</sup> The purpose of this chapter has been to demonstrate that when examined within the contexts in which they are advanced, these various forms of argument are not only non-fallacious, but they can also serve to facilitate inquiry that proceeds under conditions of uncertainty. It remains to be seen how these same forms of argument fare within later stages of inquiry into BSE.

## Notes

1. The expression ‘argumentative strategy’ has been used by many argumentation theorists, although with somewhat different meanings from the meaning employed in the present context. For example, Jovičić (2006: 29) states that ‘[a] person displays an *argumentative strategy* when he with or without awareness avails himself both of the reasoning and the social aspects in an argumentative activity with the aim of persuading an audience to accept the claims advanced’ (italics in original). For Godden and Walton (2004: 219), the expression ‘argumentative strategy’ refers to an altogether more circumscribed unit of argument than that envisaged by Jovičić: ‘In this paper, we argue that denying the antecedent is not always a fallacious argumentative strategy’.
2. This standard list includes the fallacies that Woods et al. (2004) have described as the gang of eighteen. These fallacies include *ad baculum*, *ad hominem*, *ad misericordiam*, *ad populum*, *ad verecundiam*, *ad ignorantiam*, *post hoc, ergo propter hoc*, affirming the consequent, denying

- the antecedent, begging the question, equivocation, amphiboly, hasty generalization, biased statistics, composition and division, faulty analogy, gambler's fallacy and ignoratio elenchi.
3. I am not taking the position of Finocchiaro's 'thoroughgoing rationalist'. Rather, my stance is much closer to that of the realist in that I acknowledge that fallacies exist: 'a thoroughgoing rationalist may be inclined to go to the absurd extreme of claiming that no actual argument is ever fallacious. . .the rationalist might in his quest try to find evidence that [logic textbook] accounts are not arguments, and hence not logically incorrect for categorial reasons. He may find rationality in them by categorizing them differently. I personally don't know what this category would be, but I doubt very much that the rationality involved would be pedagogic or rhetorical rationality. The realist in me prevails here and parts company with the rationalist' (Finocchiaro 1981: 17).
  4. Of course, two very significant civil servants in the BSE affair, the Chief Medical Officer and the Chief Veterinary Officer, were also scientists. Their roles were to present government policy on matters relating to human and animal health, respectively.
  5. Section 4 Committees were established under Section 4 of The Medicines Act 1968. Four of these committees were involved in matters relating to BSE: the Veterinary Products Committee; the Committee on Dental and Surgical Materials; the Committee on the Review of Medicines; the Committee on Safety of Medicines.
  6. The following figures reveal the extent of the escalating animal health problem. In May 1987, BSE had been confirmed in four herds. By 15 December 1987, there were 95 confirmed cases on 80 farms. On 19 February 1988, there were 264 cases from 223 farms. A total of 2,296 cases on 1,742 farms had been confirmed by 13 January 1989 (BSE Inquiry Report, Volume 1: 13–15).
  7. Reilly and Miller (1997: 241) explain the rather slow emergence of reports on BSE as follows: '[M]edia coverage of BSE developed slowly, and did not enter mainstream public debate until 1990. There was already a well-developed interest in food safety because of salmonella and listeria, and the government was in the process of introducing a new Food Safety Act. Food had been in the media throughout 1988 and 1989, but BSE had been hidden behind the other so-called 'food scares', coming to prominence only when political actors engaged with the issue'.
  8. One distinguished epidemiologist described the ruminant feed ban to Lord Phillips and his inquiry team as 'a spectacularly successful control measure. . .one of the notable success stories of global disease control' (BSE Inquiry Report, Volume 1: 39).
  9. This is evident in a submission that Mr Rees (Chief Veterinary Officer, 1980–1988) made to the Minister on 6 May 1988. John Wilesmith is amongst the 'investigating teams' that Mr Rees makes reference to: 'The Chief Veterinary Officer is satisfied from the information produced by the investigating teams that the source of the transmissible agent which has caused BSE is through meat and bone meal derived from sheep material in which the rendering process has failed to inactivate the scrapie agent. Affected sheep material is continuing to be processed and it must be assumed therefore that cattle continue to be exposed to infection' (BSE Inquiry Report, Volume 3: 72).
  10. A zoonosis is any infection or disease that is transmitted to man from lower vertebrates.
  11. We can see this argument at work in the following extract from the BSE Inquiry Report, in which Lord Phillips and his team are reconstructing the reasoning that led the Southwood Working Party to conclude that BSE was unlikely to have implications for human health: 'On 9 February 1989 they [the Southwood Working Party] submitted a report to the Government in the knowledge that it would be published. The report concluded that the risk of transmission of BSE to humans appeared remote and that "it was most unlikely that BSE would have any implications for human health." This assessment of risk was made on the following basis: BSE was probably derived from scrapie and could be expected to behave like scrapie. Scrapie had not transmitted to humans in over 200 years and so BSE was not likely to transmit either' (BSE Inquiry Report, Volume 1: xx).
  12. Walton (2008: 314) states that there are three critical questions that can be asked of any argument from analogy. The second of these questions relates to the analogy premise: 'The



- second criticism would be to argue that the analogy premise fails. This means questioning whether the analogy is faulty because the two situations compared are not similar in the relevant respect’.
13. ‘Extensive retrospective studies together with a review of world literature led to the conclusion, published in 1987, that scrapie had never passed to humans despite opportunities to do so over the 250 years during which the disease had contaminated sheepmeat entering the human food chain’ (BSE Inquiry Report, Volume 2: 67). The paper to which Lord Phillips and his team makes reference is Brown et al. (1987), an article that falls outside of those considered in [Chapter 1](#) of this volume.
  14. Dr Richard Kimberlin was a TSE research scientist at the Neuropathogenesis Unit in Edinburgh between 1981 and 1988. Since 1988, he was an independent TSE consultant. During the BSE crisis, he was a member of the Tyrrell Committee (an expert committee that was set up to recommend research priorities for BSE) and the Spongiform Encephalopathy Advisory Committee.
  15. The Committee on the Safety of Medicine provided advice to government on questions relating to the safety, quality and efficacy of human medicines that fell outside of the remit of the Committee on the Review of Medicines and the Committee on Dental and Surgical Materials. Two sub-committees that reported to the CSM on matters related to BSE were the Biologicals Sub-Committee (BSC) and, after its establishment in 1989, the BSE Working Group.
  16. Dr Jeffreys (Principal Medical Officer, Department of Health) remarked of the period during which the policy implications of the CSM recommendations were assessed as follows: ‘All of [the] issues needed to be debated and required considerable technical expertise. They were not questions which admitted of simple straightforward answers; indeed this was leading edge science’ (BSE Inquiry Report, Volume 7: 75).
  17. To the extent that analogical argument is based on presumption, the same *faute de mieux* considerations may be seen to be at work in this concept. Rescher (2001: 31) remarks that ‘[p]resumptions arise in contexts in which we have questions and need answers. And when sufficient evidence for a *conclusive* answer is lacking, we must, in the circumstances, settle for a more or less *plausible* one. It is a matter of *faute de mieux*, of this or nothing (or at any rate nothing better). Presumption is a thought instrumentality that so functions as to make it possible for us to do the best we can in circumstances in which something must be done’ (italics in original).
  18. In Cummings (2004c), I demonstrate how analogical reasoning fulfilled a similar function in early scientific work on HIV/AIDS. Also, Plant (2008: 49) describes how analogical reasoning shaped early actions in the management of SARS: ‘we considered that the SARS organism was most likely a virus and spread predominantly via the respiratory route. Hence we acted as though that was true, meaning that infection control, patient management, patient isolation and so on were all treated as though the (assumed) virus causing SARS was *similar to other viruses*’ (italics added).
  19. Even apart from scrapie as the origin of BSE, a number of other possibilities were considered within an explanation of the origin of the disease. Some of these possibilities were actively considered by Mr Wilesmith during his early epidemiological investigations of the disease. They included the use of organophosphates, an autoimmune reaction, endocrine poisoning and methyl bromide poisoning.
  20. An objector could argue that talk of research areas being ‘primed’ and some investigative possibilities being ‘prominent’ is unnecessarily psychological in nature and that this is symptomatic of psychologism in this study of scientific reasoning. The charge is justified and it is not one that I would even wish to overturn. In admitting cognitive agency into the account of fallacies that I am pursuing, I am quite prepared to adopt the approach to psychologism that is advocated by Gabbay and Woods (to appear) in their study of empirically sensitive logic: ‘Investigators who make room for context and agency are drawn to a form of what used to be called the Laws of Thought approach and, accordingly, are committed to an element of psychologism in logic. This psychologism is not inadvertent. Since human agents come

with psychologies as standard equipment, once you re-admit them to logic, you admit their psychological make-ups as well, warts and all. . . Psychologism is once again an open question in the research programme of logical theory. Its re-emergence should not be prejudged. Better to wait and see how, once it is up and running, a psychologically real, agent-based logic fares as a theory of reasoning’.

21. Two other variants of this argument involve claims of ‘no reason’ and ‘no (scientific) justification’. See Cummings (2002b) for discussion of these variants.
22. A notable exception was the following statement from Dr. Kenneth Calman (Chief Medical Officer, 1991–1998) in a press release in October 1995 to mark the release of the fourth annual report of the CJD surveillance unit. Dr. Calman stated: ‘I continue to be satisfied that there is currently no scientific evidence of a link between meat eating and development of CJD and that beef and other meats are safe to eat. However, in view of the long incubation period of CJD, it is important that the Unit continues its surveillance of CJD for some years to come’ (BSE Inquiry Report, Volume 1: 149). The first sentence of this statement establishes the basis of an argument from ignorance – there is no scientific evidence of a link between meat eating and the development of CJD, therefore there is not a link between meat eating and the development of CJD. That this is the intended implication of these remarks is indicated by Dr. Calman’s further claim that ‘beef and other meats are safe to eat’. The force of the argument from ignorance is substantially weakened, however, by Dr. Calman’s further remark about the long incubation period of CJD. This additional claim serves to highlight the fact that the absence of evidence of a link between meat eating and CJD should not be taken to indicate that such a link does not exist.
23. Where an exhaustive search of a closed knowledge base has been undertaken, the argument from ignorance is deductively valid. Walton (1992: 385–386) captures the deductive form of this argument as follows: ‘To the extent we know a knowledge-based K is closed, i.e., complete, in the sense of containing all the relevant information, we can infer that if a proposition A is not in it, then A is false. This argumentation scheme for the *argumentum ad ignorantiam* has the following form:
 

All the true propositions in domain D of knowledge are contained in K.  
A is in D.  
A is not in K.  
For all A in D, A is either true or false.  
Therefore, A is false.  
This form of inference is deductively valid.’
24. See note 33 in [Chapter 2](#) for a summary of the epidemiological findings of Brown et al. (1987).
25. In a letter to a medical correspondent in August 1988, Sir Richard Southwood stated: ‘My colleagues and I have made various recommendations based, I have to admit, largely on guesswork and drawing parallels from the existing knowledge of scrapie and CJD’ (BSE Inquiry Report, Volume 4: 45). Within the General Conclusions of the Southwood Report, Sir Richard remarked: ‘scrapie has been widespread in sheep flocks in Britain and in other countries for at least two centuries, while CJD, a human encephalopathy with a worldwide distribution, has remained rare. From the present evidence, it is likely that cattle will prove to be a “dead-end host” for the disease agent and most unlikely that BSE will have any implications for human health’ (BSE Inquiry Report, Volume 4: 36).
26. At all stages of the BSE inquiry, scientists produced the ‘no evidence’ statements that are the basis of the argument from ignorance. On 5 June 1987, the Chief Veterinary Officer, Mr William Rees, wrote in a submission to MAFF’s Parliamentary Secretary, Mr Donald Thompson, that ‘[t]here is no evidence that the bovine disorder is transmissible to humans’ (BSE Inquiry Report, Volume 3: 25). In June 1992, the Spongiform Encephalopathy Advisory Committee (SEAC) published an Interim Report on research, in which it was stated that ‘[t]here remains no evidence to suggest that the human disorders are causally associated with those in animals’ (BSE Inquiry Report, Volume 6: 512). By implication, this statement is

- saying that there is no evidence that the human disorders are causally associated with BSE. The (intended) conclusion is that the human disorders are not causally associated with BSE, i.e. BSE is not transmissible to humans.
27. The CJD Surveillance Unit was established under the direction of Dr Robert Will at the Western General Hospital in Edinburgh. Its main objectives were 'to identify any change in the epidemiological characteristics of CJD and to assess the extent to which any such changes were linked to the occurrence of BSE' (BSE Inquiry Report, Volume 8: 13).
  28. Woods and Walton (1978: 91) use the language of confirmation theory to characterize the argument from ignorance. This characterization makes clear how the argument suppresses the possibility that a proposition can be unconfirmed: 'the fallacy... consists in suppression of the possibility that H [the hypothesis] may be unconfirmed, i.e., the live possibility that there are no *known* data for H is omitted' (italics in original). The same suppression that is presented by these theorists as a fallacy was, I am claiming, a highly desirable attribute of this argument in the context of the BSE inquiry.
  29. Walton and Batten (1984: 154) call this condition 'evidential priority': 'The assumption is that the evidentiary wellknownness of A, in order to make A of utility as a premiss, must be prior to that of B. Once the deduction is granted however, the value of B should be adjusted upwards to a plausibility value equal to (and not greater than) A. Once A has been so utilized as a premiss for B however, B could never be used as a premiss in an argument that has A as a conclusion. Reason: to be useful as a premiss, the value of B must be greater than that of A. But... the value of B should not be greater than that of A, if A has been used as a premiss for B in a previous deduction. Thus arguing in a circle, from A to B, and then subsequently from B to A, violates some requirement of evidential priority'.
  30. Three such exceptions are Cummings (2000), Sorensen (1991) and Walton (1985). Sorensen (1991: 245) states that 'a variety of arguments having the form "P, therefore, P" do not beg the question', where question-begging form is defined as the propositional identity of premise and conclusion. It will not have escaped the reader's attention that the argument form 'P, therefore, P' is deductively valid. This led some philosophers (e.g. Sextus Empiricus, Mill) to claim that all deductively valid arguments commit the fallacy of begging the question.
  31. Walton (1991) provides an excellent overview of contemporary and historical literature on question-begging argument.
  32. Rescher's prohibition of circular sequences in disputation has particular significance in the present context, given his aim to develop a model of formal disputation that can capture the rational methodology of scientific inquiry: 'We shall explore this particular sector of dialectics (formal disputation) to see what epistemological lessons can be drawn from it in order to exhibit the utility of such "dialectics" for the theory of knowledge. The goal of this exploration is the development of a dialectical model for the rationalization of cognitive methodology – scientific inquiry specifically included' (Rescher 1977: xii).
  33. Walton (1985: 263) remarks that '[i]n mathematics, it is common practice to start at proposition A and then prove B, then start again at B and prove that A follows. An equivalence proof in mathematics, of the if and only if type, often takes this form. Although the form of proof is circular, in many instances such a proof is rightly thought non-fallacious'.
  34. Walton (1985: 272) remarks that 'in the majority of circular arguments we looked at, the circularity cannot be condemned as wrong or fallacious precisely because the context of dialogue fails to indicate decisively that a priority condition is a procedural requirement. The economist's argument we began with, for example, should not be declared fallacious or viciously circular by a reasonable critic unless the critic can cite evidence of an agreement, or at least a clearly agreed upon context or background requirement to argue only in one direction or the other. Similarly for the mathematician. If the objective (the problem) is to prove from A to B, and also from B to A, there need be no fallacy in solving the problem by arguing in a circle'.
  35. The committee's terms of reference were '[t]o advise the Ministry of Agriculture, Fisheries and Food and Department of Health on research on transmissible spongiform encephalopathies including: (a) work already in progress or proposed; (b) any additional work

- required; (c) priorities for future relevant research. In the context of these terms of reference, transmissible spongiform encephalopathies include those affecting both domestic and wild ruminants and man' (BSE Inquiry Report, Volume 1: 55–56).
36. One of the propositions for research into TSEs omitted from the final report of the Tyrrell Committee was the following: 'Of meat and bone meal made from scrapie-sheep. Orally to cattle, to confirm the current hypothesis of the origin of BSE' (BSE Inquiry Report, Volume 11: 26).
  37. Professor Bourne's remarks are taken from the transcript of oral evidence that was given to Lord Phillips and his team on 19 March 1998. The full exchange reads as follows: 'MR WALKER: . . .It is very helpful to have the indication of how you saw the task at the outset. Perhaps I could turn to Professor Bourne? PROFESSOR BOURNE: Clearly, we saw BSE as a very serious issue, and we were aware at that time that BSE was a TSE, that it had only a few months previously been shown by the work of Fraser et al. We recognised that an understanding of the basics of this disease was going to come through continuing work on scrapie. That was the model that one would work on, scrapie with work in sheep and in lambs. We also recognised that the facilities available for this work were fragile, there were not many facilities available for this work. I saw it as a need to really put in place a much stronger fundamental science programme to understand the pathogenesis nature of the disease. We were also aware at that time of the epidemiological evidence coming from the Ministry work, particularly John Wilesmith's group. I think the importance of that work was very evident to us. So my view was that we had to go forward specifically on two major research fronts, one to increase the epidemiological work, and the other, to put in a much stronger science base relating to an understanding of the pathogenesis of the disease based upon the mouse and scrapie model' (10–11).
  38. That the analogy with scrapie was itself the focus of investigation by the Tyrrell Committee is evident from the following comments in the Tyrrell Report: 'Many of the practical measures taken have been based on shrewd judgements of the analogy between BSE and scrapie of sheep. Specific studies on BSE itself are now needed to establish whether those conclusions were sound' (BSE Inquiry Report, Volume 11: 208); 'If the preliminary studies and arguments-by-analogy used to determine our present control policies turn out to be incorrect, it will be essential to have well-documented facts available so that current policies can be effectively revised' (BSE Inquiry Report, Volume 1: 56).
  39. The issues of circularity and bootstrapping are a constant preoccupation of theorists in epistemology. In this context, circularity emanates from the need to make use of one's rational methods in order to validate those methods: 'As one probes backward to substantiate the substantiating considerations that one uses in justificatory reasoning, either one continues to have recourse to ever newer materials (in which case there is an unending and thereby vitiating regress) or one eventually has justificatory recourse to previously employed materials (in which case there is a vicious circularity)' (Rescher 2001: 140). Bootstrapping through the use of presumptions is an antidote to vicious circularity: 'The point of this line of thought is precisely that this would be viciously circular, since we have no independent access to "the truth" as such. What we must do in rational inquiry is pull ourselves up by our own bootstraps, relying on our principles of presumption but critically reappraising them as well. We begin by provisionally accepting certain theses whose initial status is not that of certified truths at all, but merely that of plausible postulations, whose role in inquiry is (at this stage) one of regulative facilitation' (Rescher 2006: 67–68).
  40. This tendency is aptly captured by Finocchiaro (1981: 15–16) as follows: '[L]et us examine the second element of textbook accounts of fallacies, the description of various devices which I wish to call by the neutral term of "disputed practices". One problem with these descriptions is that they are usually prejudicial in the sense that their fallaciousness is built right into their description. . . There is a pattern in these biased descriptions, and it is the following. If the disputed practice is a type of inductive argument, namely one claiming that the conclusion is only strongly, but not conclusively, supported by the premises, then the practice will

be described as a type of deductive argument, namely one claiming that the conclusion is conclusively supported by the premises. If the disputed practice is a type of what might be called a partial argument, namely one claiming that the conclusion is only partly, but not too strongly supported by the premises, then the practice will be described as a type of allegedly inductively strong argument. . .the pattern (or shall I say the fallacy?) is that of exaggerating the strength of the connection claimed between various assertions. . .’.