Introduction: the FMD event

On 8 April 2001, Nick Brown, then England’s Minister for Agriculture, sent written advice about biosecurity to 85,000 livestock farmers. This action led to the first use of the term ‘biosecurity’ in the House of Commons debating chamber on 9 April, as Brown outlined the latest measures being taken to combat the epidemic of foot and mouth disease (FMD) that only a month earlier he had erroneously announced was ‘under control’. In fact, FMD, a viral disease of hoofed mammals, had spread through livestock to epidemic levels before it was even detected. The epidemic cost the UK £8 billion (much of this in sectors outside of agriculture) and gave rise to the slaughter of over 6 million animals in the largest-ever animal disease cull (for fuller accounts see Donaldson et al., 2002; 2006). Whilst relatively confined to Great Britain (although The Netherlands and, to a lesser extent, Ireland and France were also affected) the crisis took place on a global stage. Control measures were dictated by the European Union, due to its status as a trade bloc under the World Trade Organization (WTO), as well as by WTO regulations themselves, and pictures of the hellish aftermath of slaughter and carcass disposal were broadcast around the world. The epidemic demonstrated that a modern state, with large resources and supposedly adequate contingency planning, could be overwhelmed by the multiplication of a simple virus. In the political debates, media coverage, and rapid policy making that accompanied the epidemic, biosecurity emerged as a government watchword, apparently central to the arsenal that eventually defeated FMD in September 2001.

Biosecurity manifests variously around agriculture and animal disease, public health, (bio)terrorism, and the potential misuse of biotechnologies and bioscience research (compare Collier et al., 2004; Donaldson and Wood, 2004; Hinchliffe and Bingham, 2008). Viewed from a geographical perspective, biosecurity implies the maintenance of a spatial separation between categories of biological things: those which are...
valued (perhaps for economic or ethical reasons) and those which represent a threat to the well-being of the valued group. Beyond that general sense, biosecurity ramifies, depending on the type of things to be protected and the reasons for valuing them, what they are being protected from, and the specific means of separation. Biosecurity can denote basic hygiene practices such as hand washing, or it can conjure webs of surveillant control (of humans as proxies for disease) as happened during the 2001 FMD epidemic (Donaldson and Wood, 2004). The term itself presents a semantic banquet for geographers. The evocative ‘bio’ prefix brings to mind the ‘relational ontologies’ and ‘hybrid politics’ (Castree, 2003) encapsulated in performances of nature, society, and space (eg Latour, 2004; Szerszynski et al, 2003; Whatmore, 2002a), whilst the ‘security’ element resonates powerfully with contemporary geopolitical concerns (Braun, 2007).

My own interest in biosecurity began with the 2001 FMD event, outlined above. I use the term ‘event’ here in an ontological sense (Fraser, 2006) for two reasons. First, for Whitehead (1920) events are the primary ontological category from which time, space, and everything else are abstracted. Events do not happen to things; things emerge from a succession of events. The 2001 FMD epidemic, for me, is a bounded object that gives rise to all manner of things, spaces, agencies, issues, or explanations depending on how one chooses to approach it; biosecurity offers one line of approach. The particular form that biosecurity took as it emerged in the UK FMD crisis was part of that event, simultaneously material, political, spatial, animal, and viral. That form has been dealt with elsewhere (Donaldson and Wood, 2004). Second, the singularity of an event introduces difference and raises new questions or problems, but does not in itself determine how, or by whom, they will be articulated (Stengers, 2000). Or, as Rabinow puts it, “new forms emerge that catalyze previously existing actors, things, temporalities or spatialities into a new mode of existence, a new assemblage, one that makes things work in a different manner and produces and instantiates new capacities. A form/event makes many other things more or less suddenly conceivable” (1999, page 180). This second point suggests that rather than consider why biosecurity emerged out of FMD we might consider what biosecurity means now that it is with us.

This paper is not an analysis of the FMD event—many other published sources provide that service (compare Donaldson et al, 2002; 2006; Law, 2006; Ward et al, 2004). Here, I am concerned with agricultural biosecurity in the UK after the event. Specifically, I am interested in the articulation of the concept of biosecurity as it developed in policy and regulation. This concerns me for good reasons. How we think about or articulate biosecurity is important in delineating the effects it has. Though the effects may be entangled with concerns about politics and trade, biosecurity entails important goals about the health and well-being of human and nonhuman organisms. If control is sought through biosecurity, it might be sought for sound reasons and with good intent [Lyon (2001) notes the importance of care through surveillant control]. Consequently, I wish to offer a critique that, rather than being disparaging, contributes to a ‘critical mass’ (Latour, 2003a) of ideas about biosecurity so that it might be better enacted by all concerned. Being properly attentive to an event requires inventive problem making, rather than problem solving (Fraser, 2006, following Stengers). Problem making—as a tradition from Dewey, down to contemporary thinkers such as Latour (2005) and Rabinow (2003) tells us—is an active process; it entails the making of connections and the making of propositions. My aim in this paper is to outline the problem-solving and problem-making aspects of biosecurity.

To do this I follow the object of biosecurity through a number of ‘sites’. First, I consider biosecurity on farms in order to establish the practical and material points of reference for the concept of biosecurity. Then I follow biosecurity into the realm
of policy making and parliamentary discourse. Here, rather than asking ‘what is’ biosecurity—because, as I will suggest, in practice it is often not much—I am concerned with ‘what else is with’ biosecurity. [This is a move parallel to Bingham’s (2006) approach to emerging biotechnologies.] This shift in perspective can open the study of a concept to the relationships that help produce it, and aid in understanding its significance. From this basis, I consider biosecurity alongside risk, as an ‘organising idea’ (Rothstein et al, 2006) that shapes the regulatory landscape. I develop an approach to risk politics that follows on from the distinction between problem solving and problem making. Finally, I chart the position of biosecurity and its risk politics at the science/policy interface.

**Biosecurity acts**

“We used to just call it cleansing and disinfecting.”

National Farmers’ Union (NFU) official
(personal interview, December 2001)

During the FMD epidemic, talk about biosecurity pointed in one direction: biosecurity was done mainly on the farm. Talking to people involved in animal production (be they farmers or scientists of various types) reinforces this impression. The doing of biosecurity is a nuts-and-bolts part of livestock management, largely involving careful hygiene practices. The Scottish Executive Environment and Rural Affairs Division (SEERAD) states that:

“Biosecurity is a set of management practices that collectively reduce the potential for the introduction or spread of animal disease-causing organisms onto and between farms” (http://www.scotland.gov.uk/Topics/Agriculture/animal-welfare/Diseases/GenControls/15721).

According to the same SEERAD document, the “key practices” of biosecurity centre on the following activities: buying in animals; clean food and water; hygiene; separation and isolation; slurry management; traceability and identification. These indicate that biosecurity practice for individual farmers already has a spatiality that extends beyond the farm. Whilst most relate to on-farm activity, the first and last points relate to the farm’s links with other sites. Buying in animals, moving new stock onto the farm premises, triggers a ‘standstill’ meaning that no animals can be moved off the farm for a set period in case the new animals are carrying disease. The farm acts as a ‘buffer’ to prevent disease spreading to other farms. If new stock is infected it is too late for the farm that has brought it in, but the standstill reduces the risk of disease spreading further before it is detected. Traceability and identification refers to procedures—record keeping, form filling and filing, tagging—for identifying individual animals and being able to trace where they have been over their life course (and hence which other animals they may have come into contact with). These two sets of biosecurity practices connect biosecurity on a single farm to the wider spatial formations in which it is embedded: livestock markets, agricultural fairs, abattoirs, and the mobile sites of livestock transport. All of these sites have sets of biosecurity practices associated with them which resemble those on farms. To distinguish this doing of biosecurity from the politics of biosecurity described later in this paper, it can be thought of in terms of ‘biosecurity acts’, individual repetitive tasks that are cumulatively responsible for excluding any potential pathogens. These acts are mundane, belonging to the everyday business of livestock management.

The technical practices that constitute biosecurity acts are themselves defined by guidance and regulation, which form another mundane layer of biosecurity in the distribution of information through leaflets, videos, and websites. This other set of
practices is essentially focused around the promotion of ‘good biosecurity’ in line with
a legislative instrument: the Animal Health Act 2002. This post-FMD amendment to
the 1981 Animal Health Act introduced a requirement that biosecurity guidance be
produced, made available to producers, and regularly updated. Biosecurity practice is
voluntary; under the Animal Health and Welfare Strategy for Great Britain (AHWS)
(Defra, 2004), it is seen as part of an holistic approach to ‘farm health planning’. This
approach involves partnership working to identify ‘best practice’ for stock management
that includes biosecurity practice. As part of this process, farmers are encouraged to
consult with their local vet about drawing up a tailored farm health plan. But
the voluntary emphasis of this information and promotion activity disappears if there
is a confirmed disease outbreak. In such circumstances, biosecurity acts become
enforceable and subject to tight control.

A key link in this tightened control is the local disease control centre (LDCC) that
will be set up to coordinate actions in the event of a disease outbreak. Although in
these management procedures biosecurity becomes linked to enforcement via surveil-
ance, which focuses more on the control of humans than on the control of disease
(Donaldson and Wood, 2004), there remains a very mundane component to the pro-
cess of emergency biosecurity management. A major criticism of the UK Government
following the 2001 FMD epidemic was that many field personnel did not know the
FMD contingency plans. This situation has been rectified by making very detailed
procedures easily available online. The procedures involved in setting up an emergency
LDCC are available as part of the Veterinary Instructions, Procedures and Emergency
Routines (VIPER) manual. According to VIPER, each LDCC must have a biosecurity
manager whose first task is to set up a biosecurity team. The team must then:

1. Set up desk as directed by Divisional Operations Manager ....
2. Following list of stationery is minimum: blutack, stapler, staple extractor, pens,
marker pens, highlighters, telephone pad, post-it pads, spare paper.
3. Identify Team by putting a ‘Biosecurity Team’ sign in a prominent position”
(http://www.defra.gov.uk/animalh/viper/ldcc/biosecurity/biosecurity-setup.htm).

These instructions may raise a smile, yet they denote a performance that is vitally
important in mobilising emergency biosecurity. Put into practice, they enact a site for
managing biosecurity through a list of mundane materials that also, literally, make
the biosecurity team visible. This apparent shift from routine to emergency biosecurity
parallels the renewed articulation of biosecurity after the FMD event: the novelty of
biosecurity in practice is less in those biosecurity acts and more in their now being
made visible as biosecurity.

Biosecurity as a biophysical effect comes into existence in between the management
and advisory processes and the technical practices of biosecurity acts, produced every
bit as much through the glossy leaflets and video tapes of distributed guidance and the
paperwork of farm health plans and the LDCC biosecurity team as through cleansing
and disinfecting, isolation, and movement controls. But these various processes can
also at times fade into the background, leaving biosecurity as an independent entity.
This is illustrated well by a segment shown on BBC News broadcasts when avian
influenza was confirmed in a dead swan on the Fife coast of Scotland on 5 April
2006. A BBC reporter approaches a local poultry farmer at the boundary to his
property. The farmer states that the reporter cannot enter the farm premises “because
of biosecurity”. Biosecurity is now a ‘figuration’ (Latour, 2005), standing as a single
identifier for the various agencies that produce it—it is also a novel figuration, as
indicated by the comment that opened this section. And, whereas concerns around diag-
nosis, slaughter, and vaccination remain open to contestation (Clout and Holt, 2007),
biosecurity after the event represents a new discourse of power that producers utilise.
Risk politics

When biosecurity acts, what else acts with it? One starting point in answering this question is to note that biosecurity is not about the management of animal diseases themselves; it is concerned with animal disease risk. The practices of biosecurity detailed above are aimed at reducing the likelihood of a given population becoming infected, at reducing risk in this (limited but pertinent) sense. This facet of biosecurity is visible in specific government activities, such as the ‘State of the Art Review of Biosecurity Risk Management’ conducted by Defra’s (Department for Environment, Food and Rural Affairs) scientific agencies (CSL, 2005; Science Advisory Council, 2004; Veterinary Laboratories Agency, 2005). This process reflects both a recent increase in the centrality of risk to the practices of governing in the UK (Cabinet Office, 1999; 2002) and a commitment by the government to adopt accepted best practice in risk analysis in animal health and disease prevention (Defra, 2003). ‘Risk thinking’ (Rothstein et al, 2006) has also made its way into agribusiness management with epidemic animal diseases noted as a significant ‘production risk’ for farmers (Meuwissen et al, 2001). Whilst in a financial/business sense farmers are faced with a changing ‘risk environment’ (Meuwissen et al, 2001), in a more imaginative and expansive sense the complexity of flows in agrifood systems presents us with a ‘risk agriculture’ (Law, 2006) that certainly extends risk far beyond the farm gate. And in the midst of all this risk is biosecurity. Biosecurity and risk are entangled; here, we need to untangle risk a little.

Beck’s, by now well-known, risk society thesis (RST) posits a growing awareness of risks (potentially harmful future impacts) as negative externalities of modern wealth production, leading to social organisation around the distribution of bads rather than goods (Beck, 1992). The risk mediations of agrifood systems (Law, 2006; Stassart and Whatmore, 2003) complicate this situation for animal disease risks. Most animal-disease-causing pathogens have not arisen directly from human activities [although the BSE prion represents a key example of a ‘modernisation risk’ (Oosterveer, 2002)]. Animal diseases constitute a ‘classical’ production risk to the livestock industry, but become ‘modernisation’ risks through the multifarious mediations and associations of agrifood systems and their (sometimes unexpected) connections to other spheres. Through these associations, animal diseases become a risk to socioeconomic and political stability (Donaldson et al, 2002) and to public health concerns in the case of zoonotic diseases. But if risk is everywhere or a means of engaging with everything, as the RST suggests, does it retain any critical potency? Callon, for one, asserts that risk is not a useful term for social scientists as it represents a “one dimensional way of defining the stakes and the issues”, imposing “a certain form to political debate” (Callon in Barry and Slater, 2002, pages 288 – 289). Callon claims that amongst civil society actors in his work (Callon et al, 2001) ‘risk’ is not a register used to frame problems. The usefulness of risk, though, might lie in its relevance, when relevance is a
capacity to stop “thought turning in circles and [concentrate] the attention on the singularity of an object or situation” (Stengers, 1997, page 6). I will make two claims to the continued relevance of risk for social scientists.

First, in following the work of those who study risk “as a way in which we govern and are governed” (O’Malley, 2000, page 459) we can agree with Callon that risk thinking does often impose certain forms on political debates, and deliberately so. The distribution of risk may indeed be a “technocratic dream” (Callon in Barry and Slater, 2002) but this is no reason to dismiss it; rather, it necessitates an examination of the forms that risk thinking lends the political process. According to Power (2004), we are now concerned with ‘the risk management of everything’, partly as an extension of ‘audit cultures’ that arose in the late 20th century. Power notes a move beyond the RST’s widespread awareness of anthropogenic risk that comes with a greater ability to intervene in the world towards a situation in which the experts charged with managing risk are becoming aware of risks to their own reputations. Rothstein et al (2006) expand this idea by suggesting a distinction between societal risks (risks to “members of society and their environment”) and institutional risks (risks to regulatory frameworks and those seeking to manage societal risks). The regulation of societal risks exposes the limitations of regulatory systems, thus generating institutional risks. Conversely, a focus on institutional risks can sensitise regulators to ever more areas of societal risk. This process gives rise to a spiralling logic of ‘risk colonisation’ whereby risk thinking becomes central to ever more processes of regulation, governance, and institutional management: an organising principle for efficient governance on the one hand and a potentially paralysing force on the other. Significantly, Rothstein et al note one key difference between their theory of risk colonisation and the RST. For Beck, it is an apparent lack of control that makes everybody into risk managers; for Rothstein et al it is an increase in control as more and more actors are drawn into spiralling risk regulation systems. This increased control has another aspect to it. Barry (2002a) suggests making a distinction between the very technical practices of politics and ‘the political’ as a space of debate and dissent. Talking of a situation in terms of risk is a way of shifting it away from the political—away from open debate—and toward the technical, calculative practices of risk management (Barry, 2002b). So risk politics has an ‘anti-political’ dimension (Barry, 2002a). The process of risk analysis enshrined by the WTO and other transnational institutions aptly demonstrates this dimension, being divided into three stages (eg Dratwa, 2002; Oosterveer, 2002): risk assessment, risk management, and risk communication. The first two stages express a clear divide between science/expertise, which is placed in risk assessment, and politics, which is placed in risk management. This division, according to Dratwa (2002), leads to policy decisions that are always seen as definitive closures [see Hinchliffe (2001) for a disease-related example].

Second, risk can be a way to think about the social in action. For Latour, Beck’s use of ‘risk’ is synonymous with ‘network’ in its actor-network theory sense, denoting contingency or “whatever deviates from the straight path of reason and of control to trace a labyrinth, a maze of unexpected associations between heterogeneous elements” (Latour, 2003b, page 36). The circumstances of the FMD event itself represent just such a deviation (Donaldson et al, 2002). This approach to risk also resonates with event-based ontologies which foreground contingency without “basing contingency on some [other] specific ontological foundation” (Mackenzie, 2005, page 389) and hence with the notions of ‘risky construction’ and collective experimentation which Latour and others draw from the (event-orientated) work of Stengers (Dratwa, 2002; Latour, 1997; Whatmore, 2002b). For Stengers (1997; 2000), a key determinant of good science is risk taking: conducting experiments (seen as events) with full awareness that the world may ‘object’ to the experimental proposition (Latour, 2000). By situating
risk as a component of events we can infer that the correct response to risk is not
problem solving but problem making—a position that clearly stands in opposition to
the anti-political dimension outlined above.

Dratwa (2002) has extended this mode of thinking further into practical politics
and policy making by suggesting we think of ‘taking risks’ in the same way as we think
of taking decisions. Which is to say that risks are chosen by policy makers, and politics
has an experimental dimension. This choice, though, is hampered by the division
between science and politics outlined above. Dratwa argues that a political tool already
exists to overcome this divide, if it can be extracted from the accepted schema of risk
analysis. The precautionary principle is usually taken to include the idea that action
should be taken in the absence of full (scientific) knowledge in order to prevent future
harm, but is tied to risk management, considered to be concerned only with politics
and separated from the risk assessment, which is the domain of science. To fully assess
risks, scientists need input from the policy makers dealing with risk management. For
Dratwa, the precautionary principle raises the possibility of an experimental politics
based on problem-making and ‘acting and doubting’ together.

There are two approaches to risk, then, that argue for its relevance and hence its
maintenance in our critical repertoire. The first approach focuses on risk in its techni-
cal sense and draws our attention to risk management as an antipolitical tool with a
self-driving logic of problem solving by the extension of control. The second approach
considers risk as the property of events which escape control but which can never-
theless be interacted with in an experimental fashion. Importantly, this second
approach may be actively political, opening space for debate if it can be brought to
bear. The focus of this political approach to risk is on problem making, placing ‘risk
taking’ at the heart of both science and decision making.

Biosecurity politics
So biosecurity acts, and it acts with risk. But what has been asked of biosecurity in the
politics engendered by the FMD event?

‘Halfway through the epidemic the word ‘biosecurity’ suddenly appeared and the
concept was treated as if it was an eternal truth that everybody had taken in with
their mother’s milk. I did not have the faintest idea what biosecurity was—I
thought it was some sort of organic washing powder. Suddenly farms were being
told that they were breaching the rules of biosecurity, but it is only in the past few
days that a video has been produced to tell farmers what biosecurity is” (David
Curry, House of Commons, 3 July 2001).(1)

“Throughout the epidemic, the Government sought to sully the names of United
Kingdom farmers by accusing them of increasing the spread of the disease through
allegedly poor biosecurity measures.” (Ann Winterton, House of Commons, 9 November
2001).

During the FMD epidemic, biosecurity was usually taken to mean technical farm-
based practices. Yet, the term also carried political connotations; it denoted an area
still open for debate, as illustrated by the parliamentary rebukes, above. The implication
of such comments was that the government could use the idea of biosecurity as
something that occurred on farms, and was therefore the responsibility of farmers, as a
way of shifting responsibility for disease control. Government, however, sought to
portray biosecurity as purely technical. Later in the epidemic, the idea that rules and

(1) House of Commons transcripts available at http://www.publications.parliament.uk/pa/cm/cmhansrd.htm
standards could be applied to enforce biosecurity became more central. The new minister with responsibility for FMD control, Margaret Beckett (House of Commons, 12 July 2001), spoke in a manner that took for granted the existence of such things as “proper biosecurity” and “good biosecurity standards” and announced that government had “taken steps to link biosecurity standards with the granting of livestock movement licenses.”

Although Beckett referenced a risk-based approach (tying movement licenses to biosecurity standards as a means of reducing risk of disease spread) she also contributed to the moral dimension noted by Winterton, above. Further attempts to enshrine a clear moral dimension to biosecurity practice and allocate responsibility (and hence apportion blame) were made during drafting of the Animal Health Bill in late 2001 and 2002. The Bill was intended to improve animal disease control legislation based on the experience of FMD, although many felt this to be premature as there was insufficient information available on key issues, including biosecurity, to make informed policy decisions. On 9 and 12 November 2001, a new way of enforcing biosecurity was debated in the House of Commons. In order to promote ‘good biosecurity’, up to 25% of compensation for compulsorily slaughtered livestock would be withheld if the farmer responsible for the animals was deemed not to have met biosecurity standards. This figure was based on the maximum amount that could be legally withheld so as not to contravene human rights legislation. Concerns were raised over whether it would be better to fine farmers for poor biosecurity and whether breaches in biosecurity should be penalised at all. Also causing concern was how to properly assess biosecurity standards when the slaughter teams arrived. Could farmers not simply step up measures to make it appear as if they had appropriate standards of biosecurity for the assessors? The issue of assigning responsibility for biosecurity was inherently tied into what biosecurity means and how it should be practised, as well as into who defines those features and how they can be assessed. Initial attempts to tie biosecurity to compensation or fines were abandoned due to opposition in parliament and concerns within Defra over whether there could possibly be any objective assessment of biosecurity such that standards could be enforced (Public Accounts Committee, 2005).

Nevertheless, the inclusion of biosecurity as part of a holistic ‘farm health planning’ approach in the AHWS (Defra, 2004) has prompted a sustained interest in regulating biosecurity. But the partnership approach (between government and industry) that the AHWS espouses has led to a new way of framing such regulation, under the banner of ‘risk sharing’ (Defra, 2005). This way of thinking can be traced to an earlier animal disease event, the little known outbreak of classical swine fever in the UK in 2000, but it was FMD that provided impetus and made biosecurity more central (JIGWG, 2006).

“The Joint (Industry/Government) Working Group [JIGWG] will consider the balance of risks and responsibilities associated with keeping farm animals in the context of the importance and role of both on-farm and external biosecurity controls” (http://www.defra.gov.uk/farm/policy/regulation/csharead/jigwg/index.htm).

The introduction of risk thinking is a way of making biosecurity antipolitical, and part of a technical risk management (and risk sharing) and regulatory framework. Via this route, biosecurity has gained discursive power, despite Defra's failure to find a more robust measure of enforcement. The tendency of livestock producers during recent disease events, highlighted earlier, to talk about good biosecurity as part of their routine management practices attests to this essentially antipolitical capacity. Yet, there remains a disjuncture between the antipolitical articulation of biosecurity and the technical effectuation of biosecurity. As we have seen, it is difficult to define a point at which biosecurity acts, as defined by government guidance, can be objectively
seen to deliver good biosecurity. In other words, biosecurity itself is a risky activity: there is no absolute way of knowing whether any given set of biosecurity acts will ultimately be successful in preventing the emergence of disease. And if the aspirations held for biosecurity cannot be routinely enforced through metrics and standards in farm practices then the hold of biosecurity policy instruments over those who perform biosecurity acts is tenuous. Choosing to act antipolitically by portraying biosecurity as a purely technical activity is also a risk taken. However, there is another way in which biosecurity is portrayed that is actively political, opening up spaces for debate.

Throughout the inquiries following the FMD epidemic, the NFU adopted a position on biosecurity that sought to shift the burden of responsibility for biosecurity practice away from farmers. Drawing parallels with Australia and New Zealand (cf Barker, this issue), the NFU called for improved national border biosecurity. This position has also been picked up in wider usage of biosecurity within parliamentary discourse.

“The National Farmers’ Union highlighted the border as one of those crucial points: it told us that biosecurity ‘starts at our borders with the outside world and that border is in some cases ... the European Union border’” (EFRACOM 7th Report, 2002a).

Alongside this shift in scale to national biosecurity, and also inherent in it, is another vision of biosecurity which has gained strength. Biosecurity is a condition or status to be maintained; it can be ‘protected’ (eg Mark Pritchard, House of Commons, 29 June 2005) or threatened by “another outbreak of foot and mouth, another outbreak of swine fever, or ... some other element of biosecurity” (EFRACOM minutes of evidence 19 June 2002). This particular vision of biosecurity is interesting because of the way it comes to define how problems are articulated, as biosecurity becomes an end rather than a means to an end. For example, in outlining key questions for research into biosecurity, Defra (2002a) highlighted a need to identify likely future threats to biosecurity and determine how to move biosecurity “offshore” (again focusing on the condition of biosecurity at a national scale). In another clear reference to biosecurity as a condition, avian influenza has been referred to as “a clear threat to our biosecurity” (Oliver Letwin, House of Commons, 17 November 2005). This comment was made in an attack on the government and another such comment relating to avian influenza uses this vision of biosecurity in a slightly different way:

“As we now know that avian flu has been brought into the UK through the bird trade, [Ben Bradshaw] is worried that if he does not know how many birds are brought in, he cannot know how effective our border controls are and cannot therefore enforce the biosecurity that we all need?” (James Paice, House of Commons, 17 November 2005).

In this statement, biosecurity is something “that we all need”; as well as being a condition, it is a national public good in the face of avian influenza. This vision can work to the government’s advantage, enabling Ben Bradshaw (the Defra minister with responsibility for animal health until mid-2007) to state that, with respect to avian influenza, “We have far better biosecurity in this country” (House of Commons, 2 February 2005). This vision of biosecurity as a public good can be linked to animal health and welfare as a public good (as enshrined in the AHWS): “Biosecurity generally is about high quality animal health which I think the public deserves” (Ian McConnell, EFRACOM minutes of evidence, 16 October 2002).

We can see these propositions as group-making statements (Latour, 2005). They are, in effect, asking to whom animal disease represents a risk and providing the answer that it is to everyone. What is actually at risk is our biosecurity, which encompasses human and nonhuman health and welfare. So, what are we to make of all this? Biosecurity is doing a lot of work in theory. It is tied into risk regulation, markets, and
financial incentives, and it represents the face that the nation-state presents to animal disease risk [or at least the nation-state ‘called to arms’ (Billig, 1995) in the face of animal disease risk] and animal health and welfare. Through this last proposition, biosecurity is construed as something we should all care about. What we see here is the way in which the concept resonates with many other ‘affairs of state’ or policy domains, especially the notions of the national border, national security (cf Braun, 2007), and the public good. In contrast to the antipolitical connotations of biosecurity policy noted earlier, this opens the way for new connections to be made between the realm of farming and food production and the wider business of the nation-state and its publics. The emergence of biosecurity can be recast as that which “makes many other things more or less suddenly conceivable” (following Rabinow, 1999, page 180).

Biosecurity science?
Much of the wrangling over biosecurity outlined above took place within a process of contingency planning and policy making for animal disease control, following in the wake of three national inquiries into the FMD event (Anderson, 2002; Policy Commission on the Future of Farming and Food, 2002; Royal Society, 2002). During that period, the technicalities of biosecurity were still an open matter to some.

“What we have to understand first of all is that biosecurity is a new word and most people still understand that biosecurity is a disinfectant mat and a bucket of disinfectant at the end of the road, it is actually a huge subject. In the Report [Royal Society, 2002] we talk about setting up a research institute, whether it be virtual or in a centre of excellence, to validate that topic and talk about what biosecurity is, because it involves all sorts of things like the testing of animals, the vaccination of animals, isolation facilities, and so on.” (David Black, EFRACOM minutes of evidence, October 16, 2002)

“We certainly need ... an applied research programme and the aim is evidence based biosecurity. What we need is a well developed package of biosecurity advice to farmers and veterinarians which is rationally and securely based” (Sir Brian Follet, EFRACOM minutes of evidence, 16 October 2002)

These statements from two scientists involved in the examination of FMD control demonstrate a drive to situate biosecurity in a scientific frame of reference. The first statement also gives a clear indication that a broad view has to be taken on what to include as biosecurity acts if the status of biosecurity is to be maintained. This move could be seen as striking while the iron was hot, as the focus on an evidence base and science-based policy making was not confined to animal disease policy within Defra. The department had been set up towards the end of the FMD epidemic, largely as a political response to criticisms levelled at its predecessor, the Ministry of Agriculture, Fisheries and Food, which publicly failed in managing FMD (Donaldson et al, 2002; 2006). Amidst intimations that the new department was ‘cobbled together’ and only partially planned (Donaldson et al, 2006), there was a need to put Defra onto a sound footing and the expansion of the department’s science base was key in this legitimation process. One of Defra’s ten guiding principles concerns the use of the best available science to inform policy making (Defra, 2002b). The previously mentioned ‘State of the Art Review of Biosecurity Risk Management’ fulfils this role with respect to biosecurity, but is also a closure of sorts, a formal separation of science and politics as per the standardised approach to risk analysis (to which Defra has committed itself). The review is a high-level process of risk assessment, outlining current knowledge and knowledge

(2) See Ward et al (2004) for an overview of the lesson-learning process.
gaps within the various scientific agencies of Defra. Its reference to biosecurity is less about the practice of biosecurity acts and more about the national status of biosecurity, against which risks can be identified.

Aside from this division of science and politics, there are divisions enacted within the sciences. Post-FMD, certain sciences have been brought into conflict over animal disease risk analysis. The 2001 epidemic was “the most completely documented major outbreak of animal disease to date” and all the collected data have been made available through the Central Science Laboratory website (http://footandmouth.csl.gov.uk/). The availability of these data and the opportunities that they provide for producing new knowledge to inform risk assessment has increased the immediate currency that certain forms of analysis have had in the development of animal disease policy. At the height of the epidemic, a group of epidemiologists assembled—initially in an unofficial capacity but later as the official FMD Science Group—to predict the course of the epidemic using computer-modelling techniques. This process was contested from the start, appearing at times more of an exercise in justifying rather than informing the mass culling policy adopted (Wilkinson et al, forthcoming). The core of the group continued to advise Defra, and key members went on to serve in various positions within Defra’s science infrastructure. However, deep divisions between different groups of modellers within the FMD Science Group are played out in the scientific publications of the various teams (Bickerstaff and Simmons, 2004) and the availability of the FMD data has paved the way for those who had a very different experience of FMD control to enter the frame. Through the FMD event and its aftermath, there has been a sustained conflict between veterinarians (especially those in the field) and epidemiologists. A group of authors, containing vets who had worked in an LDCC during the epidemic, published their own analysis suggesting that the controversial culling policy supported by the FMD Science Group was unnecessary and even detrimental to the overall control of the disease as well as dramatically overextending the number of animals to be slaughtered (Honhold et al, 2004). Significantly, models used to predict the course of the disease during the epidemic did not take into account the influence of biosecurity acts. A recent exercise revealed concerns that FMD models still do not deal with biosecurity thoroughly enough (Defra, 2006).

Although modelling has played a limited role in the development of biosecurity (eg Waage et al, 2005), it has been more associated with another aspect of disease control: preparedness (cf Fearnley, this issue). Preparedness focuses on what to do in the event of a disease outbreak, rather than on the prevention of an outbreak. An overemphasis on preparedness in Defra’s approach has been cited as detracting from “more sustainable” approaches to animal disease such as biosecurity (Science Advisory Council, 2006a). Instead of the integrated package of biosecurity science proposed by the Royal Society, modelling has dominated.

Despite its obvious linkages to the technical dimensions of disease control, scientific practice is not necessarily antipolitical. Indeed, in outlining my concepts of risk I placed well-constructed science on the side of problem-making politics, rather than on the side of problem-solving antipolitics. In following biosecurity into contact with the sciences, we can trace three divisions. The first division, between science and policy, follows the accepted norms of risk analysis. It thus prevents the problem-making dimensions of biosecurity politics that do exist from coming into contact with those of the sciences. The second division, between the sciences and biosecurity in practice, places a closure on the innovative definition of biosecurity acts through scientific research (as proposed by The Royal Society). These two divisions demonstrate the antipolitics that results from situating biosecurity as a definitive technical solution within a risk management framework. However, the third division, between types of
science/expertise, highlights the political potential of biosecurity science. There is debate around how to include biosecurity practice in modelling calculations; there are epistemological divisions between different types of scientists and experts working on animal disease. Following through and encouraging such debates and divisions could allow for a further understanding of what it is that is made “more or less suddenly conceivable” (Rabinow, 1999, page 180) by the presence of biosecurity. Bringing together the contested scientific objects of animal disease risk and the various policy domains that are woven together by biosecurity (see previous section) would take this process one step further. As Dratwa (2002) puts it:

“Scientists should not be contacted merely as problem-solvers or answer-givers, but also as constructors of questions, of problems. They should not be left to construct those on their own, however” (page 207).

Dratwa is intimating that scientists need to work with an understanding of what policy makers are able to do, and that the two groups must work together, rather than in the distinct compartments of the standard approach to risk analysis. The tying together of various natural sciences and their objects with policy objectives and political visions is a key point at which the concept of biosecurity requires extra input. Despite their being left out of the process of animal disease policy, it has been noted that social scientists could contribute to a “more open framing of policy issues” within Defra (Science Advisory Council, 2006b, page 7). Whilst there are undoubtedly natural scientists of various types better equipped than social scientists to represent the novel formulations of nonhuman agency denoted by the ‘bio’ [the key political role that Latour (2004) assigns to the natural sciences is the political representation of non-humans], social scientists should be better equipped at examining new forms of collectivity, such as the bringing together of various policy domains, knowledges, and modes of agency with the politics encompassed by the ‘security’. Through collaborative, interdisciplinary research we can attempt to offer new propositions which use biosecurity to address possible configurations of science, animal health, policy making, farming, food safety, trade, and so on. Being properly attentive to biosecurity—exploring fully its political, problem-making potentials—requires a biosecurity science based on just such a process.

Conclusion
This paper has followed biosecurity after the event of the 2001 FMD epidemic. Characterising the epidemic as an event provides for a focus on what biosecurity means after the event, rather than on the questions of why it emerged. I set myself the task of critique through adding to a critical mass of ideas around biosecurity for the purpose of improving the construction of biosecurity. I have gone about this task by examining the antipolitical and political consequences of biosecurity, linked to its capacities for problem solving and problem making, respectively. The first point I added was that on-farm biosecurity is not so much a new practice as a new way of thinking and talking about a range of activities that have gone on before. Biosecurity acts are presented as a new solution to the problem of animal diseases, post-FMD. This contributes to the antipolitical dimension of biosecurity policy, which seeks to extend regulation and rational order and to stall debate amongst both the agricultural and scientific communities. However, this form of biosecurity might be more powerful discursively than it is materially. In subsequent disease events, farmers and producers have professed their strict biosecurity practices in the face of what were, effectively, breaches in biosecurity. The very riskiness of placing so much emphasis on biosecurity as a catchall technical solution to disease management and prevention without any way of fully knowing its
effectiveness militates against policy makers and regulators ever being able to give up completely an active interest in biosecurity.

The antipolitical aspects of biosecurity are dominant, yet, whilst its association with risk thinking enacts conceptual and political closures, biosecurity politics also raises questions: a political act. By following biosecurity through political discourse, I have charted how concerns around animal disease, refreshed by the FMD event, are being articulated and understood within government. Biosecurity as a status is synonymous with good animal health and welfare but also intersects with concerns over public health and national security. How far, then, might agricultural biosecurity extend into other public concerns such as biodiversity conservation, GMOs, and food safety? If the status of biosecurity is a national public good, who should provide it, how should they do so, and what exactly does it entail? These sets of questions, combined with the competing and complementary positions being enacted in biosecurity science, represent the problem-making potential of biosecurity.

For government the constructive problem that could be raised is: which risk to take. Going with biosecurity as a routine and purely technical exercise in risk management risks complacency in the face of unpredictable nonhuman agencies. Considering the wider implications of biosecurity as part of the public good of the nation-state might open or contribute to a whole other range of political debates. For the rest of us the problem might be: although we want biosecurity to act decisively and to close boundaries to pathogens, do we want it also to close political debate? This question could be rephrased as: what do we want the relationship between biosecurity acts and biosecurity politics to be? Social scientists need to occupy the middle ground of this relationship because the connections wrought by the concept of biosecurity might manifest as either the colonisation of new domains by an antipolitical mode of biosecurity or the creation of new social and political forms based around the questions raised in the previous paragraph.

At the heart of this paper lies a sense that good science is political; it engages with risk—the inherent contingency of events—through a process of inventive problem making and this problem making is a route by which debates are opened and maintained. Similarly, we could say that good politics is experimental, that it proceeds by a (precautionary) process that Dratwa (2002) refers to as “acting and doubting”. As they stand at present, biosecurity science, policy making, and parliamentary discourse are not deliberately engaged in a political problematisation of biosecurity. However, they do accomplish this through the associations that they make and through the variations they enact as to what exactly it is that biosecurity stands for. One thing that social scientists can do to promote this positive process is to adopt an experimental view of biosecurity that treats imprecision or multiplicity in its definition and construction as a virtue. Biosecurity would be a figuration for a wider set of productive relationships than at present, through which we can make propositions to produce better animal health and welfare, better public health, better science, better political accountability, and better economic stability (probably in that order of descending importance and certainly with constant questioning of what we mean by those things). The technical veracity of biosecurity acts will continue to be tested by disease events. Its conceptual and political aspects, its role in the building of collectives, needs to be tested by experimental events that we bring about, new problems that we formulate in conjunction with other scientists, policy makers, and publics. Making and testing new problems, building links, and building groups seem like the perfect tasks for a social scientist.
References

Anderson I, 2002 Foot and Mouth Disease 2001: Lessons to be Learned Inquiry Report (The Stationery Office, London)
Animal Health Act, 1981 Public General Acts—Elizabeth II chapter 22 (HMSO, London)
Animal Health Act, 2002 Public General Acts—Elizabeth II chapter 42 (The Stationery Office, London)
Barker K, 2008, “Flexible boundaries in biosecurity: accommodating gorse in Aotearoa New Zealand” Environment and Planning A 40 1598 – 1614
Barry A, 2002a, “The anti-political economy” Economy and Society 31 268 – 284
Barry A, 2002b, “Political events”, http://www.goldsmiths.ac.uk/csisp/papers/barry_political_events.pdf
Barry A, Slater D, 2002, “Technology, politics and the market: an interview with Michel Callon” Economy and Society 31 285 – 306
Beck U, 1992 Risk Society: Towards a New Modernity (Sage, London)
Bickerstaff K, Simmons P, 2004, “The right tool for the job? Modeling, spatial relationships, and styles of scientific practice in the UK foot and mouth crisis” Environment and Planning D: Society and Space 22 393 – 412
Billig M, 1995 Banal Nationalism (Sage, London)
Bingham N, 2006, “Bees, butterflies, and bacteria: biotechnology and the politics of nonhuman friendship” Environment and Planning A 38 483 – 498
Braun B, 2007, “Biopolitics and the molecularization of life” Cultural Geographies 14 6 – 28
Cabinet Office, 1999 Modernising Government (The Stationery Office, London)
Cabinet Office, 2002 Risk: Improving Government's Capability to Handle Risk and Uncertainty Strategy Unit (Cabinet Office, London)
Callon M, Lascoumes P, Barthé Y, 2001 Agir dans un Monde Incertain: Essai sur la Démocratie Technique (Seuil, Paris)
Castree N, 2003, “Environmental issues: relational ontologies and hybrid politics” Progress in Human Geography 27 203 – 211
Clout L, Holt R, 2007, “No foot and mouth on third cull farm”, Telegraph.co.uk, http://www.telegraph.co.uk/news/main.jhtml?xml=/news/2007/08/10/nfandm610.xml
Collier S, Lakoff, Rabinow P, 2004, “Biosecurity: towards an anthropology of the contemporary” Anthropology Today 20 3 – 7
CSL, 2005 Contributions to a State-of-the-Art Review of Biosecurity Risk Management Central Science Laboratory, Department for Environment, Food and Rural Affairs, London
Defra, Department for Environment, Food and Rural Affairs, London
2002a Horizon Scanning Strategy for Science
2002b Foundations for our Future—Defra’s Sustainable Development Strategy
2003 Route map for Implementation of Commitments in Government Response
http://www.defra.gov.uk/corporate/inquiries/response/index.htm
2004 Animal Health and Welfare Strategy for Great Britain
2005 Partners for Success: A Farm Regulation and Charging Strategy
2006 Foot and Mouth Disease Modelling Exercise Report
Donaldson A, Wood D, 2004, “Surveilling strange materialities: categorisation in the evolving geographies of FMD biosecurity” Environment and Planning D: Society and Space 22 373 – 391
Donaldson A, Lowe P, Ward N, 2002, “Virus – crisis – institutional change: the foot and mouth actor network and the governance of rural areas” Sociologia Rurals 42 201 – 214
Donaldson A, Lee R, Ward N, Wilkinson K, 2006, “Foot and mouth: five years on: the legacy of the 2001 foot and mouth disease crisis for farming and the British countryside”, DP 6, Centre for Rural Economy, Newcastle upon Tyne
Donaldson A, Murakami Wood D, forthcoming, “Commentary: avian influenza and events in political biogeography” Area
Dratwa J, 2002, “Taking risks with the precautionary principle: food (and the environment) for thought at the European Commission” Journal of Environmental Policy and Planning 4 197 – 213
EFRACOM, 2002a Seventh Report: Illegal Meat Imports http://www.publications.parliament.uk/pa/cm200102/cmselect/cmenvfru/968/968.pdf
EFRACOM, 2002b, Minutes of evidence, Environment, Food and Rural Affairs Select Committee, http://www.publications.parliament.uk/pa/cm/cmenvfru.htm
Enticott G, 2008, “The spaces of biosecurity: prescribing and negotiating solutions to bovine tuberculosis” Environment and Planning A 40 1568 – 1582
Fearnley L, 2008, “Signals come and go: syndromic surveillance and styles of biosecurity” Environment and Planning A 40 1615 – 1632
Fraser M, 2006, “Event” Theory, Culture and Society 23 129 – 132
Hinchliffe S, 2001, “Indeterminacy in-decisions: science, policy and politics in the BSE (Bovine Spongiform Encephalopathy) crisis” Transactions of the Institute of British Geographers, New Series 26 182 – 204
Hinchliffe S, Bingham N, 2008, “Security life: the emerging practices of biosecurity” Environment and Planning A 40 1534 – 1551
Honhold N, Taylor NM, Wingfield A, Einshoj P, Middlemiss C, Eppink L, Wroth R, Manley L M, 2004, “Evaluation of the application of veterinary judgement in the pre-emptive cull of contiguous premises during the epidemic of foot-and-mouth disease in Cumbria in 2001” Veterinary Record 155 349 – 355
JIGWG, 2006, “Sharing responsibilities and costs of animal disease”, report 12 July 2006, questions and answers, Joint Industry/Government Working Group http://www.defra.gov.uk/farm/policy/regulation/csharead/jigwg/pprs/pdf/reportqa.pdf
JIGWG (Joint Industry/Government Working Group), papers available from http://www.defra.gov.uk/farm/policy/regulation/csharead/jigwg/pprs/index.htm
Latour B, 1997, “Foreword: Stengers’ shibboleth”, in Power and Invention Ed. I Stengers (University of Minnesota Press, Minneapolis, MN)
Latour B, 2003a, “Why has critique run out of steam? From matters of fact to matters of concern”, http://www.bruno-latour.fr/articles/article/089.html
Latour B, 2003b, “Is re-modernization occurring—and if so, how to prove it?” Theory, Culture and Society 20 35 – 48
Latour B, 2004, The Politics of Nature (Harvard University Press, Cambridge, MA)
Latour B, 2005, Re-assembling the Social (Oxford University Press, Oxford)
Law J, 2006, “Disaster in agriculture: or foot and mouth mobilities” Environment and Planning A 38 227 – 239
Lyon D, 2001 Surveillance Society: Monitoring Everyday Life (Open University Press, Milton Keynes, Bucks)
Mackenzie A, 2005, “Problematising the technological: the object as event?” Social Epistemology 19 381 – 399
Meuwissen M P M, Hardaker J B, Huirne R B M, Dijkhuizen A A, 2001, “Sharing risks in agriculture: principles and empirical results” Netherlands Journal of Agricultural Research 49 343 – 356
O’Malley P, 2000, “Configurations of risk” Economy and Society 29 457 – 459
Oosterveer P, 2002, “Reinventing risk politics: reflexive modernity and the European BSE crisis” Journal of Environmental Policy and Planning 4 215 – 222
Policy Commission on the Future of Farming and Food, 2002 Farming and Food: A Sustainable Future Cabinet Office, London
Power M, 2004 The Risk Management of Everything: Rethinking the Politics of Uncertainty Demos, London, http://www.demos.co.uk/files/riskmanagementofeverything.pdf
Public Accounts Committee, 2005 Foot and Mouth Disease: Applying the Lessons (The Stationery Office, London)
Rabinow P, 1999 French DNA: Trouble in Purgatory (University of Chicago Press, Chicago, IL)
Rabinow P, 2003 Anthopos Today: Reflections on Modern Equipment (Princeton University Press, Princeton, NJ)
Rothstein H, Huber M, Gaskell G, 2006, “A theory of risk colonization: the spiraling regulatory logics of societal and institutional risk” Economy and Society 35 91 – 112
Royal Society, 2002 Infectious Diseases in Livestock (Royal Society, London)
Science Advisory Council, Department for Environment, Food and Rural Affairs, London 2004 Horizon Scanning
2006a Evidence and Innovation Strategy: SAC Response to the Public Consultation
2006b Social Science
Stassart P, Whatmore S, 2003, “Metabolising risk: food scares and the un/re-making of Belgian beef” Environment and Planning A 35 449 – 462
Stengers I, 1997 Power and Invention (University of Minnesota Press, Minneapolis, MN)
Stengers I, 2000 The Invention of Modern Science (University of Minnesota Press, Minneapolis, MN)
Szerszynski B, Heim W, Waterton C (Eds), 2003 Nature Performed (Blackwell, Oxford)
Veterinary Laboratories Agency, 2005 *State of the Art Review of Biosecurity Risk Management in Animal Diseases and Veterinary Public Health* Department of the Environment, Food and Rural Affairs, London

Waage J K, Fraser R W, Mumford J D, Cook C D, Wilby A, 2005 *A New Agenda for Biosecurity* (Department of the Environment, Food and Rural Affairs, London)

Ward N, Donaldson A, Lowe P, 2004, “Policy framing and learning the lessons from the UK’s foot and mouth disease crisis” *Environment and Planning C: Government and Policy* 22, 291 – 306

Whatmore S, 2002a *Hybrid Geographies* (Sage, London)

Whatmore S, 2002b, “Generating materials”, in *Using Social Theory: Thinking Through Research* Eds M Pryke, G Rose, S Whatmore (Sage, London) pp 89 – 104

Whitehead AN, 1920 *The Concept of Nature* (Cambridge University Press, Cambridge)

Wilkinson K, Lowe P, Donaldson A, forthcoming, “Beyond policy networks: policy framing and the politics of expertise in the 2001 foot and mouth disease crisis” *Public Administration*
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