

Horizon scanning rural crime - agroterrorism an emerging threat to UK agriculture?

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Abstract

Acts of terrorism are more normally associated with urban areas, infrastructure, and military or governmental targets. However, as societies around the world come to terms with the reality of asymmetric warfare and global terrorism, new targets and vulnerabilities have to be considered and a wider view of what constitutes critical national infrastructure should be recognised.

This paper challenges 'traditional' strategic thinking, which has considered agriculture as having limited vulnerability and being predominately susceptible to biological attack through an exploration of the potential threat and the implications for agriculture and rural communities in the UK for a variety of Agroterrorist attacks. Consideration of case studies and scenario building has identified the wider socio-economic implications for rural communities. These potential impacts go well beyond the farm gate and involve a variety of emerging and established industries such as horse racing, speciality food, leisure and tourism as well as threatening individual well being.

Finally an appraisal of the UK government policy in this area highlights some key areas of policy concern given the potential wide nature of an Agroterrorism attack, and argues that the UK should recognise Agroterrorism as a distinct threat to critical national infrastructure (as in the US). Through doing so it should seek to raise awareness across rural communities and stakeholders for both prevention and mitigation means.

Key words: agroterrorism/bioterrorism, critical national infrastructure, rural communities

Introduction

Since September 11th 2001, communities around the world have been drawn into the 'Global War on Terror'. The lesson clearly to be learned from these atrocities and other attacks is that the nature of warfare has and is changing and that what was once considered solely as plot material for a Hollywood blockbuster is now (unfortunately) part of the reality of the current situation. Whilst agriculture and the rural economy are not conventionally associated with acts of terrorism, this paper explores the scope, nature and impact of a deliberate terrorist attack on the agricultural sector in the UK – that is an agroterrorism incident.

Terrorism, Critical National Infrastructure and agriculture

Whilst terrorism is not a new threat to the UK, (the lengthy experience centred on Northern Ireland is evidence of this), the past focus on domestic terrorism has arguably shifted attention from international threats. It may be considered that the result is that international terrorism has found a focus within the UK and used it as a base both to commit acts in the UK and abroad (Makarenko 2007).

The emergence of Al-Qaeda as a global network which is both adaptable and exploitative of changes in the 'strategic environment', such as the exploitation of the war in Iraq for propaganda, recruitment and fundraising (Wilkinson 2007), has meant a change in how we consider this threat and the language we use to describe it. Whilst this change initially reflected military terminology, the adaptations seen as necessary in law enforcement and civil preparedness to deal with the Al-Qaeda threat have subsequently adopted this terminology.

The globalisation of Islamic based terrorism can now be seen as a form of wider scale warfare. No longer domestic or regional in its nature, terrorism today is a form of asymmetric warfare; that is warfare fundamentally based on the protagonists adaptation to emerging situations. In short it is war not between peoples as such, but war amongst peoples (Smith 2005). With asymmetric warfare comes increased uncertainty and the decreasing ability of traditional doctrine to counter it (Anker and Burke 2003). This means that our perceptions and understanding of vulnerability and what is vulnerable have to be reconsidered. No more so than when we consider the nature of what is Critical National Infrastructure (CNI).

CNI incorporates the vital elements of the home front, which are essential to maintain society, and includes communications, the emergency services, energy finance and food (MI5 2005). Disruption (through terrorist attack) wholly or partly to any of these sectors, could cause a range of impacts from loss of life, economic impacts at regional or national level, or to communities' ability to function (MI5 2005).

Merely recognising an area as being of CNI status does not necessarily translate into a clear remit to plan and inform stakeholders involved in that sector. The huge variability in the number and capabilities of stakeholders in each of the CNI sectors has left some CNI sectors dependent on generic planning and with limited focus and understanding of their operation, and vulnerability in relation to the detection, prevention or mitigation against terrorist attack.

The food sector is one of the most complex, with many components involved in the production, manufacturing, distribution, and retailing of food and drink products for UK produced goods. At the lowest level of 'attack' the sector is vulnerable to the blackmailer or disgruntled employee wishing to extort or disrupt a company or business; at the upper end a whole sector might be severely damaged.

The origins of agroterrorism

Of all the acts of 'terrorism', agroterrorism is one of the least studied and till recently little considered by contingency planners. Whilst a country's food system has historically been a target in military campaigns from ancient times to the Napoleon Wars and the blockade of the North Atlantic by German forces in World War Two, military interest in direct attacks on food production systems received most attention during the cold war.

Many nation states including the US, Russia, UK and France invested in a variety of biological agents in the 20th century. Deploying these bioweapons against agriculture had though been for most nation-states a theoretical consideration (Monke 2005). In the early 1990s the threat from biological attack came to be accepted by many policy makers, (particularly in the US) as the probable form of terrorist attack on the human population (Noah, Noah and Crowder 2002). Although there was little physical evidence to support this, beyond some past localised use by radicals. This concern at the threat of biological attack agents grew in the 1990s and included the concern that anti-livestock, anticrop and antisoil agents could fall into the hands of non-state aggressors (Foxell 2001; Kohnen 2000).

Initial concern with agroterrorism began in the US where the focus was on biological agents including crop diseases, pests and animal diseases. The use of the latter raises further issues, as some may be transmittable to humans (Zoonotic). Whilst there are hundreds of potential pathogens, realistically only a few dozen are considered viable (Katz 2005). When considering viability of an agent, livestock are considered to be more widely susceptible than crops to pathogens, principally because, livestock in industrialised countries – the UK, US, Australia, etc are generally considered disease free. They therefore make effective vectors of transmission, particularly, during live animal movements, (Katz 2005).

Anti-terrorism policy development in the US considered agroterrorism in a very narrow context. Parker (2002), (as part of the Federal Strategy)

described the risk specifically as being 'agricultural bioterrorism'. Similarly Kohnen (2000) described it as the deliberate use of a biological agent against livestock, poultry or crop.

The biological stance was further reinforced by studies such as Kosel and Anderson (2004) who considered the vulnerability of feed stocks in US agriculture and more recently Ungerer and Rogers (2005) who assessed the vulnerability of Australian agriculture within the context of the introduction of disease.

The result is that the principal view and major influence upon contingency planning is that agroterrorism is considered to be a sub-set of bioterrorism; that is the deliberate introduction of animal or plant diseases with the aim of generating losses and fear (Monke 2005).

The present terrorist threat –reconsidering the characteristics of agroterrorism?

Recent British assessments of the terrorist situation both globally and in the UK indicates a changing and expanding picture. Al-Queda is clearly committed to further attacks, and as the conflicts in Iraq and Afghanistan continue the situation globally can only become more complex and dangerous, meaning that the UK is now seen as a key target for Al-Queda, (Gregory and Wilkinson 2005). The nature of the threat may also be seen to be changing, with the threat now including chemicals, bacteriological agents, radioactive materials and nuclear technology (Manningham-Buller 2006). Numerous assessments have indicated that Al-Queda is actively seeking these materials and knowledge relating to chemical, biological, radiological and nuclear (CBRN) weaponry (Gregory and Wilkinson 2005; Intelligence and Security Committee 2006).

The potential for the use of CBRN materials with the ability to cause widespread economic disruption are now seen as being very much part of the terrorist's portfolio (Intelligence and Security Committee 2006; Lewis 2005).

With this in mind agroterrorism may need to be considered not just as a biological threat focused on plants and animals but something broader aimed at damaging the rural economy (Allan and Leitner 2006). Indeed, it may be useful to consider agroterrorism as the deployment of CBRN materials with the aim of damaging both the agri-food and rural economy.

Should agroterrorism be of concern to the UK?

The UK's rural economy is diverse. In brief, there are distinct areas of agricultural production. For example the south and eastern parts of the UK are largely cereal areas, the north, west and uplands of the UK are mostly livestock, with the central part of the country a mixed farming economy and

horticulture. UK farm production accounts for some 60% of all the raw food consumed in the country and some 73.3% of all indigenous food types (e.g. potatoes), (ONS 2006). The risk to both supply of goods and the agri-food economy from tampering is acute. Additionally, the UK rural economy is highly diversified. For many years British farmers have been encouraged to diversify in the face of declining markets and Common Agricultural Policy reform. This has resulted in high levels of farm diversification with approximately 46% of full-time farms engaged in some alternative enterprise and half of these gaining at least 25% of their total income from that diversification (DEFRA 2006). Additionally, outside of agriculture there are many high value businesses such as hotels, recreation activities, tourism facilities, golf courses, racecourses and racehorse-training yards interspersed across the countryside.

Experience of Foot and Mouth (FMD) in the UK in 2001 provides an insight into the potential costs to the countryside of an agroterrorist incident. During the period February 2001 to January 2002 when the last county was declared disease free, agricultural production lost some £355 million (approximately 20% of annual farming income) (Thompson et al 2002). During the outbreak some 4m animals were slaughtered casting blight over the countryside as their carcasses were disposed of through mass burial or burning. The countryside was effectively closed down with the result that tourism and associated businesses lost between £2.7 and £3.2 billion (Thompson et al 2002). Whilst not all the tourism losses were in the countryside many foreign visitors were put off visiting the UK because of the FMD outbreak, particularly over the lucrative summer months. During this period access to much of the countryside and the National Parks was restricted or prohibited. This also resulted in many rural sporting events and activities being restricted or suspended. The horse racing industry was particularly badly hit with many high profile events cancelled. For example the cancellation of the 2001 Cheltenham festival resulted in the loss of £4.5m in ticket sales alone and upwards in £7.2m to the wider regional economy in hospitality etc (Watkiss et al 2005). The resultant social cost was also high with businesses closing and redundancies damaging the viability of rural communities.

CBRN in the rural environment

Within the realm of CBRN materials there are a number of agents whose availability or ease of manufacture make them more likely materials of terrorist choice. The UK's agricultural system is still highly dependent on the use of pesticides and insecticides, which are considered to be an effective prophylactic against introduced crop diseases (Sample 2005).

In 2004 the UK's Department of the Environment Farming and Rural Affairs (DEFRA) produced guidance for local authorities on the decontamination of the open rural environment following exposure to CBRN materials. Within this document a number of materials were singled out as examples (Table 1), these provide a useful insight into the range of

potential agents under consideration and the importance of recognising the persistence of these materials in the environment. This impacts on the length of time the contamination is a risk and the degree to which decontamination can be employed (if at all).

It would be unlikely that a chemical attack or nuclear attack would be directly targeted at a rural community. However, drift or fallout from a urban incident may affect the countryside.

Table 1: Rural CBRN Contamination

	Type of Agent		
	Chemical	Biological	Radiological
Persistent environmental behaviour	Mustard or VX	Anthrax	Cobalt -60 or Iridium-192
Non-Persistent environmental behaviour	Sarin or Cyanide	Plague or Ricin	N/A

Adapted from (DEFRA 2004)

Radiological agents

The use of radioactive elements or compounds has often been dismissed as being too difficult to obtain or construct. Whilst a nuclear device is a complex weapon a 'dirty bomb' or Radiological Dispersal Device (RDD) is a simple mix of conventional explosive and radioactive material (USNRC 2003). Allan and Leitner (2006) argue that conventional wisdom would dictate that RDDs are best suited to urban environments, which makes them ideal for use against rural environments where surveillance is least.

Much discussion has centred on the availability of radiological materials. Whilst it is often cited that material may be obtained from former Soviet installations, however, domestic sources are far more easily obtainable from hospitals, university research centres, construction and industrial sites (USNRC 2003). It is often reported that these materials are 'lost' or stolen from facilities. Although many of these sources are not useful for a RDD, thefts of material such as Iridium-192 are of concern (USNRC 2003)

RDDs have a number of advantages over chemical and biological agents in that radiation causes damage to all living tissue, not just the target host. The long-term effects on the human body and the potential for delayed illness, particularly cancers, may make this a more frightening incident for those in the affected area. Furthermore, radiological contamination cannot be neutralised or destroyed so contaminated material can only be removed and stored. Contamination damages the very basis of the agricultural production as well as damaging land values.

Biological agents

Biological agents figure highly in deployment potential. At the lowest level there is contamination with biological agents such as salmonella and E-coli. Such contamination is localised and may generally contaminate a single property or enterprise. However, most of the potential agents are more likely to be deployed with the aim of maximising the coverage of the impact. Whilst the DEFRA review notes plague and ricin these are more likely to be resultant from contamination from an urban incident ‘spilling’ over into the rural hinterland. Of much greater concern are the Zoonotic diseases, in particular Anthrax and Highly Pathogenic Avian Influenza (eg. H5N1). The former is capable of being manufactured and the latter is present in wild bird populations in Eastern Europe. Key pathogenic agents with the potential to be deployed as anti-livestock and or anti-rural economy agents are outlined in Table 2.

Table 2

Disease	Host(s)	Zoonotic
Foot and mouth disease (FMD)	Cloven footed domestic and wild animals – cattle, sheep, pigs etc	X
Anthrax	All warm blooded animals	√
Brucellosis	Mainly cattle, but also sheep, pigs, dogs and goats	√
Highly pathogenic avian influenza (HPAI) in particular H5N1	Poultry and bird species	√
Glanders	Mainly horses	Some strains can affect people
Swine vesicular disease	Pigs	X
Rinderpest	Cloven footed domestic and wild animals – cattle, sheep, pigs etc	X
Newcastle disease	Poultry	X

Adapted from Centre for Disease Control (CDC) (2003 and 2005),
Ungerer and Rodgers (2006)

Sourcing material presents similar problems to obtaining other agents. Many of the pathogens are available in the environment, particularly in less developed countries. Ungerer and Rodgers (2006) explore the mechanism of collecting and transporting the FMD virus. The concerning aspect of this process is the simplicity of the operation and the ability of a perpetrator to visit a number of farms to spread and cultivate the infection. Ungerer and Rodgers also raise the spectre of the terrorist purchasing their own livestock to actively culture the disease. Having a pool of infected beasts would allow outbreaks to occur in various locations (as in the UK’s experience of FMD in 2001) resulting in a stretching of the response capability of authorities (Ungerer and Rodgers 2006).

Where does the vulnerability to the agricultural sector lie?

The UK's agriculture has a number of features that heighten its vulnerability to terrorist attack. These principally relate to its mode of operation, its workforce and its openness. The main points of vulnerability lie within the livestock and horticultural sectors.

The UK livestock sector agriculture is highly dependent on inputs, particularly of feed. Studies by Kosel and Anderson (2004) have identified that this is a potential route for contamination. Livestock also are transported long distances in the UK, for fattening or slaughter, again exacerbating the risk of disease transfer. This route was clearly influential in the 2001 FMD outbreak in the UK. During the FMD outbreak bio-security restrictions were imposed nation-wide, with controlled entry to farms, and the widespread use of disinfectant mats and wheel washes. In the subsequent years much of this procedure has been eroded and vehicles move regularly between properties with little or often no precautions.

Hobby farms may also provide another route for the propagation and dissemination of animal disease. Outside of the 'normal' agricultural system, hobby farmers can exhibit a lack of animal husbandry skills and have limited participation with mainstream agricultural institutions and their extension systems. They also generally lack targeted biosecurity information and are often found to have poor compliance with legislation (Department of Primary Industries, 2006; House of Commons, 2002; Ontario Ministry of Agriculture 2004). In Australia it has been noted that hobby farms often see biosecurity as something not of concern to them due to their low stock levels, (Department of Primary Industries 2006). For these reasons the biosecurity of hobby farms are of concern in most major agricultural systems including Australia, Canada, New Zealand and the US, as they potentially could become centres of unmonitored infection or contamination.

Other points of vulnerability stem from farm water systems, boreholes, abstraction points, ring mains, reservoirs and header tanks. They are all vulnerable to tampering, which could act as a conduit for disease or bacteria. The September 2006 outbreak of E-coli in the US linked to contaminated irrigation water (BBC 2006), although accidental, illustrates how easy it would be for deliberate contamination to take place, particularly of salad crops.

The changing nature of the labour force may also pose a risk. The UK rural economy benefits greatly from migrant workers, many employed under legitimate European Union schemes. Many workers come with references and provenance, although given the demand for labour some gangmasters are not adverse to engaging in unlawful employment practices (Rogaly 2006) and so engage illegal workers with no papers. Not knowing the background of employees clearly poses a risk to any business. Whilst there is no evidence that terrorists prefer illegal entry to the UK over legal ways of gaining entry, any risk assessment of the food production system (which

by its nature allows employees close contact with either the means of production or the product) must consider this factor. Whilst contentious this is a consideration which stems from a number of documented links between individuals who have sought asylum in the UK and terrorism (Makarenko 2007).

Finally, the openness of the British rural environment could also act as a vehicle for the spread of any disease or the dissemination of radiological contamination. Public footpaths and land designated as open access land under the Countryside Rights of Way Act (2000) offer legitimate and unhindered access to land where livestock are kept. Geographically remote livestock presents the opportunity to disseminate infection largely unmonitored (Monke 2004). Additionally, large areas of common land that are grazed by livestock, such as the New Forest National Park and the Long Mynd in Shropshire, are open access for walkers and recreationists, with the potential for close interaction between people and livestock. The spread of animal disease may be further facilitated by the presence of wild herds of deer and wild boar in the UK, which freely roam the countryside and mix with livestock and are potential carriers of diseases such as FMD (DEFRA 2007).

Potential Impacts on the UK's agriculture and rural environment

The potential impact of an agroterrorist attack may be best considered through hypothetical case studies. The UK has already suffered a major FMD outbreak and the information from this serves well as an illustration of the outcomes for the rural economy for a non-Zoonotic disease. The Chernobyl incident of 1986 and its subsequent contamination of upland parts of the UK also gives an insight into the issues relating to a low-level radiological incident.

The key aspect of the impact of an attack is scale. Contaminants like salmonella and E-coli are more likely to affect a single or limited number of properties due to limited mobility. However, an attack may have a wide geographical impact through consumers, as it is most likely to affect horticultural crops, which are distributed to many supermarkets and outlets. An incident such as this would in the UK be tracked by the Food Standards Agency (FSA) who would alert wholesalers, retailers and consumers. Evidence from recent food scares in the UK - BSE, Salmonella in eggs, Sudan 1 (food colourant) etc - indicates that consumer are inclined to abandon products regardless of actual risk. This is especially likely for horticultural crops which lack branding and individual identification. A widespread scare such as this could damage confidence in the market and have direct implications for the producer and their suppliers. Contamination though is unlikely to have a wide impact upon the rural economy outside of the affected sector. Indeed attacks such as these are more likely to be a result of bio-criminality (extortion, market manipulation etc) (Wheelis et al 2002)

With the threat from diseases like FMD the impacts become much greater. Even with a small-localised outbreak of FMD (as in the case of Surrey 2007) it takes time to be eradicated through quarantine and contiguous culling. The immediate impact of a disease such as FMD on the farming economy is to restrict livestock movements, close livestock markets and to end the export of livestock and meat products (DEFRA 2007a). With larger geographical outbreaks as in 2001, the impacts are noticeably wider in the economy. The impact on tourism and recreational activities are well documented as the affected areas of countryside are effectively closed to visitors to prevent the spread of the disease. The economic impacts of FMD become more widespread as time goes on, with the closure of sporting events and impacts on external trade and exports. However, it is the political and social arenas where the impacts may be felt most strongly. As culls and restrictions increase, the public may direct their anger away from the terrorist group towards the government of the day (Katz 2005).

The personal and emotional impacts of animal disease are also great (Macleod 2007). Although rural communities have changed vastly over the last few years, people in rural settlements generally feel a strong sense of community and a high degree of personal attachment to the local area (Commission for Rural Communities 2006). Agriculture may not be the main employer, but it is in general the countryside and the landscape, which draws and binds communities together. The rural population may provide community resilience through strong social networks (at least in the short and medium term) (Barclay 2004), but the long term impacts are harder to manage without intervention and will be felt (as in the 2001 UK FMD experience) at family and community level with increased stress, depression and relationship strain (Ungerer and Rogers 2006).

With Zoonotic diseases and radiological contamination, the long term impacts are exacerbated both economically and socially. A Zoonotic outbreak would result in an immediate halt to exports and a high potential for the curtailing of international travel, as seen in the 2003 SARS outbreak and more recent HPAI outbreaks in the far east and eastern Europe. The long-term impact of this could be a reduction in confidence and a concomitant reduction in overseas investment and an influence on the UK money markets. With both Zoonotic and radiological material there is also likely to be enhanced fear amongst the population. Such an attack could potentially lead to some difficult decisions by the authorities being taken as the areas affected are most likely to be sealed off to prevent the spread of disease or contamination and to enable decontamination. The UK's 2004 Civil Contingencies Act allows for the evacuation of areas during an emergency and under the Military Aid to Civil Authorities framework, units of the UK armed forces may be deployed for community support, crisis management, rescue, disaster recovery and restoration of normality, (Wilkinson 2007, 375).

UK armed forces are key to the UK's homeland security (Wilkinson 2007). However, the images of civilians managed by troops possibly wearing CBRN protective suits may arouse disquiet in the media and further

promote public fear. Dealing with such movements of people, their shelter needs, food, water and medical needs may stretch authorities and again test public confidence in government. US experience following Hurricane Katrina (2005) amply illustrated the problems of deploying military forces alongside civilian responders. Issues relating to communication, control, integration and victim management were observed as key issues of concern in post-incident reviews, (GAO 2006). On top of these management issues the UK has a problem with military over-stretch, long-term commitments in Iraq and Afghanistan allowing less time for civil contingency focussed exercises and training as well as reducing the actual pool of available personnel for UK deployment.

The impacts of an RDD or Zoonotic disease attack will go on long after the immediate crises. RDD contamination (if low level and contained) may be removed from the site and stored in a repository. However, this will remove the soil and reduce any confidence in future agricultural activity. Removal of persistent biological agents similarly damages the soil resource as well as being an expensive operation.

Certain industries may also withdraw from affected areas (or from the UK). High value enterprises in horticulture and horse breeding may decide to relocate to minimise contamination or potential future disruption. The 'image' of the countryside as a location for recreation and leisure may be similarly irreparably damaged, leading to visitors opting for 'non-affected' sites or possibly non UK locations. As the UK's rural economy is based so much on this type of diversification and actively supports agriculture, this may not only damage the wider rural economy but also the recovery of agricultural business.

On-going costs for decontamination, monitoring and compensation may stifle growth and undermine confidence in the wider economy. Indeed along with the legacy of contamination, the countryside would be left with a damaged social fabric, vulnerable to further economic pressure.

UK Government policy and planning

The UK does not have a formal agroterrorism policy to deal with the contingency effects of a deliberate agroterrorist attack. It is managed through a number of channels including the Centre for the Protection of National Infrastructure (CPNI), formed in early 2007. Whilst CPNI's remit covers the food sector, it has of yet not produced any public documentation on the subject. This leaves DEFRA as the principal authority for advise regarding CBRN incidents in the rural environment. However, it has no mention of agroterrorism on its website. Planning for a CBRN event is led through the Radioactive Substances Division which is DEFRA's lead agency for this area (DEFRA 2006a), with the Government Decontamination Service (GDS) providing additional information and advice. In terms of the collection of information and advice relating to animal health and disease (Zoonotic and no-Zoonotic) a group of authorities

(including the Food Standards Agency, the Department of Health and the UK regional executives for the UK) led by DEFRA co-ordinate this through their 'Zoonoses' report which is published periodically, the last being in 2004. Additionally since FMD 2001, the movement of livestock has been more closely controlled and monitored, largely through the employment of an Animal Health and Welfare Strategy which operates a veterinary surveillance programme, to alert the state veterinary service to potential outbreaks of disease.

The UK Government has a number of organisations dealing with terrorist and emergency preparedness backed by legislation – the principal piece being the Civil Contingencies Act (2004), which supports local and regional government's action. The key advisory body for the public is UK Resilience run by the Civil Contingencies Secretariat. Again this organisation has no information directly relating to agroterrorism. Only one document deals in detail with the rural situation, which is a set of guidance for local governments dealing with the 'decontamination of open environment exposed to CBRN substances or material' (DEFRA 2004). However, this does not relate directly to agriculture but to the urban and rural environments in general and mostly details the responsibilities of local government and other agencies in terms of decontamination, rather what a landowner could or should be doing following an attack. This type of advice is left to the document 'Preparing for Emergencies' a booklet that was sent to all UK households post 9/11. This booklet advises the population to 'Go in, stay in and Tune in'. Whilst this may be appropriate advice, and for many in the population guidance they can follow, for agriculturists, equine units etc this is not always practical, as many livestock managers will maintain their husbandry even under difficult conditions. Indeed this document can also be said to have rather an urban focus, reflecting the belief that that is the key area of vulnerability.

Under the 2004 Civil Contingencies Act, local authorities play a major role in dealing with incidents on the ground. Their role is key in organising logistical support for staff and facilities dealing with the incident, and they also have the remit to lead voluntary agencies and staff reception centres, (Home Office 2004). Additionally under the 2004 Act they are to promote business continuity, warn and inform the public, prevent emergencies from occurring and undertake risk assessment. With the expansion of responsibility, there are issues relating to funding as well as the logistics and administration of adopting these new functions. Richards (2007) raises the issue that beyond funding, research indicates some authorities had little knowledge of their regional responsibilities or the resource implications of developing them.

The UK picture is one of much information regarding CRBN issues disseminated amongst many organisations with very little focus and a general non-recognition of agroterrorism as being a distinct threat. The general lack of awareness in the UK of agroterrorism is surprising given the impact of the 2001 FMD outbreak. There is also limited acknowledgement of the issues of dealing with geographically disparate rural communities,

many of which are economically tied to their property more than a 'normal' householder. As a result of this broad grouping of CRBN issues, there is no information available to farmers, landowners or rural business advising them of risks or measures they could take to enhance their business security. For example few are aware that they themselves are liable to meet the costs of dealing with a CRBN incident on their land (DEFRA 2004).

Conclusion

It is apparent that the UK rural sector is not served well with information regarding agroterrorism. Indeed it is barely publicly accepted as a risk and there is no authoritative information available written for the UK rural community. Where available, much of the information is written for technical specialists and as such presents a very top down approach to dealing with these issues. For this reason the UK should possibly move towards more openness in this area, particularly given the relative vulnerability of the agricultural and rural sector and the potential economic and social impact. There is a vast array of knowledge relating to agroterrorism within the agricultural, veterinary and related academic community, which may be mobilised to inform and tackle this issue at a planning, and response level. At present the UK has a system largely suited to dealing with natural disease occurrences, and its suitability for tackling an intentional attack is largely unconsidered. In stark contrast, Monke (2005, 28) argues that post 9/11 the USA recognised it was deficient in its agrodefence capability and so has upgraded its measures to address the reality of agroterrorism.

The USA has adopted a flexible and integrated model to dealing with this complex issue. Current work undertaken by the author involves a review of US Federal and State responses to agroterrorism, including farm level risk assessment. This has involved the public and private sector as well as universities and NGOs in providing information and training to law enforcement, first responders and communities. The US Department of Homeland Security has developed a series of individual agriculture sector focussed training packages on the subject with plans to deal with issues relating to the potential impacts such as animal carcass disposal, dealing with human casualties and decontamination. In addition they have recognised the changing face of the rural community and developed (where appropriate) training and information for those living in rural areas but are not agriculturally dependant, as it is recognised that the co-operation of this part of the community is key to promoting effective biosecurity.

The approach the UK may wish to adopt may reflect the US methodology, where awareness, preparedness and community inclusiveness across sectors are seen as key to tackling these potential events.

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