Agricultural Terrorism
The US Perspective

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Introduction
Throughout history, natural disasters ranging from droughts and floods to untimely frosts and unmitigated heat have routinely reduced production of the safe and inexpensive food that is taken for granted in the United States. However, the terrorist attacks on the World Trade Center and other American targets in 2001 caused policy-makers to consider whether American agriculture was also susceptible to malicious acts of terror.

American agriculture could be a particularly inviting target. Not only could intentional contamination of the food supply or a natural disaster affect the health of humans, plants and animals, it could also have profound and lasting effects on the agricultural economy and compromise consumer confidence. In 2006, an outbreak of human illness caused by *E. coli* O157:H7 associated with spinach grown in the state of California led to 183 cases and one death in 26 states (MMWR, 2006). The spinach disaster was followed by an outbreak of *Salmonella* traced to contaminated tomatoes, which affected almost 200 people in 21 states (Wood, 2006). Another *E. coli* outbreak associated with shredded lettuce at fast food restaurants affected 152 individuals a few months later (USFDA, 2008). Following national recalls by the United States Food and Drug Administration (US FDA), consumer confidence in leafy greens plummeted, sales dropped, shares of publicly traded grocery store stock declined in value, produce had to be destroyed and losses to growers and processors approached an estimated $50-100 million.

Two months after these outbreaks, consumer purchasing of leafy greens was still significantly below pre-outbreak levels (Cuite et. al, 2007). If consumer confidence is shaken by food-borne illnesses not associated with intentional contamination of food, then it is reasonable to assume that a directed attack against agriculture, well planned and executed, would cause significant and long-lasting economic and social impacts in addition to any ensuing human, plant and animal diseases.

This chapter briefly discusses the history of agroterrorism in America, the potential impact of agroterrorism on the US economy and how policy-makers have responded to the likelihood of an attack on US agriculture.

What is Agroterrorism?
Agroterrorism has been described as:

*“The deliberate introduction of a disease agent, either against livestock or into the food chain, to undermine socioeconomic stability and/or generate fear.”*(Chalk, 2003)

and:

*“Agroterrorism is a subset of bioterrorism, and is defined as the deliberate introduction of a plant or animal disease with the goal of generating fear, causing economic losses, and/or undermining social stability.”* (Monke, 2007)
Although these and similar definitions have been accepted for some time in topical discussions, both descriptions accentuate plant and animal disease but do not mention water, human health or food safety. A more inclusive definition of agroterrorism proposed in this chapter is the “intentional introduction or threat of introduction of biological, chemical or physical agents into agricultural production or processing systems that diminish human, animal or plant health, compromise public confidence in the safety of food and water, generate economic losses for the agricultural sector or undermine social stability.”

The Importance of US Agriculture

The agriculture sector of the United States economy directly employs only 2% of the nation’s workforce but, overall, approximately one in six US workers, ranging from producers to processors, shippers and grocery shops to restaurant workers, are associated with food and fibre production. (USDA, 2005) Estimates from 2002 indicate that agriculture contributes $1.3 trillion dollars (USD), or 11%, to the gross domestic product. Gross farm sales exceed $200 billion dollars annually, with production almost evenly split between livestock and plants.

As of 2003, the United States produced more than 42% of the world’s maize, 35% of the world’s soybean and 12% of the world’s wheat. A significant proportion of US agricultural production (21%) is exported, with crops (22%) outpacing livestock (10.5%). These products made up 8% of all US exports ($60 billion USD) in 2003, which more than balanced the agricultural imports of 4% ($47 billion USD)(US Census Bureau, 2004).

Because of production surpluses and government policy supports, the average family in the United States spends only an estimated 5.8% of disposable household income on food, whether it is prepared at home or eaten away from home. Estimates from the European Union suggest that 7.2% of disposable household income is spent on food in its member countries. The world average for household spending for food is 15% for most developed nations and over 30% for many developing nations (USDA, 2006). Because US citizens are used to having access to safe, inexpensive food and water, any disruption in US agricultural productivity would severely shake consumer confidence and could lead to significant social unrest.

The cost of recovering from natural disasters or intentional agricultural terrorism directed at plants, animals or production and distribution systems would be much higher than that associated with the loss of product alone. Agroterrorism, because it is a directed and purposeful activity designed to create maximum damage to targets, could have much higher costs than randomly occurring natural outbreaks. The immediate loss of tangible goods and consumer confidence in safe and wholesome food and declines in domestic food purchases would be followed by declines in the value of publicly traded stocks in agriculture and food-based industries and loss of domestic and international markets, agricultural and non-agricultural alike. The Foot and Mouth Disease (FMD) outbreak in the United Kingdom in 2001 illustrated the extent of collateral economic damage associated with an agricultural disaster. Due to that episode, costs to agriculture were estimated at £3.1 billion. Additional costs to the tourism and hospitality industries were estimated at between £2.7 and £3.2 billion (Thompson et al., 2002).

Effects of Agroterrorism, Natural Disasters and Disease Outbreaks on Agriculture in the United States

Agroterrorism

Attacks against agricultural production systems and water supplies are not new and have been employed throughout the world for many years. Over the past forty years, the United States has experienced numerous incidents of intentional contamination of food, feed and water. Although the following list is comprised of events that did not involve recognised terrorist groups or states, the events indicate how easy it has been to contaminate food, feed or water.

In 1970, 30 cows were found dead on a farm owned by a Black Muslim group in Ashville, Alabama. Analysis of a pinkish-white material found on rocks in the stream from which the cows drank was identified by a local veterinary surgeon as cyanide. It was alleged that the local racist group, the Klu Klux Klan, might have been responsible (New York Times, 1970).
One of the earliest proven attempts to disrupt civil society with bioterrorism in the United States occurred in 1972, when a group of college students who belonged to a neo-nazi group apparently cultured and then planned to put 30-40 kg of typhoid bacteria into Chicago’s drinking water system. Fortunately, had the group been successful in delivering the bacteria into the water system, the bacteria would have been killed by normal water chlorination and no illnesses would have been expected. In less developed countries, however, the plan, if carried out, could have been effective in inducing human illness. In addition, the incident made authorities aware of how easy it was to culture pathogens in a school laboratory (Kellman, 2001).

In 1984, upset about local zoning board decisions that had gone against them, followers of the Indian guru Bhagwan Shree Rajneesh tested a plan to influence a local election by spiking salad bars with Salmonella Typhimurium at 10 restaurants and one grocery store in the town of The Dalles, Oregon. The cult members had hoped to incapacitate enough voters through food poisoning the day before a local county election so that their own candidates would win and would eventually reverse the previous zoning board decisions. At least 751 persons became sick with gastrointestinal illness from what local public health officials thought was a naturally occurring contamination. It was only when the cult leader admitted one year later to purposefully contaminating the salad bars that the plan was revealed. Fortunately, the exercise did not make enough people sick, so the plan to influence the November election was abandoned (Carus and Tucker, 2001).

In 1999, a Wisconsin man was indicted for contaminating, on two occasions, consumer products intended as ingredients in animal feed processed by National By-Products, Inc. The contamination with the pesticide chlordane forced the company to recall products and to destroy raw material, leading to losses exceeding $2.5 million. Chlordane, a potent pesticide, is linked to cancer in humans. On 13 April 2000, a federal jury returned a guilty verdict to the charge of tampering and sentenced the defendant to three years’ incarceration (USFDA, 2000). In early 2003, a disgruntled employee at a supermarket in Michigan intentionally contaminated over 200 pounds of minced beef with a nicotinic acid-based insecticide. Approximately 100 people in the community eventually became ill with symptoms of nicotine poisoning. The perpetrator was indicted after an investigation by the Federal Bureau of Investigation and the United States Department of Agriculture (MMWR, 2003a).

In 2007, a number of pet dogs and cats were reported to have become ill with symptoms consistent with kidney failure. Many of the pets were diagnosed with abnormal crystals in their urine samples and impaired kidney function. Many deaths of dogs and cats were alleged to have resulted. Epidemiological investigation strongly associated the ill pets with various pet foods that were processed by a Canadian pet food manufacturer, which used imported wheat gluten and rice middlings from China in the pet food formulations. Analysis of these raw products from China indicated that the wheat and rice products were contaminated with the synthetic polymer melamine to try to increase crude protein levels. The price of the wheat and rice was directly tied to crude protein concentrations and the contamination was a deliberate attempt to increase the value of the product.

An April 2007 hearing in the US Senate led to legislation requiring the Secretary of the Department of Health and Human Services to establish: “(1) processing and ingredient standards for feed, pet food, animal waste, and ingredient definitions; (2) update standards for pet food labelling that includes nutritional information and ingredient information; and (3) an early warning and surveillance system to identify contaminations of the pet food supply and outbreaks of illness from pet food”. (US Senate, 2007) Although the melamine incident was a case of manipulating agricultural production for financial gain and not a deliberate form of agroterrorism, it illustrates how easy it was to contaminate foodstuffs for companion animals and humans.

Natural Disasters and Disease Outbreaks
The recent history of natural disasters and disease outbreaks that resulted in widespread agricultural losses in the United States is impressive. Hurricanes Floyd (1999) and Katrina (2005) left agricultural and environmental devastation in their wake. Total damage estimates as a result of hurricane Floyd were approximately $6 billion. The estimated livestock damage was estimated at over $13 million. Hurricane Floyd destroyed a total of 2,504,161 acres (1.0 million hectares) of crops, with damage es-
estimates exceeding $543 million. Portions of ten states were declared major disaster areas, from Florida north to Connecticut (NWS, 1999 and NCFMP, 2007).

The effects of Katrina reached far beyond the immediate geographical area that felt her winds. The Mississippi River serves as the major shipping route for maize, soybean, rice and wheat produced in the nation’s major grain-producing states from Louisiana to Minnesota, a distance of over 1200 miles. New Orleans, at the terminus of the Mississippi River, is a major port for US oil imports and for export of agricultural products and is the site of considerable oil processing. Hurricane damage brought a halt to the flow of agricultural trade through New Orleans, which resulted in a domino effect of negative consequences. Grain producers were not able to move their harvested grain to the port of New Orleans, requiring them to seek storage facilities at high storage fees. Commodity prices were affected due to excessive stockpiles and there was eventual loss of product that could not be stored properly (Schnepf and Chite, 2005). Hurricane damage to farm-related industries was estimated at more than $2 billion. The estimate included $1 billion in direct losses, as well as $500 million in higher fuel and energy prices (AFBF, 2005).

Officials suspected that the outbreak of Exotic Newcastle Disease that occurred in California in 2002 was introduced into the United States by birds smuggled into California for illegal cock fighting. Although that incident was relegated to 50 small backyard producer premises and only 5,700 birds were euthanised, it demonstrated how easily a potentially devastating disease agent could be introduced into the country (Nolen, 2002).

The rapidly expanding trade in exotic pets was associated with the first outbreak of human monkeypox seen in the United States. In June 2003, 71 people in several Midwestern states were afflicted with pox type symptoms after handling prairie dogs that they had purchased as pets. Monkeypox, native to parts of central and western Africa, is common in rodents. The prairie dogs had been housed with African Gambian rats at exotic pet supply warehouses, contracted the disease from the rats and transmitted monkeypox to humans (MMWR, 2003b).

In November 2003, The Center for Disease Control and Prevention (CDC) and the Food and Drug Administration (FDA) issued interim final rules to establish new restrictions on the import, capture, transport, sale, exchange, distribution and release of African rodents, prairie dogs and certain other animals to prevent the introduction and spread of monkeypox in the United States. The government response was swift but this incident yet again pointed out how easily exotic diseases could be introduced into the country (USFDA, 2004).

Agents and Toxins with Agroterrorism Potential

Agents and toxins that can cause disease in plants and animals are often easy to employ, spread rapidly through the environment, are generally safe for humans to handle and have a potential for great economic damage. Terrorists would not only want to create as much damage as possible, but would also want to take credit for the attack in the ensuing media coverage. Pathogenic organisms and toxins that affect animals might be more likely to be used as agents in an agroterrorism attack. There are a number of reasons for this:

- Animal pathogens can be easily imported, concealed and introduced into production animal herds.
- Many animal pathogens are zoonotic, i.e. they can cause disease in both humans and animals and can also be transmitted between humans and animals.
- Animal pathogens can multiply within the target species, create a carrier state and thereby serve as vectors of the disease, prolonging the outbreak.
- Many animal diseases are highly contagious and have the potential to cause a rapidly progressing, explosive epidemic.
- Due to very effective eradication programmes in the United States over the past century, production animals in the United States are immunologically naïve to many foreign animal diseases.
- Many animal pathogens can spread to wildlife, creating a reservoir that would be difficult, if not possible, to control.
- In addition, due to historically effective eradication programmes, veterinary professionals and producers, the first line of surveillance for foreign diseases, are inexperienced in their early recognition.
• In an outbreak requiring the widespread destruction of infected animals, the disposal of dead animals would become a challenge to public health agencies. Media coverage of the burning or burial of dead animals would be distressing to consumers and might cause them to question the government response.

In contrast, plant pathogens and toxins may be less likely to be employed as agents of agroterrorism because their effects might be more protracted and less dramatic, resulting in a diminished ‘shock value’ to consumers. Other reasons why plant agents would be less likely to be employed in an agroterrorism attack include:

• Plant pathogens are as easily imported into the country as animal pathogenic agents but difficult to disseminate over a large area due to weather, temperature, humidity, particulate binding, dilution and air currents.
• Many plant pathogens require months to show their effects. The time lag between introduction and noticeable disease would reduce the shock value of a terrorist act.
• Given the lack of immediate effect after introduction of a plant pathogen, it would be difficult for terrorists to ‘take credit’ for an event.
• Many plant pathogens mimic naturally occurring diseases, further reducing the shock value.
• Plant pathogens have very little, if any, direct effect on human health.
• There is not as much consumer distress over media coverage of destroyed crops as there is over destruction of animals.

Through its Select Agent Program, the United States Center for Disease Control and Prevention (CDC), regulates all laboratories and other entities that possess, use and transfer pathogenic agents and toxins that could be used in a terrorist attack. These select agents were designated as such because they have the potential to create a severe threat to human, animal and plant health, either through direct effects on humans, plants or animals or on their products, or because they are particularly virulent, easily introduced into populations and difficult to prevent, recognise and treat (Table 36.1) (CFR, 2005).

Current Susceptibility of US Agriculture to Terrorism

Consolidation and Vertical Integration
A trend in American agriculture over the past 50 years has been toward larger farms and less plant and animal diversification on each farm. Large farms have become so prevalent that according to the National Agricultural Statistics Service of the USDA, 6.7% of farms (143K/2.1 M) account for 75% of the value of agricultural production in the United States and average 2000 acres in size.

In the beef, pork and poultry industries, consolidation among meat packers to form mega corporations has followed and perhaps even directed the same trend. During the past 30 years, concentration within the meat packing industry has tripled and now just four beef packing companies control more than 83% of the industry. Similar trends have occurred in pig and poultry processing (Farm Bill, 2007 and USDA, 2002).

From a bio-surveillance standpoint, large consolidated farms can be either very good or very bad. If adequate surveillance and response systems are in place, large farms can recognise, control and mitigate breaches of bio-security rapidly and effectively. However, because of their sheer size, an unrecognised outbreak of animal or plant disease can affect many more acres of crops and more individual animals, resulting in significantly more financial loss than on small diversified farms.

Concurrent with the change from small diversified farms to larger, more specialised farms has been the vertical integration of agriculture. In a vertically integrated system, producers, shippers, processors and often retailers are all part of the same company. There are economic advantages to this business model as well as greater control of product quality and uniformity. Vertical integration provides an opportunity to develop and implement effective biosecurity programs such as Hazard Analysis of Critical Control Points (HACCP), since one management team has control of all aspects of production, processing and retailing to consumers, essentially the ‘farm to fork’ concept.

However, there are risks with vertical integration. From an agroterrorism perspective, the danger of vertical integration is that a breach in any part of the system could conceivably affect the entire system, resulting in
widespread exposure of consumers to tainted produce and massive financial loss to the company.

Other Potential Vulnerabilities of U.S. Agriculture

With the development of the international economy, humans, animals and consumer products can travel across the globe within 14 hours. In today’s world, extremism and the frequency of international travel make the intentional introduction of foreign disease agents a possibility and unintentional introduction a probability.

Farms in the United States are geographically dispersed and are typically grouped in remote locations. Livestock, especially cattle, are often born and raised at one site and then transported to another site to be fattened to market weight. Ultimately they are transported once again to a processing facility at yet another location. Commingling of livestock, especially if surveillance is deficient, could allow easy and rapid transmission of disease among animals and across large regions of the country. A national identification system for all individual animals or shipments of livestock would greatly improve traceability. However, without a national capacity to arrive at an early and definitive diagnosis of foreign plant or animal diseases, spread of an introduced pathogen could occur una-

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<th>USDA only agents and toxins</th>
<th>USDA/HHS overlap agents and toxins</th>
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<td>• African horse sickness virus</td>
<td>• Botulinum neurotoxins</td>
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<td>• African swine fever virus</td>
<td>• Botulinum neurotoxin-producing species of Clostridium</td>
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<td>• Akabane virus</td>
<td>• Brucella abortus</td>
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<td>• Avian influenza virus (highly pathogenic)</td>
<td>• Brucella melitensis</td>
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<td>• Blue tongue virus (exotic)</td>
<td>• Brucella suis</td>
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<td>• Bovine spongiform encephalopathy agent</td>
<td>• Burkholderia mallei</td>
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<td>• Camel pox virus</td>
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<td>• Classical swine fever virus</td>
<td>• Clostridium perfringens epsilon toxin</td>
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<td>• Cowdria ruminantium (Heartwater)</td>
<td>• Coccidioides immitis</td>
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<td>• Foot-and-mouth disease virus</td>
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<td>• Japanese encephalitis virus</td>
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<td>• Lumpy skin disease virus</td>
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<td>• Malignant catarrhal fever virus (exotic)</td>
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<td>• Mycoplasma capricolum /M. F38/M. mycoides capri (contagious caprine o pleuropneumonia)</td>
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<td>• T-2 toxin</td>
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<td>• Venezuelan equine encephalitis virus</td>
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Plants

• Candidatus Liberobacter africanus
• Candidatus Liberobacter asiaticus
• Peronosclerospora philippinensis
• Ralstonia solanacearum, race 3, biovar 2
• Sclerophthora rayssiae var. zaeae
• Synchytrium endobioticum
• Xanthomonas oryzae pv. Oryzicola
• Xylellia fastidiosa (citrus variegated chlorosis strain)
bated for too long to prevent widespread damage to the industry.

Although measures have been enacted to improve border security, experts warn that there is still much work to be done. In addition, there is little biosecurity at processing and distribution centres and even less on most farms. A recent study found that livestock producers fattening beef cattle did not have high implementation of biocontainment, biosecurity or security practices. The authors found that, in general, larger cattle feedyards had better biosecurity practices than smaller facilities (Brandt et al., 2008).

Since the United States has been relatively successful in eliminating many internationally important animal diseases such as foot and mouth disease and classical swine fever, there are few producers, extension agents and veterinary surgeons, conceivably the first line of surveillance, who are adept at recognising foreign animal and plant diseases. Furthermore, since eradication programmes have been so successful, there has been little need to fund federal indemnity programmes for livestock losses associated with disease surveillance and eradication programmes. Many livestock producers see no financial incentive in reporting odd disease symptoms for fear that an investigation by animal disease authorities will result in economic losses to them with little chance of regaining the value of animals or their products. In these circumstances, passive surveillance for animal diseases could be severely affected. This was apparent when the ban on processing downer cattle (cattle unable to rise) for slaughter took effect right after the first case of bovine spongiform encephalopathy (BSE) was discovered in the United States in 2003. (USDA, 2003) BSE surveillance was centred on testing at processing centres by teams from the Food Safety Inspection Service (FSIS) of the USDA. The highest BSE risk cattle, those that were non-ambulatory or showing neurological signs, were often lost to surveillance because, with the downer cow ban in place, they never made it to slaughterhouses where they could be tested.

The longer the time between recognition of symptoms and actual diagnosis, the greater the chance of an explosive outbreak occurring. Besides the lack of trained personnel on most farms, there are few on-site, rapid diagnostic tests for most agents liable to be used in an attack on the nation’s food production systems. At a United States Senate Government Affairs Committee hearing 2003, a simulation of an intentional introduction of foot and mouth disease (FMD) into the country was described. Since the incubation period for FMD is three to five days and the disease is not usually diagnosed until day five, and due to the customary movement of cattle throughout the country, FMD would have already spread to 23 states by the time it was diagnosed. By day nine, it would have been in 29 states and would require an estimated 700,000 people to aid in response and recovery operations and to deal with the estimated 23 million head of cattle destroyed. Estimated losses ranged from $30.4 billion to $83.6 billion, not including loss of export markets. These estimates did not include the possibility of FMD spreading to deer and elk and becoming endemic in the wildlife population (US Senate, 2004).

A terrorist attack on the transportation infrastructure could also have profound effects on agriculture. Similar to the consequences seen with hurricane Katrina, any disruption of producers’ ability to get their products to terminal markets would dramatically affect the agricultural economy, as well as food and feed supplies. Similarly, since agriculture is very labour-intensive despite advances in mechanisation, any intentionally introduced epidemic affecting the labour force would necessarily affect the harvesting, processing and marketing of food, feed and fibre.

**Legislative and Presidential Responses**

**Legislative Responses**

During recent years in the past, the United States Congress has held four hearings on agroterrorism, three in the Senate and one in the House of Representatives. Congressional hearings are formal events during which invited witnesses are asked to offer their expertise on the topic of interest. Congressional hearings serve to focus legislators’ attention on particular issues and often result in the eventual introduction of legislation to address needs discovered during the hearings. The four hearings were entitled, ‘Agroterrorism: The Threat to America’s Breadbasket’, ‘Evaluating the Threat of Agroterrorism’, ‘Bio-security and Agroterrorism’, and ‘Biosecurity Coordination’.
Three major pieces of legislation were passed into law, two in 2002 and one in 2006, and focused on the nation’s security with specific provisions to safeguard agriculture, the food supply and public health. The Bioterrorism Preparedness Act (PL 107-188) was passed in 2002 and expanded FDA authority over the registration of food manufacturing and required prior notice from importers within a specified period prior to product arrival at the US borders. It also created the Select Agent List and the policies tightening the control over possession, transport and uses of those agents. In addition, the Act expanded agricultural security at USDA facilities and defined criminal penalties for violation of the Select Agent rules and for terrorism activities against animal production and processing enterprises.

The massive Homeland Security Act (PL 107-296) created the Department of Homeland Security (DHS) by combining parts of many agencies throughout the federal government into one Cabinet level agency. Two major changes directly affected agriculture: 1) responsibility for agricultural border inspections was transferred from the USDA to the US Customs and Border Patrol (CBP) while retaining scientific expertise from the USDA; and 2) responsibility for Plum Island Animal Disease Center, the lead foreign disease unit in the United States, was transferred from the USDA to the DHS. The reason for consolidation of these activities within the DHS was to coordinate activities and intelligence to prepare the agricultural industry for disaster prevention, planning, response and recovery.

The third law, the Animal Enterprise Terrorism Act (PL 109-374) was enacted to expand criminal penalties for terrorism activities against animal production and processing enterprises.

**Presidential Responses**

Presidential directives have been issued throughout US history to establish national policies, goals and objectives, especially for administrative agencies within the Executive Branch of government. These directives can be challenged by Congress if they are thought to violate the statutory process or conflict with the Constitution. Presidential directives often carry the force of law but can be modified extensively by Congress through its legislative oversight. For example, Congress can authorise and appropriate funds for only some provisions of executive directives, thereby dramatically altering their function and effectiveness in achieving the original intent of the President (Relyea, 2007)

Three Presidential Directives concerning homeland security were issued from December 2003 to December 2004. The first was the Homeland Security Presidential Directive-7 (HSPD-7), which designated critical infrastructure that was vulnerable to terrorist attack and was essential to the operation of the economy and government.

Presidential Directive-9 (HSPD-9) was issued a month later and was entitled ‘Defense of United States Agriculture and Food’. This directive established a national policy to protect against attacks on agriculture and food systems. The directive specifically instructed federal agencies to develop prevention and surveillance systems to monitor plant and animal health, food quality and public health through an integrated diagnostic system. It also recommended the establishment of a National Veterinary Stockpile (NVS), which would be able to deploy vaccines and therapeutic products within 24 hours of an attack, and a National Plant Disease Recovery System (NPDRS), which was charged with developing disease- and pest-resistant plant varieties within one growing season of an attack.

A previous Presidential Directive-5 (HSPD-5) called for the development of a National Response Plan to coordinate federal agencies as they plan prevention, response and recovery capabilities. Agricultural components of the plan provided nutrition assistance for disaster areas, control and eradication of animal and plant diseases and pests, assurance of food safety and protection of natural and cultural resources and historic properties.

The Executive Branch has also been active in promoting the development of public-private partnerships to protect critical infrastructure. Examples of public-private partnerships engaged in agricultural security activities include the:

- National Infrastructure Protection Plan, which shares best practices, identifies deficiencies in biosecurity, and improves communication between government agencies and private sector agriculture.
- Strategic Partnership Program Agroterrorism, which determines critical aspects of agriculture that may
be vulnerable to attack, enhances intelligence and surveillance, and develops mitigation strategies in case of an attack.

- Information Sharing and Analysis Center, which assesses information shared with the law enforcement and intelligence communities

Private, university and governmental laboratories and research centres have also been asked to coordinate activities so that a seamless laboratory system would have the surge capacity needed to respond in the case of an attack. In addition, public and private research centres have been asked to coordinate research activities to provide the scientific basis for response and recovery phases.

**Funding of Government Anti-agroterrorism Activities**

Legislative and executive branch responses to the threat of agroterrorism have little impact unless they are accompanied by appropriate levels of funding. The US Congress has oversight of the national budget and has, for the most part, complied with the President’s funding level requests for agroterrorism activities.

The bulk of federal funding to combat the potential of agroterrorism proceeds to the Departments of Agriculture and Homeland Security. The agricultural biosecurity functions of these two agencies are funded primarily through direct appropriations from Congress and, to a lesser degree, through user fees generally charged to food importers. The leading USDA recipients are the Agriculture Research Service (ARS), the Animal and Plant Health Inspection Service (APHIS), the Cooperative State Research, Education and Extension Service (CSREES), the Food Safety Inspection Service (FSIS), the Economic Research Service (ERS) and various administration and executive operations.

Funds appropriated to the Department of Homeland Security are used to support Customs and Border Protection (CBP) and to support research and training in science and technology.

Federal funding of activities directed toward agricultural biosecurity has increased by $262 million from the 2002 budget through to the 2007 budget. The requested budget for 2008 would increase funding by another $201 million over the 2007 budget, which would be almost a 100% increase in funding from the 2002 baseline level (Table 36.2).

Federal funding for agroterrorism activities described by function is depicted in Figure 36.1. The bulk of funding goes to the US Customs and Border Patrol. The second largest amount of funding is spread across the USDA and DHS and directed to address catastrophic threats. Ninety three percent (93%) of funding for agroterrorism activities is directed to border security, identifying and researching catastrophic threats and preserving critical infrastructure.

**Table 36.2. Appropriations for funding of activities direct against agroterrorism. Source: Monke, 2007.**

<table>
<thead>
<tr>
<th>YEAR (millions)</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008 (requested)</th>
</tr>
</thead>
<tbody>
<tr>
<td>USDA</td>
<td>552</td>
<td>416</td>
<td>412</td>
<td>596</td>
<td>598</td>
<td>523</td>
<td>719</td>
</tr>
<tr>
<td>DHS</td>
<td>NA</td>
<td>69</td>
<td>227</td>
<td>211</td>
<td>264</td>
<td>295</td>
<td>300</td>
</tr>
<tr>
<td>TOTAL</td>
<td>552</td>
<td>485</td>
<td>639</td>
<td>807</td>
<td>862</td>
<td>818</td>
<td>1,019</td>
</tr>
</tbody>
</table>

**Figure 36.1. Homeland security funding for agriculture by function. Source: Monke, 2007.**
Conclusions

Agriculture is a significant component of the US economy, providing safe and inexpensive food for people and feed for animals at an affordable cost and helping to balance trade with international markets. It is fundamental to the health of humans, animals and the ecosystem.

Previous natural disasters and incidents of deliberate contamination of food, feed and water have shown that agricultural systems in the US are susceptible to intentional and malicious attacks. The ineffective state preparations and federal responses to hurricane Katrina in 2005 highlighted the necessity for a well-funded, directed and coordinated response to help communities in need.

The US government has taken numerous measures to counteract the threat of agroterrorism based on the principles of primary, secondary and tertiary prevention. Primary prevention focuses on eliminating or reducing individual and community exposures through enhanced surveillance and communication at borders, at production and processing facilities, and at importing entities, whether the importers are countries or international corporations. The bulk of the federal budget allocated to agricultural biosurveillance is directed at border security and keeping foreign pests and pathogens out of the country.

Secondary prevention centres on recognising exposures and preventing disease through better training of individuals in the diagnosis of foreign diseases, better diagnostic tests and coordinated and timely laboratory response capabilities. These areas have also received considerable federal financial support over the past five years. A recent example of renewed interest in developing a cadre of professionals adept at foreign disease diagnosis is the mandatory training in exotic and emerging animal diseases taken by students in the professional veterinary medicine programmes at 23 colleges in the United States. However, such efforts are offset by the unfulfilled need for veterinary surgeons in production medicine and public health practice. Legislation to encourage more veterinary medical students to enter food animal and public health careers has also been introduced in Congress.

Tertiary prevention concentrates on mitigating the effects of disease outbreaks through rapid response and mobilisation of necessary funds and personnel. Over the past seven years throughout the country, there have been, and continue to be, many simulations and tabletop exercises that link local, state and federal agencies in a coordinated response to natural disasters and intentional exposures. All three levels of government have been energised to develop coordinated and workable plans to respond efficiently to threats to public health.

Public health and agricultural planners recognise that the damage associated with an outbreak is proportional to the time elapsed between the index case and diagnosis. They also recognise that as efforts progress through primary to tertiary prevention, attendant costs rise dramatically. Planning must be all-inclusive and bring to the discussion the intelligence and science communities, the public and private sectors and risk communicators who can inform consumers about the nature of threats.


Further Reading:


Chapter 36


References


Chapter 37


