

# T E S T I M O N Y

**RAND**

## *Terrorism, Infrastructure Protection, and the U.S. Food and Agricultural Sector*

*Peter Chalk*

*CT-184*

*October 2001*

---

The RAND testimony series contains the statements of RAND staff members as prepared for delivery.

Published 2001 by RAND  
1700 Main Street, P.O. Box 2138, Santa Monica, CA 90407-2138  
1200 South Hayes Street, Arlington, VA 22202-5050  
201 North Craig Street, Suite 102, Pittsburgh, PA 15213-1516  
RAND URL: <http://www.rand.org>  
To order RAND documents or to obtain additional information,  
contact RAND Distribution Services: Telephone: 310-451-7002;  
Fax: 310-451-6915; or Email: [order@rand.org](mailto:order@rand.org)

***TERRORISM, INFRASTRUCTURE PROTECTION, AND  
THE U.S. FOOD AND AGRICULTURAL SECTOR***

**Testimony of Dr. Peter Chalk**

**Policy Analyst, RAND Washington Office**

**Before the Subcommittee on Oversight of Government Management,  
Restructuring and the District of Columbia, U.S. Senate**

**October 10, 2001**

The opinions and conclusions expressed in this written testimony are the author's alone and should not be interpreted as representing those of RAND or any of the sponsors of its research.

**TERRORISM, INFRASTRUCTURE PROTECTION, AND THE U.S. FOOD AND  
AGRICULTURAL SECTOR**

**Statement by Dr. Peter Chalk,\* Policy Analyst, RAND Washington  
Office**

**INTRODUCTION**

Thank you Mr. Chairman and distinguished Members of the Senate Subcommittee on Oversight of Government, Management, Restructuring and the District of Columbia the opportunity to testify on this important subject.

Over the past decade, many states, particularly in North America and Western Europe, have made substantial investments in improving their ability to detect, prevent and respond to terrorist threats and incidents. This has fed into an increasingly well-protected public infrastructure throughout much of the developed world where, at a minimum, effectively developed vulnerability-threat analyses have been used to maximize both anti-terrorist contingencies and consequence management modalities. This investment in preparedness, training and response has helped with the development of viable incident command structures that now span the ambit of potential terrorist attacks,

---

\* This testimony is based on the author's cumulative knowledge of terrorism and threats to the US food supply. No Federal government grants or monies were used to prepare this written testimony. **The opinions and conclusions expressed both in this testimony and the published work from which it is derived are entirely the author's own and should not be interpreted as representing those of RAND or any of the sponsors of its research.**

from conventional bombings to more "exotic" biological, chemical, radiological and nuclear incidents.

Agriculture is one area that has received very little attention in this regard, however. Indeed, in terms of accurate threat assessments, response structures and preparedness initiatives, the sector continues to exist as a glaring exception to the wide-ranging emphasis that has been given to critical infrastructure protection in this country.

This testimony aims to expand the current debate on public infrastructure protection and bio-terrorism by assessing the vulnerabilities of agriculture and the food chain to a deliberate act of agro-terrorism. For the purposes of this testimony, agro-terrorism will be defined as the deliberate introduction of a disease agent, either against livestock or into the food chain, for purposes of undermining stability and/or generating fear. Depending on the disease agent and vector chosen, it is a tactic that can be used either to generate cause mass socio-economic disruption or as a form of direct human aggression.

#### **THE IMPORTANCE OF THE US AGRICULTURAL AND FOOD SECTOR AND IS VULNERABILITY TO SABOTAGE**

Agriculture and the general food industry remain absolutely critical to the social, economic and, arguably, political stability of the US, indirectly constituting roughly two percent of the country's overall domestic gross domestic product (GDP). One in eight people work in some component of agriculture - more if food production is included - making the industry one of the US' largest employers.<sup>1</sup> Cattle and dairy farmers alone earn between US\$50 and US\$54 billion a year through meat and milk sales, while roughly US\$50 billion is raised every year through agricultural exports. The share of produce sold overseas is more

---

<sup>1</sup> Comments made by Noreen Hynes during the International Conference on Emerging Infectious Diseases (ICIED), Atlanta, Georgia, July 16-19 2000.

than double that of other US industries, which gives agriculture major importance in terms of the American balance of trade.<sup>2</sup>

These figures represent only a fraction of the total value of agriculture to the country, as they do not take into account allied services and industries such as suppliers, transporters, distributors and restaurant chains.<sup>3</sup> The down stream effect of any deliberate act of sabotage/destruction to this highly valuable industry would be enormous, creating a tidal wave effect that would be felt by all these sectors, impacting, ultimately, on the ordinary citizen him/herself.

Unfortunately, the agricultural and food industries remain highly vulnerable to deliberate (and accidental) disruption. Critical considerations in this regard include:

- The increased disease susceptibility of farm animals as a result of steroid programs and husbandry practices instituted to elevate the volume and quality of meat production as well as meet the specific requirements of potential vendors. These bio-technic treatments have increased the stress levels of exposed livestock and, in doing, have inadvertently served to lower their natural resistance to viral and bacterial infections.<sup>4</sup>
- The existence of a large number of agents that are both lethal and highly contagious to animals, many of which livestock are not routinely vaccinated against. At least 22 such diseases are known to exist. The bulk of these ailments are both environmentally hardy - being able to

---

<sup>2</sup> Ellen Shell, "Could Mad Cow Disease Happen Here?" *The Atlantic Monthly* 282/3 (1998): 92; "Stockgrowers Warned of Terrorism Threat," *The Chieftain*, August 19, 1999.

<sup>3</sup> Terence Wilson et al., "A Review of Agroterrorism, Biological Crimes and Biological Warfare Targeting Animal Agriculture," paper supplied to the author, 22.

<sup>4</sup> Author interview with Animal and Plant Health Inspection Service (APHIS) officials, Washington D.C., July 1999.

exist for long periods of time in organic matter – and reasonably easy to acquire and/or produce.<sup>5</sup>

- The ease and rapidity by which infectious animal diseases are able to spread, reflecting the intensive and concentrated nature farming practices in the US. Most dairies in the country can be expected to contain at least 1,500 lactating cows at any one time, with some of the largest facilities housing as many as 5,000 to 10,000 animals. An infectious outbreak at one of these facilities would be extremely difficult to contain and could necessitate the wholesale destruction of all the animals. Models developed by the US Department of Agriculture (USDA) suggest that a disease such as Foot and Mouth (FMD) could spread to as many as 25 states in as little as five days through the regulated movement of animals between farm and market.<sup>6</sup>

- The proliferation of food processors lacking sufficient security and safety preparedness measures. Several thousand facilities exist in the US, the bulk of which are characterized by lax internal quality control – typically only a fraction of the produce that originates from these

---

<sup>5</sup> Principal among these include:

- Foot and Mouth Disease
- Classical Swine Fever Virus
- African Swine Fever Virus
- Rinderpest
- Rift Valley Fever
- Avian Influenza
- Newcastle Disease
- Bluetongue
- Venezuelan Equine Encephalomyelitis Virus
- Vesicular Stomatitis
- Lumpy Skin Disease

<sup>6</sup> Author interview with US Department of Agriculture (USDA) officials, Washington D.C. and Riverdale, Maryland, 1999-2000. See also J. Ekboir, *The Potential Impact of Foot and Mouth Disease in California: The Role and contribution of Animal Health Surveillance and Monitoring Services* (Davis, CA: Agriculture Issues Center, 1999).

plants is actually subjected to end of line testing and screening - minimal bio-security and surveillance, inadequate product recall procedures and highly transient, unscreened workforces.<sup>7</sup> These sites represent ideal locations for the deliberate introduction of bacteria and toxins such as salmonella, *E. coli* )157 and botulism. Moreover, because most processed food is disseminated to a wider "catchment" area in a relatively short period of time, a single case of contamination could have significant health ramifications well beyond the immediate source of introduction.

- The increased production of genetically modified (GM) commodities. This particular development has served to exacerbate the potential threat of extremist violence being directed against both the food and agricultural industries. Problems in this regard have already occurred, with varying degrees of seriousness, throughout Western Europe, particularly in the UK and France.

#### **IMPACT OF A MAJOR ATTACK AGAINST AGRICULTURE AND/OR THE FOOD CHAIN**

The impact of a major agricultural/food-related disaster in the US would be enormous and could easily extend beyond the immediate agricultural community to affect other segments of society. It is possible to envision at least three major effects that might result.

##### *Mass economic destabilization*

Perhaps one of the most immediate effects of a major act of biological agro-terrorism would be to create, mass economic destabilization, generating costs that could be expected to cross

---

<sup>7</sup> Author interview with California Department of Health (CDHS) officials, Sacramento, August 2000.

at least three levels. First, there would be direct economic losses resulting from containment measures and the destruction of disease-ridden livestock. A study by the USDA has concluded, for instance, that if African Swine Fever (ASF) were ever to become entrenched in the US, the cost over a ten-year period would be \$5.4 billion.<sup>8</sup>

Second, indirect multiplier effects would accrue both from compensation costs paid to farmers for the destruction of agricultural commodities and losses suffered by both directly and indirectly related industries. Over 1 billion GBP was paid in compensation to farmers affected by the recent FMD outbreak in the UK (claims for each farm were in the range of 116,000GBP); tourism receipts were also hit hard as a result of cancellations brought about by the quarantine of farms located in or near popular holiday destinations such as the Lake District.<sup>9</sup>

Finally, international costs in the form of protective trade embargoes imposed by major external trading partners would be manifest. Very much indicative of the potential scale of these losses was a blanket ban that was imposed on Taiwanese pork exports following a particularly devastating outbreak of FMD between March and July 1997. The embargo caused Taipei's GDP by a full two percentage points almost overnight.<sup>10</sup>

---

<sup>8</sup> See C. Renlemann and Spinelli, "An Economic Assessment of the Costs and Benefits of African Swine Fever Prevention," *Animal Health Insight* (Spring/Summer 1994).

<sup>9</sup> "Spring Returns to Rural Britain, But Not Tourists," *The Washington Post*, March 16, 2001; "After Foot and Mouth," *The Economist*, May 5<sup>th</sup>, 2001; "Farmers Paid 1Bn Pounds for Culled Animals," *The Daily Telegraph*, June 30<sup>th</sup>, 2001.

<sup>10</sup> Overall costs of the FMD outbreak ran to US\$378.6 million during the four months. For further details see P.C. Yang, R.M. Chu, W.B. Chung and H.T. Sung, "Epidemiological Characteristics and Financial Costs of the 1997 Foot and Mouth Disease Epidemic in Taiwan," *Vet Rec* 145/25 (1999).

*Loss of Political Support and Confidence in Government*

A successful act of agro-terrorism would also serve to undermine confidence and support in government. Releasing contagious agents and contaminants against livestock or introducing them into the food chain would undoubtedly cause people to lose confidence in the safety of the food supply and could lead to questions over the effectiveness of existing contingency planning against weapons of mass destruction in general. Critics would also undoubtedly demand why the intelligence agencies failed to detect that an attack was imminent and why the agricultural sector was left exposed.

The actual mechanics of dealing with an act of agro-terrorism may act as an additional trigger for public criticism. Mass eradication and disposal are likely to be particularly controversial and could quite easily elicit protest (and possibly violence) from animal rights and environmental groups. Containing a major disease outbreak would almost certainly necessitate the slaughter of hundreds of hundreds of thousands of animal. Euthanizing such volumes would be sure to generate widespread opposition from farmers, animal rights groups and possibly even the public (despite being a scientifically justifiable method of viral containment), particularly if culling operations involved the slaughter of susceptible, but non-disease showing livestock (fire breaker operations). The fact that the US has not experienced a major cattle or sheep outbreak in the era of public TV is especially important in this regard as it effectively means that no visual point of reference has been available to prepare the public at large for the consequences of containing such a catastrophe.<sup>11</sup>

Indeed, even countries that have been subjected to major agricultural disasters can be affected by such dynamics. The UK provides a case in point. The mass depopulation operations

---

<sup>11</sup> Author interview with USDA and APHIS officials, Washington D.C. and Riverdale, Maryland, 1999-2000.

initiated to try and stem the 2001 FMD outbreak (many of which targeted seemingly health animals) engendered significant opposition from farmers, politicians (citing government over-reaction) and the public at large.<sup>12</sup> This, despite the fact that Britain had already lived through the enormity of the mad cow disaster in the early 1990s.

*Social instability*

Beyond immediate economic and political impacts, bio-terrorist assaults against agriculture and/or the food chain have the potential to create mass panic, particularly if the catastrophe had a direct public health impact. The outbreak of a contagious zoonotic disease or a major food contamination scare would be most significant in this regard, especially in the event that human deaths actually occurred. Terrorists could use this to their advantage, allowing them to create a general atmosphere of fear and anxiety without actually having to carry out indiscriminate civilian-oriented attacks.

The 1999 West Nile Virus outbreak in New York provides a partial insight into the type of mass panic that could be unleashed if a large-scale zoonotic epidemic were, in fact, to become entrenched in the US. The disease, which was previously unknown to America, quickly spread to humans, several of whom subsequently died as a result of massive heart and liver failure. An unprecedented public health scare ensued, the dimensions of which were further exacerbated by the epidemiological difficulty (at least initially) of definitively determining the pathogen's type, source and transmission mode.<sup>13</sup>

---

<sup>12</sup> Author interview with British Broadcasting Corporation (BBC) correspondent, March 2001. See also "This Wretched Cult of Blood and Money," *The Times*, May 23, 2001; "The Cruelty of This Cull," *The Sunday Times*, May 20, 2001; and "Tactics Used on Half the Farms 'Were Inefficient,'" *The Daily Telegraph*, May 22, 2001.

## **POLICY RECOMMENDATIONS**

The US - more by luck than design - has not experienced a major agricultural or food-related disaster in recent memory. There has, as a result, been no real appreciation of either the consequences or threat potential of such an event taking place in this country. This has been reflected in the make up of the US agricultural emergency preparedness and response, which have yet to be given the resources necessary to develop into a truly integrated and comprehensive system that is capable of addressing mass, multi-focal contingencies. Equally, general bio-security and surveillance at many of the country's food processing and rendering plants remains woefully inadequate, with most also lacking effective and viable product recall/trace-back plans.

Specific weaknesses include:

- A lack of resources, particularly in relation to mitigating and containing large-scale disease outbreaks.
- Insufficient personnel with training in foreign animal disease (FAD) recognition and treatment.
- A declining diagnostician pool in general as a result of insufficient educational support for veterinary science.
- An emergency management program that is essentially designed to deal with only one or two localized animal disease outbreaks at a time.
- Inadequate forensic coordination between the agricultural and domestic criminal justice communities.

---

<sup>13</sup> Comments made during a special panel on West Nile Virus during the International Conference on Emerging Infectious Diseases (ICEID), Atlanta, Georgia, July 2000.

- An emergency response program that relies on an unreliable passive disease reporting systems, and which is hampered by a lack of communication and trust between regulators and producers.
- Insufficient food surveillance and inspections at processing and packing plants.
- Inadequate response modalities to deal with food-borne diseases.

Measures can and, indeed, should be initiated to augment the effectiveness of the general agricultural/food response structure in the US. At least six policy recommendations can be made for the short and medium term.

First, more investment should be made in human, physical and logistical infrastructure, especially with regard to FAD diagnostician training; regular preparedness and response exercises and programs; appropriate diagnostic facilities capable of supporting high level research into virulent foreign and exotic animal diseases; and integrated electronic communication systems between emergency management staff and field response personnel.

Second, the overall veterinary science curriculum should be reformed, with a greater emphasis on large-scale animal husbandry and foreign/exotic disease recognition and treatment.

Third, more attention needs be given on how to involve accredited local/state veterinarians in the USDA's overall emergency management system (which would fulfill an important "force multiplier" function).

Fourth, better coordinated and more standardized links between the US agricultural, criminal justice and intelligence communities need to be fostered, especially in the context of epidemiological investigations to establish whether a disease outbreak was deliberately orchestrated or the result of a naturally occurring phenomenon.

Fifth, a viable national agricultural insurance scheme that can be used to compensate farmers in the event of a major agricultural disaster needs to be developed (something that would also help to heighten the effectiveness of the passive disease reporting system upon which the USDA relies).

Sixth, more effective bio-security, surveillance and emergency response at food processors and packing plants should be instituted, especially those that exist at the smaller end of the scale. Immediate measures that could be usefully initiated include more effective site security, increased background checks on seasonal employees and the development of clearly documented, well-rehearsed product recall plans.

Over the longer-term, concrete moves should be encouraged to standardize and rationalize food and agricultural safety within the confines of a single Federal agency that has both budgetary and programmatic powers over a wide spectrum of functional domains and jurisdictions. Such a body would help to streamline the patchwork of largely uncoordinated food safety initiatives that currently exists in the US, many of which have sought to only individually enact specific preparedness and response objectives. In addition, it would contribute substantially to the development of a national emergency animal and food disease response plan that both reduces conflicts and eliminates unnecessary duplication of effort.

Thank you for your time. I will be happy to respond to any questions that you might have.