The Threat of Agroterrorism

Economics of Bioterrorism

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Bioterrorism and its potential as an instrument of terrorist groups have dominated the minds of Americans since the anthrax attacks in the autumn of 2001. These attacks exacerbated the traumatic shock of 9/11 and resurrected fears that terrorists might deploy sophisticated biological weapons in order to wreak societal havoc. In the process, these weapons might kill or injure thousands of people and severely compromise our livestock, food chain, and water supplies.

Particularly worrisome, from an economic perspective, is a particular type of bioterrorism: agricultural terrorism. Agroterrorism is defined as attacks against livestock and crops, but this article will focus on livestock-targeted attacks, which, if successful, present a multibillion dollar challenge to the economy of the United States. Agroterrorism is a relatively affordable way for a terrorist group to undercut a nation's economy, undermine its political system, cause nationwide panic, and generate enormous publicity for the organization or individual responsible for the attack.[1]

Development of Agroterrorism. Bioweapons, includ ing agricultural biological weapons (ABW), have been used in conventional warfare since World War I, when German agents in the United States inoculated horses and cattle with the infectious disease, glanders, before the animals were shipped to France.[2] Two decades later, in 1939, the French bioweapons program intensively bred potato beetles in order to undermine the German food supply.[3] During the Cold War, the Soviet Union experimented with ticks in order to transmit foot-and-mouth disease (FMD), bovine pleuropneunomia, avian influenza, and other infectious diseases capable of infecting both animals and humans.[4] These instances illustrate the ABW expertise developed and maintained by governments for the past ninety years. However, attempts by non-state actors to acquire that knowledge are relatively new phenomena.

The threat of agroterrorism expanded exponentially during the 1990s for a number of reasons. While, in the past, bioweapon experimentation was limited to a few countries, political developments—particularly the breakup of the Soviet Union, the end of South Africa's apartheid regime, and the fall of Saddam Hussein—and recent, wide-scale, naturally-occurring epidemics have created opportunities for terrorist groups worldwide to collect bioagents.[5] The collapse of strong military-industrial complexes in these countries may allow terrorists to entice unemployed or underemployed experts in biological warfare and other related fields through monetary payments or promises of revenge. For example, in 1986, the Soviet government was spending 3.8 percent of its GDP on research and development (R&D), but, by 1992, funding had dropped to 0.74 percent of the falling GDP. In 2002, funding was 0.35 percent of the GDP; in real prices budget spending on R&D decreased by 90 percent.[6] Many of the scientists employed in these projects have since found themselves in reduced circumstances and may be open to alternative sources of support.[7]

How Real is the Threat? Attractive features of agroterrorism include its relative affordability or cost-effectiveness, the difficulty in detecting bioagents, the high concentration of livestock in limited number of places, and the high mobility of animals and animal products. In addition, the terrorist who deploys the bioagent faces limited risks because the pathogens that attack cattle usually do not affect humans.

Non-state actors may resort to agroterrorism due to its low costs. According to a recent Heritage Foundation report, "Over one hundred states have the capability to manufacture biological weapons on a large scale," and a basic biotoxin-producing facility can be built and operated for less than $10 million.[8] When one considers that the assets of Japan's Aum Shinrikyo sect were worth between $200 million and $1 billion in 1995-96 and assets of al Qaeda are estimated to be between $30 and $300 million of dollars, the creation of such facilities would be eerily feasible, financially speaking, for these wealthy terrorist groups.[9] Furthermore, these same facili-

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ties can produce drugs, usually ecstasy, which can be sold to fund other terrorist or criminal activities.[10]

The availability of open-source scientific literature and the relatively low degree of sophistication required to produce viable agents are additional factors that may make bioterrorism attractive to radical, non-state actors. A terrorist group, equipped with a competent team of graduate students and a facility no larger than a few hundred square feet, could field a small-scale program for a few hundred thousand dollars or less. Aum Shinrikyo's quest to produce a biological weapon illustrates the ease of this process. Its effort to produce botulinum and anthrax toxins was led by Seichi Endo, a young microbiologist who performed research at Kyoto's University's Viral Research Center. The sect was able to freely purchase equipment for bioweapons production, including a coil-method heat exchanger, pump motor, vinyl chloride pipes, air filtration media, molecular modeling software, and lasers. Further investigation revealed that this group unsuccessfully attempted to disperse botulinum in 1990 and aerosolized anthrax in Central Tokyo in 1993.[11]

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Globalization is yet another factor that increases our vulnerability to agroterrorism, as the volume of imported food shipments has increased approximately five-fold since the passage of the WTO treaty in 1994. An example of this susceptibility is the 1996 North American outbreak of cyclosporiasis, an infection linked to the consumption of raspberries imported from Guatemala. This outbreak resulted in 1,465 cases in North America, including cases reported in twenty U.S. states and the District of Columbia.[12] If terrorists attack food shipments that originate in countries that have not previously been linked to terrorism, unsuspecting customs officers may not sufficiently and rigorously inspect inbound products.

A Complicated Cleanup. Agroterrorism presents a particularly difficult challenge for the response community and therefore appeals to non-state actors and state sponsors of terrorism alike. According to Dr. Peter Chalk, a RAND bioterrorism analyst, "agroterrorism has a considerable utility in terms of cost-benefit payoffs that would be of particular interest to any substate group that is faced with overcoming significant power asymmetry, such as Al Qaeda."[13] This is not merely a hypothetical situation: groups like the Arab Revolutionary Palestinian Commandos and Mau Mau insurgents used biological weapons against livestock in Israel and British colonial Kenya, respectively.[14]

Detecting an unnatural outbreak of a zoonotic disease is an epidemiologic challenge. Diseases caused by weaponized biological agents with nonspecific clinical features could be difficult to diagnose and identify as a biological attack.[15] Furthermore, if the target area is geographically endemic for the pathogen used in the attack, the chance that the response team will suspect an act of agroterrorism is unlikely.

Another difficulty in responding to a biological attack on livestock is the high concentration of animals in one area. Cows are fattened on large feedlots that sometimes hold between 150,000 and 300,000 head of cattle, and approximately 78 percent of the U.S. beef stock passes through just 2 percent of the feedlots. Similarly, swine farms often hold more than 10,000 hogs, and some chicken farms pen 100,000 birds together.[16] Thus, if a disease is intentionally introduced in any of these massive feedlots, the outbreak could force the government to destroy hundreds of thousands of livestock.

Improvements in and expansion of food transportation in the past forty years have created a rapid dissemination system, in which a pound of meat generally travels about 1,000 miles between the slaughterhouse and the consumer's dinner table.[17] Furthermore, animals are usually not raised in the place of their birth, rather they travel to other farms until they mature and are then transported to a slaughterhouse.[18] These movements facilitate rapid expansion of contagious agents, among different farms and feedlots.

Wreaking Economic Havoc.

Although terrorist attacks against humans result in profound psychological effects, in terms of economic damage, such attacks pale in comparison to the potential damage wrought by attacks against agriculture targets. As Senator Susan Collins of Maine recently stated, "In the war on terrorism, the fields and pastures of America's farmland might seem at first to have nothing in common with the towers of the World Trade Center or our busy seaports. In fact, however, they are merely different manifestations of the same high-priority target, the American economy."[19] Indeed, American agriculture and food industry is a $1 trillion economic sector, which accounts for 13 percent of the U.S. gross national product. A successful agroterrorist attack would deal a crippling blow to the U.S. economy.

The economic impact of agroterrorism is multilayered: direct costs are associated with containment and eradication procedures, while indirect costs stem from business losses to industries directly or indirectly supported by agriculture, from compensation paid to farmers, and from the cost of international embargoes imposed as protective measures by major trading partners.[20] More significant, however, is the psychological impact of successful agroterrorism on the world economy and politics, for populations respond acutely to any manifestations or even rumors of terrorism. For example, in 1985, the U.S. embassy in Chile received phone calls suggesting that Chilean grape imports to the United States were poisoned with cyanide. This unverified implication resulted in $333 million in lost revenue for Chilean grape-importing companies.[21] Any attack against livestock would undoubtedly lead people to lose confidence in the safety of the food supply. If an attack affected a significant percentage of livestock, the remaining available meat products would become prohibitively expensive.[22] The economic impact of an attack, therefore, would be vast and may result in stagnation of many industries and sectors of economy due to public fear and mistrust.

Foot-and-mouth disease (FMD), a highly contagious viral infection that primarily attacks cattle, pigs, and sheep, offers an excellent example of how this might happen. FMD comprises over 70 different strains and, when aerosolized, is capable of spreading over 170 miles from its source.[23] According to both U.S. and New Zealand experts, intentional terrorist and/or criminal introduction of FMD represents the most likely source of agroterrorism over the next 20 years.[24] FMD can be transmitted intentionally or naturally through direct or indirect contact with infected animals, spread through the air from infected animals, contaminated cattle feed, or artificial insemination.[25] If intentionally introduced in only one U.S. state, FMD could reach twenty-three states within five days. The ensuing government action could be as severe as destroying an estimated 23 million animals. Response operations, including the treatment and disposal of animals, could require up to 700,000 people.[26] Organizational issues aside, the economic consequences of such an attack would be enormous. The estimated cost of an FMD attack in California alone for the first few weeks is between $6 and $13 billion.[27]

International Examples: From Taiwan to Pennsylvania. The FMD outbreak in Taiwan in 1997 induced both massive direct costs and a long-lasting shock to the country's food and agriculture industry. The direct cost of the outbreak—including diagnosis, surveillance, depopulation, cleaning, and disinfection—was approximately $4 billion.[28] Within one week of the outbreak, Taiwanese exporters saw swine prices drop by 60 percent, and 50,000 workers lost their jobs. Exports to foreign markets fell dramatically, and losses from trade embargoes were estimated to cost $15 billion over the next three years.[29]

The 2001 outbreak of FMD in Great Britain was equally devastating—its indirect cost was $1.6 billion in compensation to farmers. The lost revenue due to decreased tourism—a partial manifestation of the psychological impact of the epidemic—was an estimated $4 billion.[30] Multiple industries, including agriculture-related industry, manufacturing, construction, wholesale and retail, transportation, communication, hotels, and restaurants were adversely affected. Yet, naturally occurring outbreaks in livestock can only partially indicate the true costs of an intentional release of a biological agent.

The 1983 outbreak of highly pathogenic avian influenza (HPAI) in Pennsylvania took two years to control, during which time about 17 million birds were destroyed. Direct costs amounted to $62 million, and indirect costs have been estimated at more than $250 million.[31] Similarly, the Italian outbreak of HPAI in 1999–2000 caused infection in 413 flocks and resulted in the destruction of around 14 million birds. Compensation to farmers amounted to $63 million,

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while costs to the poultry and associated industries were estimated to be an additional $620 million.[32]

Funding for Biodefense. The direct and indirect costs of funding a potential response network are considerably lower than the costs that would ensue from an actual biological attack. In com parison to the aforementioned costs of natural outbreaks (which would be considerably less than those of a real attack), prevention costs are low. If unchecked, the economic danger of agroterrorism is enormous; President Bush's appropriation of $89 billion for one year of mili tary operations and reconstruction operations in Iraq and Afghanistan roughly equals the costs of uncontrolled FMD in California for a period of only 14 weeks.[33]

Currently, direct expenditures on agricultural biodefense include the FY2005 budget request of $5 million to finance the role of the Food and Drug Administration (FDA) in the bio-surveillance initiative for early detection of an intentional release of deadly pathogens into food, water, or the envi ronment.[34] This request would bring the total FDA counter-terrorism budget to $181 million, and is designed to enhance government-wide cooperation between the White House Homeland Security Council and the FDA, the Food Safety and Inspection Service (FSIS), and the Agricultural Research Service of the U.S. Department of Agriculture. New budget appropriations call for a Food and Agriculture Defense Initiative that will provide $381 million, which is expected to augment current monitoring and surveillance of pests and diseases in plants and animals, as well as increase the availability of vaccines and establish a system to track select disease agents of plants. Additionally, Congress has approved Project Bioshield's budget of $5.6 billion to purchase the fruits of impending biodefense research.

Future Needs. Both the potential economic impact of a bioattack against an agricultural target and the cost of the response to this threat suggest a need for better organizational models from the response community. The United States also needs to train more biodefense experts. Last year, the Partnership for Public Service and RAND issued reports examining the vulnerability of the agriculture and food industries and the federal government's ability to defend against a bioterrorist attack. The conclu sions of these reports as well as those of biodefense and emergency preparedness experts and officials in other branches of the U.S. government are clear: the U.S. economy and infrastructure are insufficiently prepared for a biological attack.[35] Furthermore, as another expert notes, "the focus of our bioterrorism response policy ought to be on programs that make sense even if the nation never experi ences a single bioterrorism attack."[36]

The response initiatives that do make sense are increased "farm to fork" surveillance (to detect a disease before it spreads throughout livestock herds); automated remote sensing capabilities; increased funding for vaccine research; data archiving in geographic information systems (GIS), which provides experts with easy access to spatial representation of diseases or pathogens; advanced live stock transportation, disease transmission, and pathogen endemnicity model ing; risk assessments and identification of particularly vulnerable areas; and rigorous terrorism response training and exercises.[37]

A Plan of Action. Policymakers may defuse public anxiety and the concerns over the lack of U.S. emergency preparedness through a simplified, five-fold, and functional strategy. The first stage requires immediate attention to those concerns of the anti-agroterrorism community regarding the efficiency of an emergency anti-bioterrorism response. This stage calls for a well-defined system of response and organization of all U.S. anti-agroterrorism emergency preparedness networks. It would also include local and national training exercises and development of agroterrorism experts.

The conclusions are clear: the U.S. economy and infrastructure are insufficiently prepared for a biological attack.

The second tier should be given a dif ferent—but not lower—level of importance. It incorporates responses to long-term analytical challenges of emergency preparedness. This level would consider the enhancement of available means of biosurveillance, as well as the improve ment of graphic, logistical, and spatial representation of data streams in GIS.

The third stage corresponds to the resource and development component of a successful emergency response system. It would involve maintaining a vaccine stockpile to guard against known biological agents, as well as increasing the ability of the anti-agroterrorism and defense communities to monitor the world for the emergence of new diseases that could potentially serve as bioagents.

The fourth tier of this system would accept responsibility for the security and integrity of the existing knowledge and materials database. The government agencies involved in this stage will monitor its offensive and defensive bioweapons programs and keep in check disgruntled and underemployed scientists formerly employed in sophisticated chemical and biological weapons programs in countries like Iraq, Russia, and South Africa. The U.S. government would rely on this tier to prevent intentional and unintentional leakage of expertise and materials to ter rorist groups and rogue states.

Finally, the physical security tier would assume responsibility for the physical integrity of our borders, seaports, airports, and food and water safety. This last layer would entail appropriate training of experts within the law enforcement community so that they understand and recognize threats of agroterrorism. Enhancing customs surveillance will require a combination of improved officer training and better biosurveillance equipment.

Each of these security measures is of equal importance, yet one may be more essential than others depending on the specific agroterrorist threat. After a successful intentional release of a bioagent, the methods and resources developed in the third tier may be more important than the other levels; on the other hand, the fourth and fifth layers would play a crucial role in preventing such attacks in the first place. Still, the successful imple mentation of all five tiers would not guar antee that terrorists could not attempt and successfully deploy a biological weapon. It would, however, guarantee that the national and localized response to an agroterorist attack would be expedient and the damages minimized.

Bioterrorism directed against agricultural targets is a serious threat to any state's economy. The experiences of other coun tries with FMD, HPAI, and other animal diseases confirm that an intentional release of a bioagent may result in production losses, trade embargoes, the loss of domestic customer base, and an increased unemployment rate. Thus, it is imperative that policymakers carefully examine the recommendations of leading biodefense professionals and establish a quick and efficient response program to prevent and respond to a biological attack.

NOTES

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