Agroterrorist Attack:
DoD Roles and Responsibilities

Edited by:
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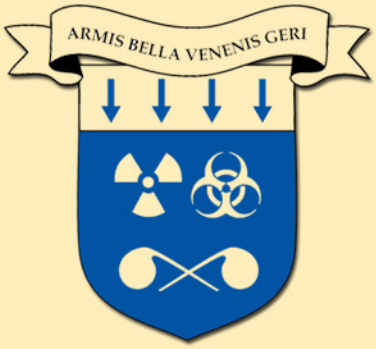

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Counterproliferation Center
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DOD ROLES AND RESPONSIBILITIES

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Disclaimer

The views expressed in this publication are those of the authors and do not necessarily reflect the official policy or position of the U.S. Government, Department of Defense, or the USAF Counterproliferation Center.

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As part of this project, a workshop was held at Colorado State University, Ft. Collins, Colorado, on December 9, 2004. In addition to the authors, attending were invited guests from the U.S. Department of Agriculture, Colorado Department of Agriculture, and other agencies to hear the authors' presentations and provide input. Many of their comments were included in the final product. The editors give their sincere appreciation to the workshop attendees for their interest and comments regarding this agroterrorism project.

Acronyms

AFIP	Armed Forces Institute of Pathology
AI	Avian Influenza
AIDS	Acquired Immune Deficiency Syndrome
ANSER	Analytic Services
APHIS	Animal and Plant Health Inspection Service
ARS	Animal Research Service
ASD (HA)	Assistant Secretary of Defense for Health Affairs
ASD (HD)	Assistant Secretary of Defense for Homeland Defense
ACVPM	American College of Veterinary Preventive Medicine
AVMA	American Veterinary Medical Association
BSE	Bovine Spongiform Encephalopathy
CBRNE	Chemical, Biological, Radiological, Nuclear, High-Yield Explosive
CDC	Centers for Disease Control and Prevention
CIA	Central Intelligence Agency
CJCS	Chairman of the Joint Chiefs of Staff
CONUS	Continental United States
CPC	USAF Counterproliferation Center
CREST	Contingency Real Estate Support Team
CSREES	Cooperative State Research, Education and Extension Service
DACVPM	Diplomate American College of Veterinary Preventive Medicine
DCE	Defense Coordinating Element
DCO	Defense Coordinating Officer

DHHS	Department of Health and Human Services
DHS	Department of Homeland Security
DoD	Department of Defense
DODD	Department of Defense Directive
DODVSA	Department of Defense Veterinary Services Activity
DOI	Department of the Interior
DSCA	Defense Support to Civil Authorities
DTRA	Defense Threat Reduction Agency
DVM	Doctor of Veterinary Medicine
EMAC	Emergency Management Assistance Compact
END	Exotic Newcastle Disease
EPA	Environmental Protection Agency
EP&R	Emergency Preparedness & Response
ESF	Emergency Support Function
FAD	Foreign Animal Disease
FADD	Foreign Animal Disease Diagnostician
FBI	Federal Bureau of Investigation
FCO	Federal Coordinating Officer
FDA	Food and Drug Administration
FEMA	Federal Emergency Management Agency
FMD	Foot-and-Mouth Disease
FORSCOM	Forces Command
FSIS	Food Safety Inspection Service
GDP	Gross Domestic Product
GPS	Global Positioning System
GSA	General Services Administration
HAZMAT	Hazardous Material
HSPD	Homeland Security Presidential Directive

IA/IP	Information Analysis/Infrastructure Protection
ICS	Incident Command System
INSS	Institute for National Strategic Studies
JDOMS	Joint Director of Military Support
JFCOM	Joint Forces Command
JTF	Joint Task Force
JTF-CS	Joint Task Force – Civil Support
KNG	Kansas National Guard
KSU	Kansas State University
LFA	Lead Federal Agency
MA	Mission Assignment
MOU	Memorandum of Understanding
MOS	Military Occupational Specialty
MPH	Masters of Public Health
NABC	National Agricultural Biosecurity Center
NAPIS	National Agricultural Pest Information System
NASS	National Agricultural Statistics Service
NBIS	National Biosurveillance Integration System
NCH	Natural and Cultural Resources and Historic Properties
NGB	National Guard Bureau
NIMS	National Incident Management System
NORTHCOM	Northern Command
NPDN	National Plant Diagnostic Network
NSSE	National Security Special Event
NRP	National Response Plan
PACOM	Pacific Command
PDD	Presidential Disaster Declaration
PFO	Principal Federal Official

PPQ	Plant Protection and Quarantine
PSRC	Presidential Selective Reserve Call-Up
READEO	Regional Emergency Animal Disease Eradication Organization
RFA	Request for Assistance
SART	State Animal Response Team
SCO	State Coordinating Officer
SECDEF	Secretary of Defense
S&T	Science & Technology
SME	Subject Matter Expert
TAHC	Texas Animal Health Commission
TAMU	Texas A&M University
TRANSCOM	United States Transportation Command
TSE	Transmissible Spongiform Encephalopathy
TSG	The Surgeon General (Army)
UK	United Kingdom
UN	United Nations
U.S.	United States
USACE	United States Army Corps of Engineers
USACHPPM	United States Army Center for Health Promotion and Preventive Medicine
USAMRIID	United States Army Medical Research Institute of Infectious Diseases
USC	United States Code
USDA	United States Department of Agriculture
USDC	United States Department of Commerce
USSR	Union of Soviet Socialist Republics
VEE	Venezuelan Equine Encephalitis
VETCOM	Veterinary Command
VFIU	Veterinary Field Investigation Unit

WMD-CST	Weapons of Mass Destruction Civil Support Team
WO	Warrant Officer
WWI	World War One
WWII	World War Two

EXECUTIVE SUMMARY

Background: Agroterrorist Threat and Consequences

The United States agricultural industry is extremely vulnerable to attack. One source states that 280 documents dealing with agroterrorism were found in Afghanistan caves.[1] In fact, "hundreds of pages of U.S. agricultural documents had been translated into Arabic. Al Qaeda's interest in American agriculture was more than academic, according to government officials. A significant part of the group's training manual is reportedly devoted to agricultural terrorism – the destruction of crops, livestock and food processing operations."[2]

The science and art of how to promulgate an agroterrorist attack is not an international secret. There is a long history of countries that have worked in this field. This may reflect the common assumption that attacks against agriculture might be more attractive to terrorists because of the economic disruption and the secondary effects on humans.[3]

Agriculture is a key component of the U.S. economy, comprising over 15% of America's jobs and 11% of the gross domestic product.[4,5] Billions of dollars worth of agricultural products are exported monthly resulting in over $50 billion exported annually.[6] If the U.S. loses its ability to maintain its agricultural exports through an act of agroterrorism, at least three primary consequences will ensue: cessation of food production, loss of vital export markets, and near-term food shortages.

Many potential adversaries either have or can easily obtain an agroterrorism capability that could cause catastrophic economic effects in the U.S. The economic impact of the September 11, 2001, attacks on America has been estimated to be well over $100 billion,[7] but the effect of a successful multipoint agricultural attack could surpass this and lead to long-term, perhaps unrecoverable damage to the agricultural export industry.

Project Overview

The U.S. Air Force Counterproliferation Center (CPC) was directed by the Defense Threat Reduction Agency (DTRA) to conduct a study to

determine the Department of Defense's (DoD) potential involvement in responding to an agroterrorism event. This resulting report details several possible roles for the DoD in a continental U.S. agroterrorist event.

To complete this report, the CPC identified subject matter experts in the following areas: (1) DoD response planning; (2) military manpower assessment; (3) plant and crop response; and (4) carcass disposal. These areas were chosen because each has a potential for DoD involvement.

The findings will provide local, state, federal, and DoD policy makers detailed information about current capabilities and future potential roles for the DoD in helping the nation prepare for, respond to, and recover from a terrorist attack on U.S. agriculture.

Key Findings and Recommendations

Chapter 2: Recent Disease Outbreaks and National Exercises

The military's role in the response to previous exercises or natural outbreaks of agricultural disease in the U.S. and in the world has not been clearly understood or well defined, and was limited or engaged as an afterthought when civilian forces became overwhelmed.

The following are key findings of Chapter 2:

- In foreign countries, the military was used in a logistical role (transporting carcasses and constructing disposal pits), mass euthanasia, and quarantine enforcement during response to natural foot-and-mouth disease and Nipah virus outbreaks (United Kingdom, 2001; Uruguay, 2000; Malaysia, 1998-1999).
- In the United States, military personnel, equipment, and facilities were used in response to natural disease outbreaks of Venezuelan equine encephalitis (TX, 1971), Newcastle disease (TX and CA, 1971 and 1972), avian influenza (PA, 1983), Mediterranean fruit fly (FL, 1997), West Nile fever (NY, 1999), and bovine spongiform encephalopathy (WA, 2003).
- Military participated in the *Crimson Sky* exercise (sponsored by the U.S. Department of Agriculture (USDA)), *Silent Prairie* series

(sponsored by the National Defense University), and several state-sponsored exercises (GA, NC, KS, and TX).

- During a time of war, the military may have other national defense priorities and obligations that prevent fulfilling responsibilities detailed in a Memoranda of Understanding to the U.S. Department of Agriculture, Animal and Plant Health Inspection Service (USDA/APHIS), as demonstrated by the military's inability to respond to the exotic Newcastle disease epidemic (CA, NV, TX, and AZ; 2002-2003) due to Operation Iraqi Freedom and Operation Enduring Freedom deployments.

The following are recommendations of Chapter 2:

- Review worldwide natural outbreaks and exercises conducted in the U.S. to better understand and conceptualize how the military could be involved in an agroterrorism response;
- Conduct exercises to enable government officials and agriculture industry leaders' participation in simulated response measures and appraise the efficacy of the existing policies; and
- Examine barriers to interagency communication and cooperation revealed through exercises and examine natural disease outbreak after-action reports.

Chapter 3: Department of Defense Response Planning

As part of its mission to defend the United States, the DoD, in conjunction with other state and federal agencies, must plan and prepare to deter, prevent, defeat, and mitigate threats against the agriculture and food system. There are many civilian agencies involved in the regulation and protection of agriculture and food production in the United States. The response planning chapter details the many federal agencies involved in protection of agriculture, progressive disaster response to an agricultural event, DoD planning considerations, and impacts of an agricultural event on the Department of Defense.

The following are key findings of Chapter 3:

- An agricultural event will hinder the military mission through disruption of food supply and troop movements, stress DoD forces with additional support requirements, activate Guard and Reserve forces, and create psychological impacts on DoD members and dependents.
- DoD Directive 6400.4 designates the Secretary of the Army as DoD Executive Agent for Military Veterinary Services. The Surgeon General of the Army has delegated authority to accomplish the following responsibilities (complete list in Chapter 3):
    - Controlling animal diseases communicable to man, and
    - Developing military standards for commercial food plants providing products to DoD components.
- Local installation commanders are authorized to respond locally on a limited basis to save lives, prevent human suffering, and mitigate great property damage (DoD Directive 3025.1).
- The National Guard can be used in Title 32 status to enforce a quarantine or stop-movement, under the control of the governor of the state, in the event of an agroterrorist incident.
- During an agricultural emergency short of a Presidential Disaster Declaration, USDA may request DoD assistance in the form of military specialists or laboratory support through the Joint Director of Military Support.
- If a Presidential Disaster Declaration is made, and state and federal resources are overtasked, longer-term DoD assistance may be requested through the Request for Assistance process coordinated by NORTHCOM.

The following are recommendations of Chapter 3:

- DoD planning should include intelligence gathering; formation of an integrated plan; and integration with local, state, and federal response systems:

  - DoD must maintain active participation in the integration and development of surveillance systems;
  - NORTHCOM should work with primary federal agencies to determine possible requirements in an emergency; and
  - Local installation commanders should examine security provisions and plan for food inspection and safety for active military and dependents at a local level, and develop contingency plans in the event of an interruption of normal food distribution.
- State Adjutants General must work with state department of agriculture personnel and other response organizations to determine probable National Guard missions and resources required in an agroterrorist incident.
- Each state should establish a public health veterinarian to serve as a link between agricultural interests and public health, thus improving communication.
- The Assistant Secretary of Defense for Homeland Defense should address the military response and role in agroterrorism since an agricultural emergency is a domestic crisis.
- DoD must take preventive measures and provide adequate training for recognition and destruction of foreign animal diseases and plant pests when redeploying to the United States.
- DoD should examine and address training and exercise types and shortfalls in response to agroterrorism, for example, expand the number of military veterinarians who attend the Foreign Animal Disease Diagnostician courses at the Plum Island Animal Disease Center.

Chapter 4: Military Manpower Assessment

Much of the history, as well as current expectations regarding sharing of resources and availability of dedicated DoD assets for response to agricultural emergencies, are based on assumptions grounded in the early 1970s DoD force structure. This force structure included a large standing army, mostly in garrison, substantial Reserve and Guard Forces replenished by the military

draft obligation, and internal/organic DoD support services and equipment. The manpower chapter reviews the type and magnitude of DoD manpower support required if an agroterrorism event occurs and comments on the appropriate level of effort needed to organize, train, and equip DoD personnel for an agroterrorist event.

The following are key findings of Chapter 4:

- There were 409 licensed veterinarians and 64 Food Inspection Specialists on active duty in the Army in 2004.
- Approximately 100 active duty Army Veterinary Corps officers also have USDA training and certification as Foreign Animal Disease Diagnosticians.
- Other potential military medical personnel whose backgrounds would help prepare them for an agroterrorism response include 15 medical entomologists, as well as Army Environmental Science Officers, Navy Environmental Health Officers, and Air Force Public Health Officers.

The following are recommendations of Chapter 4:

- The federal directives, memoranda of understanding, and DoD directives should be reviewed and updated in line with current intelligence on terrorist threats;
- Manpower requirements should be redefined to support the U.S. agroterrorism response capability;
- Multiple federal agencies should be involved in agroterrorism defense research and response to avoid "warehousing" agroterrorism assets in one institution or agency;
- Agroterrorism defense research initiatives at the U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID) and other DoD organizations should be expanded;
- Federal and state training and exercise plans should be developed and maintained; and

- Concepts and standard operating procedures for surveillance, epidemiology, quarantine, and mitigation should be developed and coordinated by DoD, U.S. Department of Agriculture Animal and Plant Health Inspection Service, as well as with state and local response entities.

Chapter 5: Plant and Crop Response

A terrorist attack against plants and crops is a national security threat. Plant and crop production possess several characteristics that make this an attractive terrorist target. The plant and crop chapter addresses these unique characteristics, potential agroterrorist targets, the responsibilities of federal agencies in safeguarding this industry, and the type and magnitude of military support required for effective plant and crop response.

The following are key findings of Chapter 5:

Characteristics that make agriculture vulnerable to attack include the geographic dispersion of crop lands in unsecured environments and the difficulty of detecting crop and plant disease outbreaks in a timely way.

Potential agroterrorist targets include field crops, farm animals, food items in the processing or distribution chain, market-ready foods at the wholesale or retail level, and agricultural facilities (including processing plants, storage facilities, wholesale and retail food outlets, food transportation links, and research laboratories).

The following are recommendations of Chapter 5:

- Enhance intelligence and monitoring concerning agroterrorism:
    - Link a national strategy to protect food and agriculture to other national security and counterterrorism programs;
    - Develop well-coordinated federal interagency mechanisms for gathering, assessing, and sharing sensitive intelligence information concerning hostile threats to U.S. food supplies and the agricultural sector;

  - Enhance DoD intelligence monitoring of priority crop areas and food processing/distribution centers;
  - Identify, train, and equip DoD personnel to rapidly detect plant disease; and
  - Enable DoD meteorologists to assist in predicting when conditions are likely to be conducive to pest outbreaks or a greater spread of disease.
- Enhance military response measures:
  - Complete coordination and training of U.S. Department of Agriculture and National Guard forces in the eradication and disposal of infested plant materials and food products;
  - Train National Guard forces to provide security for response resources (chemicals, equipment, and personnel) and implementation of the quarantine and containment actions; and
  - Create and maintain a network of regional responder centers near major agricultural production regions for more rapid response.
- Enhance command, control, and communications though development of a federally-coordinated, nationwide, electronic communications and data management network linking private agribusiness with emergency responders.

Chapter 6: Carcass Disposal

An agroterrorist event involving livestock will, by design, result in potentially large numbers of carcasses either from death due to the disease introduced or by the mass euthanasia efforts implemented to control the spread of the disease. Regardless of the cause of death, carcasses must be disposed of quickly, safely, and in an environmentally sound manner. The carcass disposal chapter describes a number of methods currently in use to handle diseased or dying animals and their carcasses which can potentially be applied to an emergency agroterrorist event. Additionally, the chapter

details the role DoD may play in carcass disposal, including heavy equipment, manpower, logistics, and contracting expertise.

The following are key findings of Chapter 6:

- Nationally approved methods of carcass disposal include: rendering, composting, burial, landfilling, incineration and tissue digestion.
- The military may provide heavy equipment for pit construction, secure transportation, and contract expertise to support disposal efforts.

The following are recommendations of Chapter 6:

- Identify the first point of contact for DoD in the event requiring an emergency response to an attack on the U.S. animal population;
- Identify personnel and security resources available for response;
- Identify personnel with incident command expertise for response coordination and consultation;
- Identify a point of contact for contracting expertise to facilitate acquisition of third-party services and equipment; and
- Identify a point of contact in the Army Corps of Engineers to oversee and administer real property, geological analyses, and engineering and construction of landfill and compost sites.

Conclusion

This study has identified four categories of deficiencies within the DoD regarding readiness for an agroterrorism event:

1. **Planning.** There is no clear plan for integrating specific military capabilities into an overall response effort. The Army maintains communication with U.S. Department of Agriculture regarding animal diseases. However, this has not resulted in an integrated response plan.

2. **Personnel.** U.S. Northern Command (NORTHCOM) has only a single planner focused on an agroterror contingency. Moreover, although there are significant numbers of trained and experienced veterinarians, laboratory technicians, epidemiologists, and specialized technicians in the military, there is no centralized mechanism for tracking their locations and availability during an agroterrorism event.
3. **Liaison.** Although DoD has a memoranda of understanding with the U.S. Department of Agriculture and the Food and Drug Administration, these relationships should be further solidified by creating permanent liaison positions.
4. **Mission.** The DoD has not specifically acknowledged it has the mission of providing forces and/or resources following an agroterrorism event. Although this may be included, by implication, under the rubric of "homeland defense," these shortfalls could be more easily remedied by a senior-level commitment to this mission.

This examination of the military's role in an agroterrorist event identified issues regarding the DoD's preparedness to contribute to a response. Senior leaders within the Office of the Secretary of Defense, the Joint Staff, NORTHCOM, and the Army should commission a more complete analysis of what should be the military's involvement following a major national agroterrorist event. The following milestones are offered as a suggested template of action for determining the optimum military participation in response to the agroterrorism threat and for ensuring DoD readiness.

1. Determine if this is a valid mission for the DoD, likely a NORTHCOM action, in coordination with the Office of the Secretary of Defense and the Joint Staff.
2. Identify categorical capabilities that the DoD might be called upon to provide through a series of interagency tabletop and field exercises, with participation from all levels (e.g., state, local, national) of government, and including relevant non-government experts as well.

3. Evaluate the current capability of the DoD to meet those identified requirements.
4. Close the delta between requirements and current capability by fine-tuning the military force structure and/or military responsibilities as outlined in interagency agreements.

This report provides a brief investigation into several potential support activities the DoD might provide if an agroterrorist attack occurred. Since the September 11, 2001, attacks, the DoD and the military services have risen to a new set of dangerous challenges in the war on terrorism. The true test of military response capability would be its response to a national agroterrorist attack.

Notes

1. National Governors Association, "Agroterror," 6 February 2003, On-line. Internet, 17 June 2005, Available from http://www.nga.org/cda/files/BIOSUMMIT03_WILLIAMS.PPT#287,2,AGROTERROR.

2. Katherin McIntire Peters, "Officials Fear Terrorist Attack on U.S. Food Supply," GovExec.com, 10 June 2003, On-line, Internet, 20 June 2005, Available from http://www.govexec.com/dailyfed/0603/061003kp1.htm.

3. J.R. Gillespie, "The underlying interrelated issues of biosecurity," *J Am Vet Med Assoc* 2000; 216:662-664.

4. R. Casagrande, 2000, "Biological terrorism targeted at agriculture: the threat to US national security," *Nonproliferation Review,* 7 no. 3, 93.

5. J. Monke, "Agroterrorism: Threats and Preparedness," CRS Report for Congress, 2004, Order Code RL32521.

6. Casagrande, 2000, 92. For a good overview of the agroterrorist threat, see also, Robert P. Kadlec, "Biological Weapons for Waging Economic Warfare," Chapter 10 in Barry R. Schneider and Lawrence E. Grinter, eds., *Battlefield of the Future: 21st Century Warfare Issues* (Maxwell AFB, Alabama: Air University Press, 1998), 251-266.

7. "How much did the September 11 terrorist attack cost America?" The Institute for Analysis for Global Security, On-line, Internet, 22 June 2005, Available from http://www.iags.org/costof911.html.

CHAPTER 1

Military's Role in Combating Agroterrorism: Introduction

Thomas C. Berg, Jim A. Davis, Donald L. Noah, and Tasha L. Pravecek

> *I am concerned about avian flu. I am concerned about what an avian flu outbreak could mean for the United States and the world…If we had an outbreak somewhere in the United States, do we not then quarantine that part of the country, and how do you then enforce a quarantine? …And who best to be able to effect a quarantine? One option is the use of a military that's able to plan and move.*
>
> –President George W. Bush
> Rose Garden Press Briefing
> October 4, 2005[1]

The World Health Organization (WHO) reported on October 24, 2005, that there have been 126 confirmed human cases of avian influenza (H5N1) and 64 deaths.[2] Quarantining farms and destroying infected flocks have been standard control measures to stem the spread of disease. More than 140 million birds have been culled in Asia.[3] Despite these efforts to control avian influenza, the disease continues to spread across the globe. This disease spread and the leap from infecting only avian species to humans as well has alarmed the President of the United States and the world. The WHO stated that "experts agree that another influenza pandemic is inevitable and possibly imminent."[4] If avian or other highly contagious disease arrives in America, prompt and effective containment of disease will be dependent on the coordinated reaction of appropriate local, state, and federal response personnel and assets.

How will the U.S. military be used in the event of a massive natural disease outbreak? Or, in the event of a terrorist attack?[5] This publication

strives to present examples and examine shortfalls concerning the DoD roles and responsibilities in the event of an agroterror event. In order to understand the potential "planning and moving" requirements of the military, the threat and consequences must be fully understood.

Agroterrorist Threat

The U.S. agricultural industry is extremely vulnerable to attack for many reasons including the geographic concentration of different sectors of agriculture, the almost ubiquitous and highly contagious nature of many diseases or pests, and the massive size of the U.S. agricultural industry. Do our adversaries have the capability to convert these vulnerabilities into a real national security threat? Former Secretary of Health Tommy Thompson stated in December 2004, "for the life of me, I cannot understand why the terrorists have not attacked our food supply because it is so easy to do. We are importing a lot of food from the Middle East, and it would be easy to tamper with that."[6] One source states that 280 documents dealing with agroterrorism were found in the Afghanistan caves.[7] In fact, "hundreds of pages of U.S. agricultural documents had been translated into Arabic. Al Qaeda's interest in American agriculture was more than academic, according to government officials. A significant part of the group's training manual is reportedly devoted to agricultural terrorism - the destruction of crops, livestock and food processing operations."[8]

The use of disease against plants and animals is not new. Indeed, in World War I (WWI) the Germans had a spy network producing biologics to inoculate horses and mules before they went across the Atlantic to support the military in the war. The peak success of the German program occurred when it infected over 4,500 mules and horses in Mesopotamia. Since WWI, many countries including the United States, Britain, and Japan have had anti-plant and anti-animal programs, and have weaponized many disease agents. In the United States, the Central Intelligence Agency developed methods for carrying out covert attacks against crops to affect severe crop loss.[9] And, in the 1940s and 1950s, the Soviet Union developed anti-agricultural biological weapons under their "Ecology" program. By 1990, a shift in Soviet strategy led to the abandonment of anti-agricultural weapons due to the belief that these weapons were not

suitable for strategic military use. The Soviets thought these weapons to be suitable only for terrorist use to disrupt a target country's economy.[10]

The science and art of how to promulgate an agroterrorist attack is not an international secret. Note in Table 1.1 the long history of countries that have worked in this field. This may reflect the common assumption that attacks against agriculture might be more attractive to terrorists because of the economic disruption, the secondary effects on humans, and the potential for deniability that might make the response or retribution less vigorous.[11]

Table 1.1 Countries with Past and Present Agricultural BW Capabilities

STATE	STATUS	DATES	DISEASE	COMMENTS
Canada	Former	1941-60s	Anthrax, Rinderpest	Exact date of project termination unclear
Egypt	Probable	1972-present	Anthrax, brucellosis, glanders, psittacosis, Eastern equine encephalitis	
France	Former	1939-72	Potato beetle, Rinderpest	Exact date of project termination unclear
Germany	Former	1915-17, 1942-45	Anthrax, foot-and-mouth disease, glanders, potato beetle, wheat fungus	In World War II (WWII) experimented with turnip weevils, antler moths, potato stalk rot/tuber decay, and miscellaneous anti-crop weeds
Iraq	Known	1980s-2003	Aflatoxin, anthrax, camelpox, foot-and-mouth disease, wheat stem rust (camel pox may have been surrogate for smallpox)	Believed to have had program elements despite UN disarmament efforts
Japan	Former	1937-45	Anthrax, glanders	During WWII experimented with miscellaneous anti-crop fungi, bacteria, nematodes
North Korea	Probable	?-present	Anthrax	
Rhodesia (Zimbabwe)	Uncertain/ Former	1978-80	Anthrax	Suspicious epidemic of cattle anthrax resulted in 182 human deaths. Some scientists believe government forces infected livestock to impoverish rural blacks during last phase of civil war.
South Africa	Former	1980s-93	Anthrax	
Syria	Probable	?-present	Anthrax	

Continued on page 4.

STATE	STAT	DATES	DISEASE	COMMENTS
United Kingdom	Former	1937-60s	Anthrax	Exact date of project termination unclear
United States	Former	1943-69	Anthrax, brucellosis, Eastern & Western equine encephalitis, foot-and-mouth disease, fowl plague, glanders, late blight of potato, Newcastle disease, psittacosis	Continued from the disease column: rice brown spot disease, Rinderpest, Venezuelan equine encephalitis, wheat blast fungus, wheat stem rust
USSR (Russia, Khazakstan, Uzbekistan)	Formerly active; current status unclear	1935-92	African swine fever, anthrax, avian influenza, brown grass mosaic, brucellosis, contagious bovine pleuropneumonia, contagious ecthyma (sheep), foot-and-mouth disease, glanders, maize rust, Newcastle disease virus, potato virus, psittacosis, rice blast, Rinderpest	Additionally experimented with: rye blast, tobacco mosaic, Venezuelan equine encephalitis, vesicular stomatitis, wheat & barley mosaic streak, wheat stem rust, parasitic insects and insect attractants

Source: Monterey Institute of International Studies, Center for Nonproliferation Studies. *Agro-terrorism: Agriculture Biowarfare: State Programs to Develop Offensive Capabilities*, created October 2000. On-line. Internet, 22 June 2005. Available from http://cns.miis.edu/research/cbw/agprogs.htm. Chart edited for space considerations; see complete chart and extensive footnotes on web page.

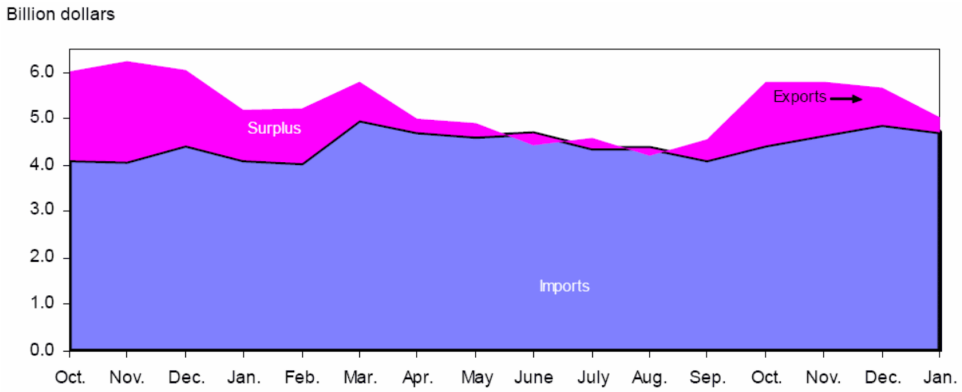
Many potential adversaries either have or can easily obtain an agroterrorism capability that could cause catastrophic economic effects in the United States. The economic impact of the September 11, 2001, attacks on America has been estimated to be well over a $100 billion,[12] but the effect of a successful multipoint agricultural attack could surpass this and lead to long-term, perhaps unrecoverable damage to the agricultural export industry.

U.S. Agriculture Industry

Agriculture is a key component of the U.S. economy, comprising over 15% of America's jobs and 11% of the gross domestic product.[13,14] Livestock sales make up half of this amount, or $93 billion and the United States is the world's largest exporter of livestock and livestock products.[15] Billions of dollars worth of agricultural products are exported monthly resulting in over $50 billion exported annually.[16] In fact, the agricultural industry is recognized as one of only two major industries in the United States that exports more than it imports; the other being the aerospace

industry.[17] U.S. agricultural exports are so significant that they generate larger revenue than the entire national GDP of 70% of the world's countries.[18]

Figure 1.1 Monthly U.S. Agriculture Trade, fiscal years 2004-2005



Nora Brooks. "U.S. Agricultural Trade Surplus of $325 Million in January 2005." U.S. Agricultural Trade Update, United States Department of Agriculture, FAU-102, 13 June 2005. On-line. Internet, 18 June 2005. Available at: http://usda.mannlib.cornell.edu/reports/erssor/trade/fau-bb/text/2005/fau99.pdf.

How has the United States become such a global force in agriculture and how has agriculture become such an important factor in the prosperity of America? Process changes, industrial technology, bio-technology, and information technology have been applied while utilizing the indigenous land, water resources, and production practices to produce what would appear to be an unstoppable agricultural machine. Smaller farms have been combined into much larger operations cutting overhead and allowing for purchases of large production equipment. The five top agricultural commodities, beef cattle, dairy products, broilers, hogs, and layers (chickens raised to produce eggs), represent animals now living in highly concentrated conditions.[19]

The modern poultry industry is a perfect example of this trend. It is common for poultry producers (also known as "integrators") to control the entire process from hatching through grow-out, to slaughter processing and market distribution.[20] These large, vertically integrated businesses commonly own or control hatcheries, farms, feed mills, slaughter facilities

and truck fleets. The advantage of this practice is a stable supply of wholesome, low-priced food products that are readily available to the consumer. The disadvantage of these highly specialized industries is the vulnerability to the accidental or intentional introduction of a plant or animal pathogen.

Certain geographic areas now specialize in growing just certain crops or livestock, thereby enhancing national infrastructure efficiencies. For instance, by 1997, Texas produced 16% of the U.S. cattle and calves and 22.5% of the U.S. cotton. In fact, 70% of the nation's beef cattle are raised on one area with a 200 mile radius.[21] Similarly, California produced 92.2% of the grapes, 47% of tomatoes, and 75% of the strawberries grown in the United States. Geographically concentrating agriculture industries may be efficient but it also increases their vulnerability to agroterrorist attack.

Additional advances in plant and animal protection are seen through species selection and genetic engineering. Some plants and animals have been selected for their disease resistance. Brahman cattle, for example, are selected for breeding partially because they have greater resistance to Texas tick fever. Moreover, some plants and insects are now being genetically modified to resist diseases and mitigate agricultural pests. Through eradication programs, the United States has been able to rid itself of some of the more severe agricultural scourges such as classical swine fever (formerly hog cholera), foot-and-mouth disease, and the infestations by screw worm fly.

The benefit from these continual improvements is a reduction in the amount the U.S. citizen pays for food from 14% on their income in 1970 to 11% in 1996.[22,23] The significance of these figures is underscored by the fact that Russians spend approximately 50% of their income on food, the Filipinos spend 44%, and the Argentineans spend 34%.[24,25] The American public expects cheap, safe, and high quality foods and places great trust in the production continuum leading to its dinner tables.

Consequences of Agroterrorist Attack

The United States, as a direct result of its national resources and increasingly efficient production capacity, has a global impact in the agricultural industry. If the United States loses its ability to maintain its

agricultural exports through an act of agroterrorism, at least three primary consequences will ensue: cessation of food production, loss of vital export markets, and near-term food shortages.

Once the initial agroterror event occurs, certain geographical areas containing specific sections of the affected industry could be shut down until situational awareness is achieved and the magnitude of the act is determined. The production, movement, and processing of livestock or crops could be stopped for days or weeks. However, it is possible that the response would require an entire industry to be shut down for months until the situation is resolved. Farms, factories, and distribution channels could be closed, leading to layoffs, job losses, and economic downturns for the communities tied to these industries.

Second, the United States will lose vital export markets as other producers in the world quickly move to fill the void with their exported goods. Although some of the market losses will be temporary, many will be permanently lost unless the United States is able to begin exporting again quickly. The cessation of all product exports may place pressure on the United States' balance of trade.

Third, the introduction of disease may have grave consequences for food availability. Some food security experts estimate that the average city in the U.S. has at most a five-day supply of fresh meat, fruit, and vegetables on hand. These food stores could last from three to five weeks if edibility, and not freshness, was the main concern. Supermarkets and restaurants have shifted to "just-in-time" deliveries to bring fresher food to their customers. However, these businesses are vulnerable to severe economic risks if their distribution supply is disrupted. Food commonly travels great distances from the farm to the dinner table. A disruption in a metropolitan area's food supply by an agroterrorist attack could lead to a surge in demand for food as panic buying and food hoarding occurred.[26] Additionally, as a result of the import/export disruption, some foreign recipients of U.S. agricultural commodities may experience near-term shortages resulting in adverse population health outcomes.

Unique DoD Capabilities

The DoD downsizing since the end of the Cold War combined with current operations in Iraq and Afghanistan to fight the global war on

terrorism have placed enormous pressure on the active duty and reserve forces of the Army, Navy, Air Force, and Marine Corps. Since military forces are most commonly seen fighting this war by directly engaging the terrorists, it is somewhat difficult to imagine what role, if any, soldiers, sailors, airmen, and marines might have in an agroterrorism event. However, the military brings unique capabilities and resources that could be vital before, during, or after such an event occurred.

The capabilities and resources the DoD brings to the federal government's response to an agroterrorism event include biological and chemical detection/reconnaissance and risk assessment, medical and veterinary support, laboratory capabilities, decontamination assets, logistics, and general response expertise.[27] The National Guard's Weapons of Mass Destruction Civil Support Teams (WMD-CST), which are composed of 22 highly skilled, full-time National Guard personnel, are designed to assist local first responders in determining the nature of an attack, provide medical and technical advice, and assist with the identification and arrival of other state and federal response assets. WMD-CST teams are a state asset and are activated by the Governor of that state. They can be federalized under recent amendments to the Presidential Selective Reserve Call-Up (PSRC) authority.[28]

Despite the DoD's wide-ranging capabilities, there are some restrictions to the unique resources and capabilities brought to support the civil authorities. In his 1999 report to the Senate Armed Services Committee, the Deputy Assistant Secretary of Defense for Combating Terrorism Policy and Support stated that the DoD's support to civil authorities is governed by five principles: (1) the DoD must have absolute and public accountability of officials involved in the oversight of this process while respecting constitutional principles and civil liberties; (2) the DoD must maintain a supporting role to the lead civilian agencies; (3) DoD support should emphasize its natural role, skills, and structures such as mass mobilization and logistical support; (4) DoD equipment and capabilities are primarily to support its war-fighting mission; and (5) the DoD abides by the existing legislative authorities that govern its civilian agency support.[29] Thus, the role of the DoD in an agroterror attack is not yet clear-cut and needs clarification if the military is to be prepared to handle the problems created by an agroterror event.

Nevertheless, the federal government has provided directives which address the concern to protect our agriculture and food resources. Homeland Security Presidential Directive/HSPD-9 (Defense of United States Agriculture and Food) states that the *"United States agriculture and food systems are vulnerable to disease, pest, or poisonous agents that occur naturally, are unintentionally introduced, or are intentionally delivered by acts of terrorism. America's agriculture and food system is an extensive, open, interconnected, diverse, and complex structure providing potential targets for terrorist attacks. We should provide the best protection possible against a successful attack on the United States agriculture and food system, which could have catastrophic health and economic effects."*[30] HSPD-9 mentions a number of federal agencies, such as the Departments of Interior, Agriculture, Health and Human Services, the Administrator of the Environmental Protection and others as having a role in defending American agriculture. Although HSPD-9 does not mention the DoD in this capacity, the DoD has in the past and will continue in the future to play a role in helping our nation prepare for, respond to, and recover from an intentional attack on our nation's food supply.

The DoD has previously helped the Department of Agriculture respond to and recover from natural biological outbreaks in American agriculture. For example, nearly 4,000 military personnel participated in the effort to stem the 1971 outbreak of Venezuelan equine encephalitis in Texas. Other such support occurred in 1971-1972 when nearly 400 military personnel participated in stopping an outbreak of Newcastle disease in California and Texas. In 1983, about 140 military personnel helped support a campaign against avian influenza in Pennsylvania.[31] Additional examples of DoD involvement in disease outbreaks are detailed in Chapter 2.

Project Overview

The U.S. Air Force Counterproliferation Center (CPC) was directed by the Defense Threat Reduction Agency (DTRA) to conduct a study to determine the DoD's potential involvement in responding to an agroterrorism event. This resulting report details several possible roles for the DoD in a CONUS agroterrorist event.

To complete this report, the CPC and project assistant[32] identified subject matter experts (SMEs) in the following areas: (1) DoD response

planning; (2) military manpower assessment; (3) plant and crop response; and (4) carcass disposal. These areas were chosen because each has a potential need for DoD consideration. The SMEs (chapter authors) and other invited guests (listed in the "Workshop Attendees" section of this report) attended a one-day workshop at Colorado State University, Fort Collins, Colorado, to discuss the topic areas. The authors incorporated comments of the invited guests and their own research into chapters which are included in this publication.

This report explores each of the four areas in greater detail. The findings will provide local, state, federal, and DoD policy makers detailed information about current capabilities and future potential roles for the DoD in helping the nation prepare for, respond to, and recover from a terrorist attack on U.S. agriculture. The following paragraphs provide a brief introduction to the content of each military agroterrorism response issue examined.

Chapter 2: Recent Disease Outbreaks and National Exercises

The military's role in the response to attacks or natural outbreaks of agricultural disease in the United States is neither clearly understood nor well-defined. In previous incidents and exercises in the United States and throughout the world, the military role was limited or engaged as an afterthought when civilian forces became overwhelmed. The exercise chapter provides examples of the memoranda of understanding that establish DoD involvement, military support in international and national disease outbreaks, and some U.S. agroterrorism exercises.

Chapter 3: Department of Defense Response Planning

As part of its mission to defend the United States, the DoD in conjunction with other state and federal agencies must plan and prepare to deter, prevent, defeat, and mitigate threats against the agriculture and food system. There are many civilian agencies involved in the regulation and protection of agriculture and food production in the United States. Principals among the federal agencies responsible for the safety of our food supply are the United States Department of Agriculture (USDA) and

the U.S. Department of Health and Human Services (DHHS) through the actions of the Food and Drug Administration (FDA). Other federal agencies with responsibilities for food supply protection include the Departments of Commerce, Homeland Security, and Defense. This response planning chapter details the agencies involved in protection of agriculture, plans for a progressive disaster response to an agricultural event, DoD planning considerations, and the likely impacts of an agricultural event on the DoD.

Chapter 4: Military Manpower Assessment

Much of the history as well as current expectations regarding sharing of resources and availability of dedicated DoD assets for response to agricultural emergencies are based on assumptions grounded in a much larger early 1970s DoD force. This force included a large standing army, mostly in garrison, substantial Reserve and Guard Forces – both replenished by the military draft obligation, and was sustained by internal/organic DoD support services and equipment. The manpower chapter reviews the type and magnitude of DoD manpower support required if an agroterrorism event occurs and comments on the scope of training, organization, and equipping needed to field an appropriate force.

Chapter 5: Plant and Crop Response

A terrorist attack against plants and crops is a national security threat. Plant and crop production is geographically dispersed in unsecured environments such as open fields and pastures. Like its livestock counterpart, the modern crop industry has evolved into large scale operations, which has increased its vulnerability to the intentional introduction of a disease. Plant and crop production possess several characteristics that make this an attractive terrorist target. The plant and crop chapter addresses these unique characteristics, potential agroterrorist targets, the responsibilities of federal agencies in safeguarding this industry, and the type and magnitude of military support required for effective plan and crop response.

Chapter 6: Carcass Disposal

An agroterrorist event involving livestock will, by design, result in potentially large numbers of carcasses either from death caused by the disease or by the mass euthanasia efforts implemented to control the spread of the disease. Regardless of the cause of death, carcasses must be disposed of quickly, safely, and in an environmentally sound manner. The method used will depend on a number of factors including the number carcasses, the cause of death, the stability of potential infectious agents, local or regional environmental conditions, the availability of equipment, the availability and type of fuel sources, the cost and the impact of public perceptions. The carcass disposal chapter describes a number of methods currently in use to handle diseased or dying animals and their carcasses which could also potentially be applied to an emergency agroterrorist event. Additionally, the chapter details the role DoD may play in carcass disposal, providing heavy equipment, detailing manpower, supplying logistics, and providing contracting expertise.

This report provides a brief investigation into several potential support activities the DoD might provide if an agroterrorist attack occurred. Since the September 11, 2001, attacks, the DoD and the military services have responded to a new set of dangerous challenges in the war on terrorism. An even sterner test of military planning and moving flexibility will be how military forces, in cooperation with other U.S. departments and agencies, respond to a national agroterrorist attack.

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CHAPTER 2

Recent Disease Outbreaks and National Exercises[1]

Tasha L. Pravecek, Jim A. Davis, and Christopher R. Greenwood

The United Kingdom's (UK) State Veterinary Service commissioned a study in 1999 to examine the contingency plans and logistical and staffing preparations for an outbreak of foot-and-mouth disease (FMD) and other exotic animal diseases. The resulting Drummond Report commented that the United Kingdom was not adequately prepared for a large response. A year later, the United Kingdom had realized little improvement in their responses to animal disease despite concerns expressed by the chief of the UK State Veterinary Service regarding contingency strategies.[2] The real test of the United Kingdom's ability to respond began on February 19, 2001, when a routine veterinary inspection in Essex showed signs of foot-and-mouth disease in 27 pigs. By the end of the UK foot-and-mouth disease crisis, hundreds of thousands of pigs, cattle, and horses were sacrificed.[3] A European Union committee on FMD found that a more rapid deployment of the British army would have reduced the backlog of carcasses for disposal and relieved the stress of the local farmers and rural communities.[4] The United States Department of Defense (DoD) should heed this European Union finding and establish military consequence management plans for animal disease outbreaks and identify/procure assets to assist the U.S. Department of Agriculture (USDA) before a similar domestic crisis.

The military role in the response to attacks or natural outbreaks of agricultural disease in the United States is not clearly understood nor well defined. In previous international and domestic incidents and exercises, the military's role was limited or engaged as an afterthought when civilian forces became overwhelmed. Many post-event and post-exercise discussions addressed the benefits of a quicker, more involved military reaction. This chapter presents the military role in recent natural events

around the world and exercises held in the United States that involved use of military personnel.

Memoranda of Understanding

The military and U.S. Department of Agriculture (USDA) have had a long standing relationship since 1964. In the 1964 Memorandum of Understanding (MOU), the DoD agreed to assist the USDA in the event of biological contamination to the U.S. agricultural base.[5] The current military role in support of agricultural incidents is further defined by a 2000 MOU between the DoD, General Services Administration (GSA), and the USDA Animal and Plant Health Inspection Service (APHIS). In this MOU, the Department of Defense also agreed to assist USDA/APHIS with developing contingency plans and exercises.[6] MOUs are further detailed in Chapter 4 of this publication.

Military Support in International and National Disease Outbreaks

According to testimony before the Senate Armed Services Committee provided by Robert Newberry, the DoD participates in exercises, assists in the development of response plans, provides laboratory support to the Agricultural Research Service (ARS) and the Animal and Plant Health Inspection Service, provides military specialists trained in foreign animal disease diagnosis, laboratory diagnosis, epidemiology, microbiology, immunology, entomology, pathology, and public health.[7] These military experts and their roles are further detailed by John Herbold in Chapter 4, "Military Manpower Assessment." Since the 1970s, there are numerous instances of the DoD participation and support in disease outbreaks and exercises.

There are several examples of DoD support to the U.S. Department of Agriculture during natural outbreaks of disease. In 1971, the DoD provided 4,000 military personnel to assist in stemming the outbreak of Venezuelan equine encephalitis in Texas.[8] The U.S. Army Medical Research Institute for Infectious Diseases (USAMRIID) developed the vaccine to quell this outbreak of encephalitis.[9] Next, during 1971 and

1972, more than four hundred DoD personnel took part in combating the Newcastle disease in Texas and California. In 1983, the Pentagon supplied manpower and equipment in response to an avian influenza outbreak in Pennsylvania.[10] And in June 1997, the DoD provided the U.S. Department of Agriculture use of facilities and specialized equipment to conduct spraying operations to combat the Mediterranean fruit fly in Florida. In 1999, the U.S. Army Medical Research Institute for Infectious Diseases collaborated with the U.S. Department of Agriculture and the Centers for Disease Control and Prevention (CDC) to identify the causative agent for the West Nile fever outbreak in New York City.[11] Finally, on December 23, 2003, a case of "mad cow disease" or bovine spongiform encephalopathy (BSE)[12] was discovered in Mabton, Washington. An Air Force aircraft transported a suspected BSE infected sample to the UK for confirmatory analysis.[13] Use of the Air Force asset allowed for rapid and safe transport, and enabled a quick confirmation of the BSE disease. In addition to these successful uses of the U.S. military in a research and response function, other nations have used their militaries for consequence management activities.

Foot-and-mouth disease is a highly communicable viral disease of cattle and swine, and other cloven-hooved ruminants. Although foot-and-mouth disease is not recognized as a zoonotic disease, its economic consequences are devastating. The 2001 foot-and-mouth disease outbreak in the UK cost the country an estimated £ 3.1 billion and £ 2.7-3.2 billion in lost revenue from agricultural trade and tourism, respectively.[14] During the foot-and-mouth disease crisis, approximately 2,900 British soldiers assisted with quarantine operations and logistical assistance.[15]

To prevent the spread of disease, meticulous border checks were critical. One month into the FMD outbreak, soldiers were called to accomplish border checks in the Republic of Ireland in an attempt to stop the spread of disease.[16] In addition to the use of military forces for border checks and quarantine, the UK military provided logistical support as well. In Uruguay, when a similar outbreak occurred in 2000, the military shut down all human and animal movement into and out of the restricted area. This quarantine action resulted in the need for military to also conduct humanitarian assistance through airdropped food supplies to the local population.[17] This airdrop demonstrated an alternative use of military forces in an agricultural emergency.

During the 2001 UK outbreak, the military was directed by the UK Ministry of Agriculture, Fisheries and Food to manage the logistics of transporting and disposing of over 3.9 million animal carcasses. In addition to transportation, military assets were used to construct the burial pits for carcass disposal. On March 25, the UK Government directed the British Army to dig huge pits at a closed military airfield near Carlisle, in Cumbria.[18] It is reported that some pits used during the outbreak measured over 8 soccer fields in length and held thousands of animals.[19] In some areas, the actual slaughter was carried out by licensed slaughter teams.[20] However, on March 28, the British army had to slaughter thousands of sheep near Cumbria.[21]

Despite the successful use of the UK military forces, the decision to deploy the army in a logistical support role took place at a late stage in the epidemic, thus resulting in a backlog of carcasses that stressed the local communities.[22] Due to the extensive nature of the UK foot-and-mouth disease outbreak, civilian resources were not robust enough to respond to the event alone. The military played a crucial role in the containment and consequence management of the foot-and-mouth disease episode.

In Malaysia, the military were used in similar roles to that of the UK foot-and-mouth disease crisis; however, there were some adverse consequences. In 1998-99, swine in Malaysia manifested an unknown neurological disease. Even before the causative agent—the Nipah virus—was discovered, the disease had spread significantly, ultimately causing 104 human deaths and countless infections.[23] Interestingly, more than 1,500 Malaysian military personnel participated in the national effort to quarantine, euthanize, and dispose of approximately one million pigs. Because of the need to quickly stem the epidemic, and the lack of other options, this involved herding the animals into freshly dug pits and shooting them from above. As a result of this type of close contact, two soldiers contracted the disease and many others sought psychological counseling. Although it is very unlikely that this method of eradication would be employed in the United States, a similar event on United States soil may see the military monitoring roads, borders, and farms, enforcing quarantine restrictions or providing communications, transportation (air and land), and earth-moving services.

U.S. Agroterrorism National Exercises

Agroterrorism exercises afford government authorities and industry leaders the opportunity to participate in simulated response measures, to appraise the efficacy of existing policy structure, and to identify barriers to interagency communication and cooperation that occur during crisis management. The federal government has sponsored two separate series of agroterrorism exercises: "*Crimson*" and "*Silent Prairie*." In terms of state sponsored exercises, Georgia, North Carolina, Kansas, and Texas are at the forefront of preparing for agroterrorism and have held numerous exercises to support their effort.

The "*Crimson*" series was developed by the Analytic Services (ANSER) Institute and sponsored by the U.S. Department of Agriculture. The first three exercises were conducted between September 2002 and January 2003. *Crimson Sky* and *Crimson Guard* both dealt with foreign animal disease (FAD) outbreaks while *Crimson Winter* simulated an attack on the U.S. food supply. The Department of Defense was reportedly involved in only the *Crimson Sky* exercise.

Crimson Sky, developed with considerable input from the North Carolina Department of Agriculture, was the first of six exercises commissioned involving the entire USDA as well as principles from other federal agencies. It was designed to test the existing capabilities of the federal government to respond to an unexpected and extremely pathogenic outbreak. Participants were divided into four groups: interagency, USDA, industry, and "various states," and each of them were asked to coordinate a containment and eradication response to the outbreak. [24]

The "*Silent Prairie*" series was sponsored by the National Defense University and grappled with the problem of an agroterrorist attack during a period of mass military deployment. Two separate exercises were held, one in June 2002, and the other in February 2003. The Office of the Secretary of Defense, the U.S. Army National Guard, Joint Chiefs of Staff, and other military leaders participated in this agroterrorism exercise, though specific details of their roles are not disclosed in open literature. The exercises were "designed to give senior government officials insights into the nuances and complexities of policymaking in the current global security environment and to illuminate policy and organizational options."[25]

The Institute for National Strategic Studies (INSS) hosted two exercises titled *Silent Prairie,* held at National Defense University's National Strategic Gaming Center.[26] The exercise sought to improve dialogue between the Legislative and Executive branches during a simulated national emergency of foot-and-mouth disease. On June 25, 2002, members of Congress, executive agency officials, and military leaders convened to take part in the exercise. Participants examined the consequences of an agroterrorist attack during a large-scale U.S. armed forces deployment – which closely mirrors today's circumstances with American military personnel and resources assigned to Iraq and Afghanistan. The exercise also explored the economic ramifications of such an attack and the response necessary once a perpetrator had been identified.

Those involved in *Silent Prairie* were forced to grapple with the challenge of balancing sufficient military capability versus domestic emergency response, management, and enforcement. "Participants examined the gravity, complexity, and difficulty inherent in responding; issues [*sic*] that would arise in a national level agricultural bioterrorism incident coincident with a large-scale overseas deployment of U.S. Armed Forces."[27]

The second exercise in the *Silent Prairie*[28] series simulated a hypothetical, 45-day attack of foot-and-mouth disease on the United States. Continuing with the theme of the previous exercise, this one was concerned with how the nation would be equipped to respond to an agroterrorism incident during a major military deployment overseas. Members of Congress, the Deputy Secretaries of Defense and Agriculture, the Surgeon General, and members of other state and federal agencies served as part of the forty individuals who participated in the exercise held on February 11, 2003.

Despite MOUs, Senate testimony, and exercises detailing military support, the interactions between the military and civilian community are not without flaws especially during a mass deployment situation. For instance, the U.S. Department of Agriculture Animal and Plant Health Inspection Service requested military assistance from the Army Veterinary Corps during the October 2002 through May 2003 exotic Newcastle disease (END) epidemic that effected bird populations in California, Nevada, Texas, and Arizona. END is an avian disease with a mortality rate

of up to 90% for exposed birds. The Army Veterinary Corps was unable to commit personnel to assist in the END crisis due to involvement in Operation Enduring Freedom (Afghanistan) that was initiated October 7, 2001, and in Operation Iraqi Freedom, initiated March 20, 2003.[29] The END epidemic resulted in over 19,000 premises being quarantined and almost four million birds depopulated.[30] Although the U.S. Department of Agriculture Animal and Plant Health Inspection Service was successful in quelling the disease, military assistance would have been beneficial and may have resulted in a quicker resolution. This crisis represents an important lesson to the civilian community: during a time of war, the military may have other national defense obligations that prevent fulfilling responsibilities detailed in MOUs to the U.S. Department of Agriculture Animal and Plant Health Inspection Service.

U.S. Agroterrorism State Exercises

Though the federal government developed two important and seemingly effective series of agroterrorism exercises, state-sponsored exercises – often incorporating county, state, and regional participation – have become far more prevalent and proactive in addressing this potential threat. This effort to heighten awareness of and preparedness for agroterrorism attacks is supported by a handful of enthusiastic and concerned localities and states. With the majority of American livestock and poultry residing in the Midwest, Southeast, and Great Plains; states like Georgia, North Carolina, Kansas, and Texas are at the forefront of this issue.

Georgia was the first state to hold an exercise that dealt with an attack on its agriculture. Its initial effort, the *Georgia State Avian Influenza Exercise*, was conducted in 1999. It later sponsored a regional exercise that simulated foot-and-mouth disease and included the participation of Florida, North Carolina, and South Carolina. The DoD participated in both of these exercises.

In the aftermath of the 1994 floods in Georgia, the state's Department of Agriculture was requested to develop an animal disaster plan that could "mitigate the effects of catastrophic disaster on Georgia's animal industries."[31] A year later, Georgia became the first state to feature an Emergency Support Function (ESF) that applied solely to animal industry

and agriculture catastrophes.[32] The *Georgia State Avian Influenza Exercise* was intended to test the state's new ESF-14 through a simulated introduction of avian influenza (AI). Sixteen state and federal agencies were present at the exercise.

A regional foot-and-mouth disease exercise was conducted August 9-12, 2001, and was comprised of a multi-state delegation from Georgia, Florida, North Carolina, and South Carolina. The exercise simulated a foot-and-mouth disease outbreak in Florida that ultimately spread into Georgia. Its objective was to test the response of support agencies as well as evaluate the projected cost of operations.[33] The Georgia National Guard was present and participated in the state's operation center during this 2001 tabletop exercise.[34]

North Carolina is one of the top producers in the poultry and swine industry, boasting a sizable portion of the nation's total population of broilers and hogs. Because of this vested interest in preserving the integrity of the agricultural system, North Carolina has been a leading proponent in the development of exercises and policy meant to diminish the effects of an agroterrorism attack.

North Carolina conducted the *Silent Farmland*[35] exercise in August 2003 to simulate an outbreak of foot-and-mouth disease in the state. *Silent Farmland* was designed to test state and federal response measures and to understand the ramifications of an agricultural bioterrorism attack on state and federal security. The exercise also evaluated the ability of key agencies to communicate and cooperate with each other. The exercise model was an adaptation of the one developed for *Silent Prairie* through the National Defense University's National Strategic Gaming Center. *Silent Farmland's* objective was to "highlight the protections needed to effectively deploy and utilize the North Carolina National Guard, as well as Department of Defense personnel, during an agricultural bioterrorism event."[36]

With the support of its National Agricultural Biosecurity Center (NABC),[37] Kansas has been the host of several agroterrorism exercises. Two of these simulations, *Exercise Prairie Plague* and the *Jefferson County Emergency Response Exercise*, made no reference to military involvement. Exercises *High Stakes* and *High Plains Guardian* featured a replicated outbreak of foot-and-mouth disease across Kansas and utilized

the Kansas National Guard as a third echelon of response to state law enforcement and traffic authorities.[38]

According to its final report, "the purpose of the NABC-KSU [Kansas State University] High Stakes simulation was to exercise Kansas local, state, and federal departments and agencies in the preparedness for, response to, and consequence mitigation of an agroterrorism attack on that state's livestock industry."[39] The simulation featured an outbreak of foot-and-mouth disease across Kansas. The National Agricultural Biosecurity Center and Kansas officials also sought to determine necessary support requirements from federal departments and agencies for response and to identify inefficiencies that arose during the coordinated emergency management efforts.[40] The hypothetical foot-and-mouth disease outbreak was based upon the same model used by the U.S. Department of Agriculture in its *Crimson Series* developed by the North Carolina Department of Agriculture and Consumer Services. [41]

In terms of military involvement in disease control measures, the final report argues for the Kansas National Guard to act as "third echelon of responders" once state law enforcement and transportation authorities become unavailable.[42] The Kansas National Guard could also be used to ensure emergency traffic patterns are followed, restricted zones are maintained, and any other response measures are fully enforced.[43] The final report for *High Stakes* is very forthright in its observation that it is important to include military personnel in these emergency response activities.

In August 2004, Kansas state agriculture and emergency disaster agencies conducted the *High Plains Guardian* exercise simulating another outbreak of foot-and-mouth disease. During this exercise, the state evaluated the military support aspect of agricultural disaster response. Participants included the Kansas Highway Patrol, Kansas Bureau of Investigation and Federal Bureau of Investigation, U.S. Northern Command, Kansas National Guard, and military reserve units. The Kansas adjutant general and state director of homeland security, Major General Tod Bunting, reported that Kansas has approximately 8,000 soldiers and airmen who are available on short notice to respond to an agroterrorism attack. Of these, 2,000 guardsmen would likely be used for quarantine to prevent movement of livestock on the roadways.[44] Although all Kansas counties have not completed an agroterrorism emergency plan, exercises

such as *High Plains Guardian* provide valuable information regarding the expected use of state and federal military assets.

As the home to more head of cattle than any other state in the United States, Texas predictably harbors an acute concern over the prospect of agroterrorism attacks within its borders. The Texas Animal Health Commission (TAHC) has sponsored much of the effort to prepare for this threat. In the past four years, Texas has hosted three significant agroterrorism exercises. During November of 2000, *Tripartite Foreign Animal Disease Test Exercise Program* tackled the challenge of coordinating a multi-national response to an outbreak of foot-and-mouth disease that threatened the United States, Mexico, and Canada. Conducted a year later, the *State of Texas Foreign Animal Disease Modified Functional Exercise* tested the state's capability of coping with a pathogenic outbreak. Another Texas event was the *Panhandle Exercise* which was more localized in nature, both in the region in which it focused (the Texas Panhandle) and the industry on which it concentrated (cattle).

The *State of Texas Foreign Animal Disease Modified Functional Exercise*[45] was the result of a partnership between the Texas Division of Emergency Management and the Texas Animal Health Commission, with the assistance of Texas A&M University. Held on June 26-29, 2001, it simulated a foot-and-mouth disease outbreak originating at Texas A&M's Swine Facility. Over the course of the exercise, the disease spread quickly, infecting various locations throughout Brazos, Burleson, and Robertson Counties.

The Texas National Guard was a full participant in the state foreign animal disease exercise.[46] The Texas National Guard offered intensive logistical support for aircraft (both fixed and rotary), construction, transportation, traffic control and communications support in association with the Texas Department of Public Safety Emergency Operations Center.[47]

Conclusion

To better understand and conceptualize how the military and its personnel could be involved in agroterrorism response measures, it is important to review the numerous worldwide natural outbreaks and exercises conducted in the United States. This review is especially vital

because many of the individuals who are charged with responding to potential natural or agroterror incidents are unaware of the situation's gravity or even its existence. Exercises also afford government officials and industry leaders the opportunity to participate in simulated response measures as well as to appraise the efficacy of existing policy structure. Oftentimes, barriers to interagency communication and cooperation are revealed through the practice of these exercises or examination of after-action reports following a natural outbreak. The examination of real-world events and exercises offers critical opportunities for consequence management improvement and reformation.

Notes

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27. Ibid.

28. For articles related to this exercises visit the following sites: Michael Doyle, "Nunes takes on ag terror exercise – He and other officials try solving simulated disease outbreak." *Bee Washington Bureau*, 13 February 2003, n.p. On-line, Internet, 18 June 2004, available from http://www.nunes.house.gov/press/2003/newsclips/feb/011303agbioterrorsimFB.htm; Michael Meredith, "Bioterrorism Threat – FMD Defense Simulation." *American Association of Swine Veterinarians*, 17 February 2003, n.p. On-line, Internet, 18 June 2004, available from http://www.aasv.org/news/story.php?id=466; and Katherine McIntire Peters, "Officials Fear Terrorist Attack on U.S. Food Supply."

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34. Jeffrey Mahany, Veterinary Medical Officer, USDA/APHIS, Georgia, personal correspondence with Christopher Greenwood 24 February 2005.

35. For additional information regarding exercise *Silent Farmland*, refer to the following reports: "Federal, state, officials to participate in agriculture bioterrorism preparedness exercise," *NC Department of Agriculture and Consumer Services*, 4 August 2003, n.p. On-line, Internet, 21 June 2004, available from http://www.ncagr.com/paffairs/release/2003/8-03silent.htm; Chris McIlroy, "North Carolina to Host Agroterrorism Exercise," *Front & Center*, 17 July 2003, n.p. On-line, Internet, 21 June 2004, available from http://www.nga.org/center/frontAndCenter/1,1188,C_FRONT_CENTER%5ED_5708.html; and Dan Wilkinson, "*Silent Farmland* Takes on Threat of Biological Diseases," *WRAL.COM Newswire*, 5 August 2003, n.p. On-line, Internet, 21 June 2004, available from http://www.wral.com/news/2383350/detail.html.

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45. The furnished report on the *Texas Foreign Animal Disease (FAD) Modified Functional Exercise* provides a detailed narrative of the three-day simulation, charting the chronology of the disease outbreak and response measures. "State of Texas Foreign Animal Disease (FAD) Modified Functional Exercise Post-Exercise Report," *Texas Department of Emergency Management*, June 2001, 1-37. On-line, Internet, 24 June 2004, available from http://www.tahc.state.tx.us/emergency/exercises/tamu_exercise_ 2001.pdf.

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CHAPTER 3

Department of Defense Response Planning

Brian V. Noland

Agriculture and food production are a vital part of the national infrastructure. A naturally occurring or terrorist agricultural event could have far reaching effects on all aspects of society. The impact of such an event could significantly affect and require a response from the Department of Defense. As part of its mission to defend the United States, the DoD in conjunction with other state and federal agencies must have a plan of action should such an event occur. More importantly, the DoD must enact plans to deter, prevent, defeat, and mitigate threats against the agriculture and food system.

Current Surveillance and Inspection Systems

Several governmental agencies are involved in the regulation and protection of agriculture and food production in the United States. Safety of the food supply is monitored at multiple levels, from oversight of the neighborhood coffee shop by a local public health department to the federal government's regulation of a large multi-state food corporation. Principals among the federal agencies responsible for the safety of our food supply are the United States Department of Agriculture (USDA) and the U.S. Department of Health and Human Services (DHHS) through the actions of the Food and Drug Administration (FDA). Other federal agencies that also have responsibilities related to the food supply include the Departments of Commerce, Homeland Security, and Defense.

State and Local Agencies

Each state independently administers its agricultural programs. Most states have a state veterinarian or commissioner of agriculture who

supervises the state's agricultural and livestock health efforts. Some states have public health veterinarians responsible for animal health issues relating to safe public consumption of animal products. Communication between the state veterinarian, the state department of agriculture, and the state and local public health department are imperative if surveillance and response efforts are to be effective.

Currently, communication, manpower, and funding issues hinder the effectiveness of many state food and agricultural agencies' ability to respond to a natural or terrorist agricultural event. To improve communication, each state should consider establishing a public health veterinarian serving as the link between agricultural interests and public health.

United States Department of Agriculture

The USDA is one of the principle federal agencies responsible for the safety of our food supply. Within the United States Department of Agriculture, the Animal and Plant Health Inspection Service (APHIS) and the Food Safety Inspection Service (FSIS) are the primary divisions responsible for animal health and food inspection and regulation.

The Animal and Plant Health Inspection Service is responsible for protecting and promoting U.S. agricultural health, administering the Animal Welfare Act, and implementing wildlife damage management activities. The Animal and Plant Health Inspection Service performs these responsibilities through extensive animal and plant health monitoring programs, disease and pest response and eradication programs, and establishment of standards for animal health. In the event of an animal or plant disease outbreak, the Animal and Plant Health Inspection Service is the agency which responds at the federal level.[1]

The Food Safety Inspection Service ensures the nation's commercial supply of meat, poultry, and egg products is safe, wholesome, and properly labeled and packaged. The Food Safety Inspection Service employs hundreds of inspectors who monitor the food safety of production facilities throughout the country.[2]

Plant Protection and Quarantine (PPQ), an Animal and Plant Health Inspection Service program, is responsible for ensuring the health of plants and crops. Animal and Plant Health Inspection Service PPQ "safeguards agriculture and natural resources from the risks associated

with the entry, establishment, or spread of animal and plant pests and noxious weeds. Fulfillment of its safeguarding role ensures an abundant, high-quality, and varied food supply, strengthens the marketability of U.S. agriculture in domestic and international commerce, and contributes to the preservation of the global environment."[3]

United States Department of Health and Human Services-FDA

The Food and Drug Administration is a scientific regulatory agency within the DHHS which is responsible for the safety of the nation's domestically produced and imported foods, cosmetics, drugs, biologicals, medical devices, and radiological products. FDA's responsibility in the food area generally covers all domestic and imported food except for that which the Food Safety Inspection Service has authority including meat, poultry, and frozen, dried, and liquid eggs.[4]

United States Department of Commerce

The U.S. Department of Commerce (USDC) is responsible for the safety of seafood and fish processing plants. The U.S. Department of Commerce mission is "to create the conditions for economic growth and opportunity by promoting innovation, entrepreneurship, competitiveness, and stewardship."[5]

United States Department of Homeland Security

In accordance with Homeland Security Presidential Directive 7, the Secretary of Homeland Security is responsible for coordinating the overall national effort to enhance protection of the critical infrastructure and key resources of the United States.[6] Agriculture is a vital infrastructure and resource. Consequently, coordination of the overall response to an agricultural event is the responsibility of the Department of Homeland Security (DHS).

There are also Sector-Specific Agencies responsible for each critical infrastructure. Sector-Specific Agencies are defined as federal departments or agencies responsible for infrastructure protection activities in a designated critical infrastructure sector or key resources category.[7,8] The United States Department of Agriculture is the Sector-Specific Agency

responsible for agriculture and food (meat, poultry, and egg products). The U.S. Department of Health and Human Services is the agency responsible for public health, healthcare, and food (other than meat, poultry, and egg products); and the Environmental Protection Agency (EPA) is responsible for drinking water and water treatment systems.[9]

United States Department of Defense

DoD Directive 6400.4 designates the Secretary of the Army as DoD Executive Agent for Military Veterinary Services.[10] Authority is further delegated to the Surgeon General, U.S. Army, to act on behalf of the Secretary of the Army for assigned responsibilities, functions, and authorities. Responsibilities include:

1. Controlling animal diseases communicable to man,
2. Developing military standards for commercial food plants providing products to DoD components,
3. Developing approved lists of suppliers,
4. Providing laboratory examinations of food products, and
5. Providing on-base inspection of food products at all joint procurement and storage facilities and facilities under control of the Departments of the Navy and Army (excluding food preparation facilities).[11]

In the continental United States, food production plants inspected by other government agencies such as the United States Department of Agriculture, Food and Drug Administration, or U.S. Department of Commerce are usually not inspected by DoD personnel.[12]

The Secretary of the Air Force retains authority over the food inspection program at Air Force installations. Public health or preventive medicine personnel of the respective service oversee on-base food preparation facilities.

General Disaster Response

Local and State

In a disaster, the first line of defense is at the local and state levels. A local government responds, supplemented by neighboring communities and volunteer agencies, as needed. If overwhelmed, the local government turns to the state for assistance. The state responds with state resources, such as the National Guard and other state agencies. The state may also request assistance from nearby states under Emergency Management Assistance Compacts (EMAC). This requires that losses and recovery needs be determined through damage assessment by local, state, federal, and volunteer organizations.

For incidents involving chemical, biological, radiological, nuclear, or high yield explosive agents (CBRNE), the National Guard employs Weapons of Mass Destruction Civil Support Teams (WMD-CST). The mission of these teams is to support the governor and the local incident commander in response to a local WMD event. The WMD-CST may be employed in Title 10 or Title 32 status as a reserve or reinforcing element for other WMD-CSTs, or as unilateral military support in a state without a WMD-CST.

The WMD-CST has the ability to identify agents, assess consequences, advise on response measures, and assist with requests for state support. If the incident is determined to be of national impact, these CSTs work as part of the overall national response with the Joint Task Force for Civil Support (JTF-CS) or another Joint Task Force commander, both U.S. Northern Command (NORTHCOM) assets.

National

If it is determined that state resources are insufficient to mitigate the disaster, the governor may request a major disaster declaration through the Federal Emergency Management Agency (FEMA) based on the damage assessment, and an agreement to commit state funds and resources to the long-term recovery. FEMA evaluates the request and recommends action to the White House based on the disaster, the local community, and the state's ability to recover.

At this point, there are two actions that may occur. First, the President approves the request and FEMA responds. Alternatively, FEMA informs the governor that the request has been denied. This process can take a few hours or a few weeks depending on the nature of the disaster.[13]

Department of Defense

The Department of Defense may become involved in the disaster at several levels. Local base commanders are authorized per DoD Directive 3025.1 to respond locally for a limited period of time, usually on a reimbursable basis to "save lives, prevent human suffering, and mitigate great property damage."[14] The governor may also activate the National Guard under state control and state funding. In the event that a Presidential Disaster Declaration (PDD) is made, and state and federal resources are overwhelmed, longer-term DoD assistance may be requested.

The procedure for requesting DoD assistance, detailed in Figures 3.1 through 3.3, is as follows. The Principle Federal Official (PFO),[15] usually FEMA, initiates a Mission Assignment (MA). If a joint field office (JFO) has been established, a Defense Coordinating Officer (DCO) will evaluate the Mission Assignment and determine whether the resources requested are available elsewhere. If the Defense Coordinating Officer determines the additional resource request is warranted, he sends the MA to the DoD Executive Secretary and later to the Assistant Secretary of Defense for Homeland Defense (ASD (HD)) for validation. If validated, the Joint Director of Military Support (JDOMS) processes the order and a copy is sent to NORTHCOM for mission analysis. The Secretary of Defense and the Assistant Secretary of Defense for Homeland Defense approve the order and the Joint Director of Military Support issues the order. The Services may then be tasked directly for resources; or Joint Forces Command (JFCOM), Transportation Command (TRANSCOM), the National Guard Bureau (NGB), and other unified commands may be tasked to support the desired requirements. Once federal DoD assets arrive in the area of operations, NORTHCOM assumes operational control of these forces.

The diagrams presented here illustrate the request for assistance (RFA) process in three different situations. Figure 3.1 depicts the RFA process if a Defense Coordinating Officer has not yet deployed. Figure 3.2

shows the process after a Defense Coordinating Officer has deployed but before the deployment of a joint task force (JTF). Figure 3.3 is the process for requests for assistance after deployment of both the Defense Coordinating Officer and the joint task force. Many DoD agencies participate in the request for assistance process, however NORTHCOM serves as the point of coordination and control in a response.

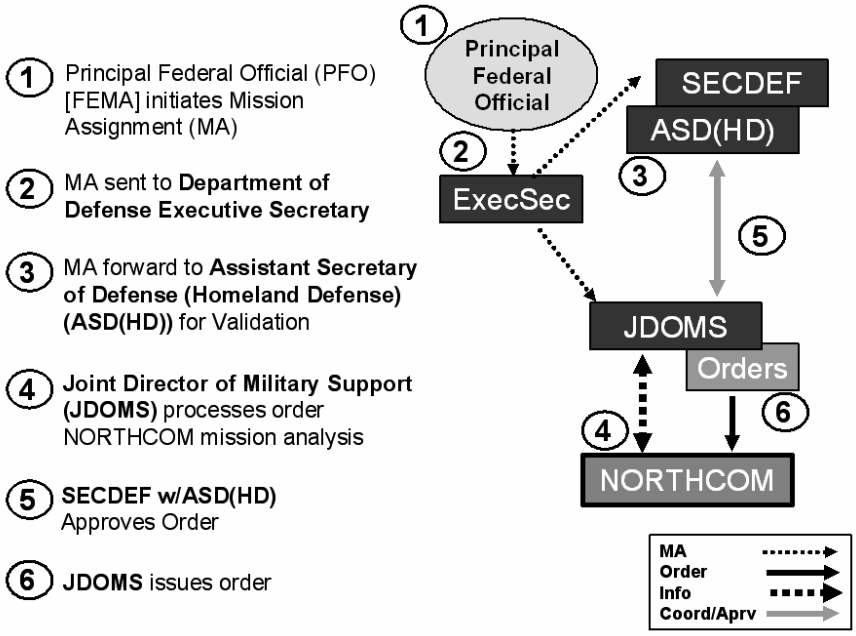

Figure 3.1 Pre- Defense Coordinating Officer Deployment Request for Assistance Process

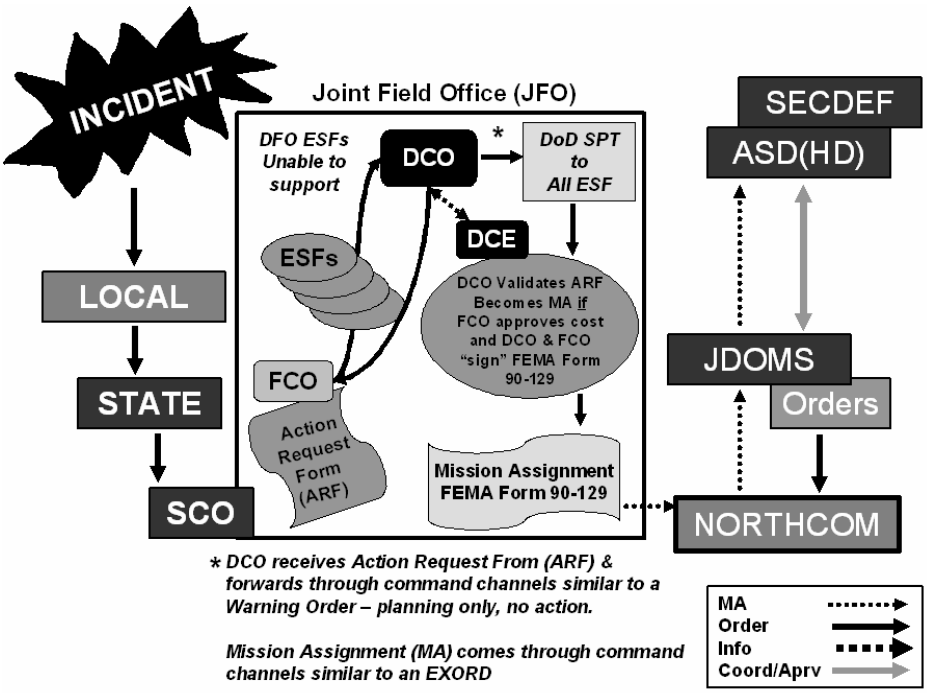

Figure 3.2 Post- Defense Coordinating Officer Deployment Request for Assistance Process.

Acronyms not included in text: SCO-State Coordinating Officer, FCO-Field Coordinating Officer, ESF-Emergency Support Function, DCE-Defense Control Element

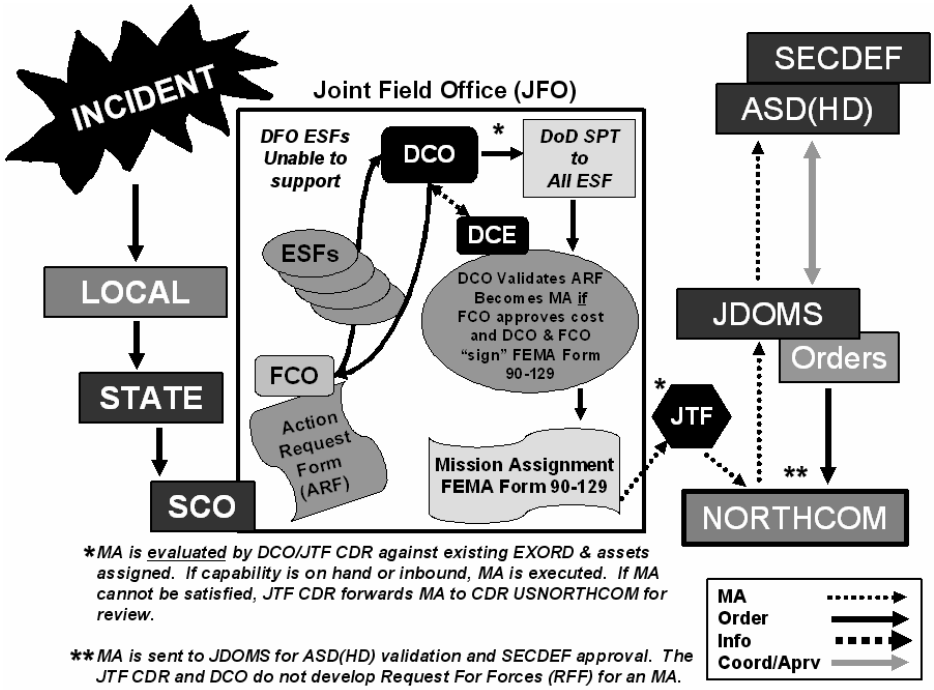

Figure 3.3 Post- Defense Coordinating Officer / Joint Task Force Deployment RFA Process

NORTHCOM is the unified combatant command responsible for establishing liaison with other federal agencies to provide disaster response capabilities during emergencies. NORTHCOM was established as a result of the events of September 11, 2001. It began operations on October 1, 2002, and became fully operational September 11, 2003.

The NORTHCOM mission focus is two-fold:

1. It must conduct operations to deter, prevent, and defeat threats and aggression aimed at the United States, its territories, and interests within the assigned area of responsibility.
2. As directed by the President or Secretary of Defense, it must provide military assistance to civil authorities including consequence management operations.

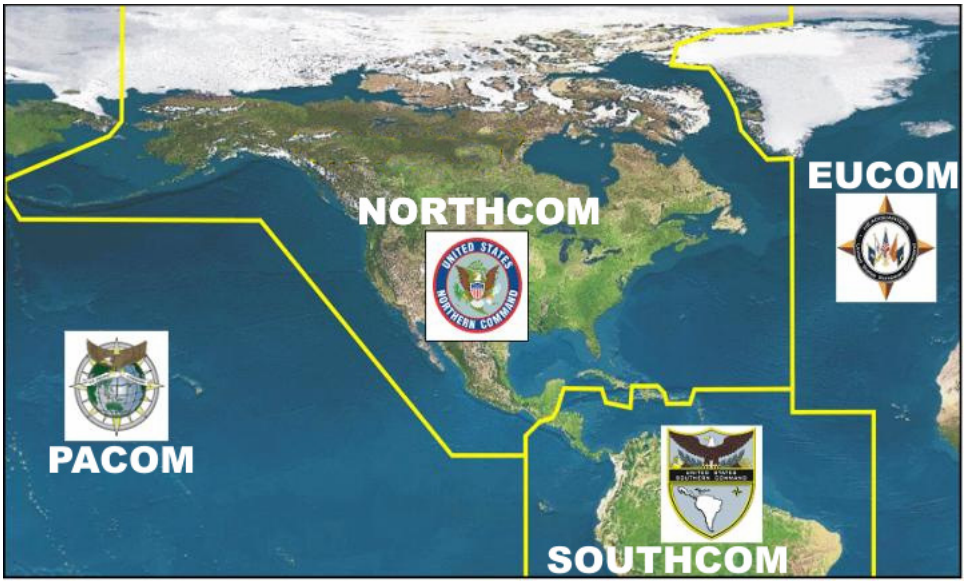

Figure 3.4 NORTHCOM Area of Responsibility

As the unified commander for North America, NORTHCOM is the supported command[16] during a national crisis, including agricultural emergencies. NORTHCOM, like many unified commands possesses few organic resources. During an emergency, the military services, Joint Forces Command (JFCOM), Forces Command (FORSCOM) and others are supporting and provide resources to NORTHCOM as approved by the Secretary of Defense.

NORTHCOM is the principal operational command responsible for planning and executing Defense Support to Civil Authorities (DSCA) within the continental United States. NORTHCOM fulfills this mission by establishing liaison and planning for support with many different government agencies and departments. NORTHCOM may be asked to support natural disasters, CBRNE events, National Security Special Events (NSSEs), and other contingencies within its area of operation. NORTHCOM has coordinated and provided military support to the California wildfires, the Shuttle disaster, the 2004 hurricanes in the Southeast, and national security events such as the political conventions, the G-8 summit, the Reagan funeral, and the presidential elections.

NORTHCOM performs these Defense Support to Civil Authorities functions by establishing a Joint Force Commander at the tactical and/or operational levels. Depending on the scope, this commander could be a Defense Coordinating Officer, a Joint Task Force, or a functional component command such as a JTF Land Component Command. The JTF commander deploys to the disaster area and exercises operational control of DoD assets in the area. The JTF commander reports to the NORTHCOM commander and actively engages with the Principle Federal Official and the Defense Coordinating Officer to determine needs and deploy resources. Effective coordination between state, federal, and DoD organizations is imperative for an efficient and effective response.

If an event occurs in Hawaii or Guam, U.S. Pacific Command (PACOM) has similar roles and responsibilities in this area of operation as NORTHCOM does in North America. PACOM may be directed to fulfill a Homeland Defense or Civil Support mission to states and territories within its area of responsibility.

General Response to an Agricultural Event

Agricultural emergencies of limited scope will be addressed by local and state authorities. If the emergency impacts international trade, the United States Department of Agriculture will quickly become involved through the United States Department of Agriculture Area Veterinarian in Charge for animal issues, or through the State Plant Health Director for plant issues.

The National Response Plan designates the USDA as the coordinator for Emergency Support Function #11 (ESF 11), Agriculture and National Resources. The United States Department of Agriculture also serves as the primary agency for: 1) provision of nutrition assistance; 2) control and eradication of an outbreak of a highly contagious or economically devastating animal/zoonotic disease, highly infectious exotic plant disease, or economically devastating plant pest infestation; and 3) assurance of food safety and food security (under USDA jurisdictions and authorities). The Department of the Interior (DOI) is the primary agency for protection of natural and cultural resources and historic (NCH) resources prior to, during, and/or after an Incident of National Significance. Federal agencies such as the Departments of Defense, Commerce, Health and Human

Services, Transportation, and others are designated support agencies to the United States Department of Agriculture.[17]

The Secretary of Agriculture has broad authority and discretion for response to and elimination of animal or plant disease. For example, in reaction to an emergency, the Secretary may transfer funds from the United States Department of Agriculture to reimburse certain federal, state, and local response expenses, including operational costs for quarantine enforcement, perimeter control, depopulation, carcass disposal, and decontamination. The Secretary may also declare an Extraordinary Emergency, which allows for the use of federal authorities to take action within a state if the state is unable to take appropriate action to control and eradicate the disease.[18]

During an agricultural emergency short of a Presidential Declaration, United States Department of Agriculture may request DoD assistance. The DoD may provide assistance, military specialists or laboratory support to the Animal and Plant Health Inspection Service on a reimbursable basis in accordance with the Economy Act.[19] The United States Department of Agriculture requests this support through the Joint Director of Military Support (JDOMS) as outlined previously.

In the event that needs cannot be addressed with the United States Department of Agriculture or other federal authorities, the President may also declare a major emergency or disaster under the Robert T. Stafford Disaster Relief and Emergency Assistance Act.[20] Presidential declaration of a major emergency or disaster activates a multitude of federal programs to assist in response and recovery.

DoD Planning

Just as general disaster response ranges from the local to the federal level, DoD planning should also include responses at all levels from the local installation to the strategic theater. Planning should include intelligence gathering; formation of an integrated plan; and integration with local, state, and federal response systems.

Intelligence Gathering

To maintain situational awareness, real-time, accurate intelligence is critically important to the military commander, his command surgeon, and the command veterinarian. This real-time agricultural and public health intelligence is difficult to obtain. While under development, systems to integrate animal and plant information systems and national laboratory data are not yet in place. For instance, NORTHCOM and other DoD medical personnel are actively participating in development of the National Biosurveillance Integration System (NBIS), a Department of Homeland Security program to integrate national biosurveillance systems of all pertinent agencies including the United States Department of Agriculture and the Centers for Disease Control and Prevention. This system is designed to bring together many disparate information systems to create a common information picture. As surveillance systems become more integrated and coordinated, DoD must maintain active participation to ensure appropriate participation for an agroterrrorist response.

Integrated Plan Development

Plan development should include extensive coordination between the DoD and appropriate agencies from the local to national level. Planners should take into consideration contingency operations, availability of manpower and equipment, and possible effects of competing local missions and responsibilities. Support planning for agricultural incidents also requires knowledge of anticipated needs by other support federal agencies. NORTHCOM should work with primary federal agencies to determine possible requirements in an emergency. These agencies include the U.S. Department of Agriculture, the Animal and Plant Health Inspection Service, Veterinary Services Emergency Programs for animal issues; the U.S. Department of Agriculture, the Food Safety Inspection Service, and the Food and Drug Administration for food issues; and the U.S. Department of Agriculture, the Animal and Plant Health Inspection Service, Plant Protection and Quarantine for plant events. In addition, NORTHCOM's command veterinarian coordinates with DHS components including Information Analysis and Infrastructure Protection (IA/IP), Emergency Preparedness and Response (EP&R) and Science and

Technology (S&T), as the Department of Homeland Security has overall coordinating authority for national emergencies.

Once probable support needs are identified, NORTHCOM must examine the inventory of resources available from all services. Specialty resources include veterinary personnel, epidemiologists, pathologists, and laboratory support. Non-medical resources include transportation, engineering, and contracting resources.

Local Installation Response DoD Planning Issues

In an incident involving food, the commander at a local military installation is ultimately responsible for the health and safety of his personnel. Therefore, it is imperative that local installation commanders examine security provisions and plan for food inspection and safety responses at a local level. Commanders should also address the safety and well-being of dependents both on and off-base. Additionally, commanders should develop a contingency plan if normal sources of food are compromised. This contingency plan may include the stockpiling of food staples on the installation and emergency preparedness training for dependents on and off the installation.

In addition to the provisions for food-related emergencies, the local commander should plan for incidents involving animals or plants. Many military installations in the United States encompass large geographical areas. These areas include numerous plant and wildlife species. Some installations also lease portions of land to local farmers. Other sources of concern are the recreational horse riding stables, government owned military horse stables, and security forces' dog kennels. Commanders have a responsibility to ensure that the installation does not become a reservoir for diseases that may adversely impact off-base areas. In the event of an animal disease outbreak on or off-base, the installation may be included in a quarantine or stop-movement area. Commanders should establish relationships with local agricultural authorities and plan for possible disruptions in normal base operations due to animal or plant disease issues.

Local commanders are assisted in their efforts by military food inspection personnel as outlined in preceding sections of this chapter. Installation public health officials should also establish and maintain liaison with local civilian public health agencies since an agricultural

emergency would likely effect the surrounding community as well. In addition to this support by specialists stationed on installations, the U.S. Army Veterinary Command (VETCOM) assists local installations in the United States in their efforts to ensure food safety and control animal diseases.

The U.S. Army Veterinary Command is responsible for food safety and quality assurance, care of government-owned animals, and animal disease prevention and control for most Army, Air Force, Navy and Marine military installations in the United States.[21,22] The U.S. Army Veterinary Command should work together with local installation commanders and civilian agriculture officials to develop programs for monitoring the health of domestic animal and wildlife populations and responding to threats against animals and plants on military installations.

State Response DoD Planning Issues

The National Guard is an important state asset for emergency response. At present, there are no military veterinary assets in the Guard. Nevertheless, State Adjutants General must work closely with state department of agriculture personnel and other response organizations to determine probable National Guard missions and types of resources that would be needed or expected in an agroterrorist incident. Additionally, all state exercises involving agricultural events should include representatives from the National Guard.

The National Guard is particularly important because guard personnel can be used for law enforcement when mobilized in a state status (Title 32) in contrast to active duty (Title 10) forces. “Title 32” refers to Title 32 of the United States Code (32 USC) and “Title 10” refers to Title 10 of the United States Code (10 USC). When National Guard assets are used in Title 32 status, they are under control of the governor of the state and can effectively function as the state militia. They may be used for disaster relief, riot control, military protocol, and any other purpose as permitted by state law. In all instances, state law governs.[23] In an agroterrorist incident, the Guard could be used in Title 32 status to enforce a quarantine or stop-movement. If placed in Title 10 status, the National Guard is federalized and effectively becomes a reserve military asset of the United

States, falling within the federal military commander structure and cannot be used in law enforcement activities, such as quarantine.

National Response DoD Planning Issues

The Assistant Secretary of Defense (Health Affairs) (ASD(HA)) is responsible for policy direction related to military Force Health Protection. As such, the Assistant Secretary of Defense (Health Affairs) provides guidance to all Services on issues of Force Health Protection. The Assistant Secretary of Defense (Health Affairs) oversees the DoD Executive Agent for Veterinary Services (Army), issues guidance on veterinary services, and monitors and evaluates implementation of policy. The DoD Executive Agent, in turn, delegates authority to the U.S. Army Surgeon General for assigned veterinary service responsibilities.[24] The Army Surgeon General implements veterinary service policies and programs through the DoD Veterinary Service Activity (DODVSA) to ensure an effective Force Health Protection program.

The DoD Veterinary Service Activity coordinates programs for food inspection and veterinary services with all DoD components. It is imperative that DODVSA maintain coordination and situational awareness with all civilian agencies involved in agriculture or food production to identify potential agricultural problems that may affect the DoD. To accomplish this awareness, the DoD Veterinary Service Activity establishes and maintains liaison with the United States Department of Agriculture, the Food and Drug Administration, the Department of Commerce, and other agencies. Food or non-prescription drug problems are typically communicated through the Hazardous Food and Nonprescription Drug Recall System. The DoD Veterinary Service Activity must ensure systems are in place for timely notification of food or animal/plant disease problems that might impact force health protection.

In addition, the DoD Veterinary Service Activity and the DoD must ensure measures are in place to prevent the introduction of foreign animal and plant agents through movement of equipment and/or personnel. DoD must take preventive measures and provide adequate training for the recognition and destruction of foreign animal diseases and plant pests to avoid unintentional introduction into the United States. This is especially

important in light of recent deployments to areas where diseases such as foot-and-mouth are endemic.

Overall responsibility for Defense Support to Civil Authorities in the DoD rests with the Secretary of Defense.[25] The Secretary of Defense fulfills this responsibility through the Assistant Secretary of Defense for Homeland Defense (ASD (HD)) who oversees homeland defense activities, develops policy, conducts analyses, provides advice, and makes recommendations on homeland defense, support to civil authorities, emergency preparedness, and domestic crisis management matters within the DoD. Specifically, the Assistant Secretary of Defense for Homeland Defense will assist the Secretary in providing policy direction on HD matters through the Chairman of the Joint Chiefs of Staff (CJCS) to U.S. NORTHCOM, PACOM, and other Combatant Commanders.[26] An agricultural emergency fits the description of a domestic crisis, and thus the Assistant Secretary of Defense for Homeland Defense should address the military response and role in an agroterrorist event.

Theater Response DoD Planning Issues

As the supported combatant commands responsible for Defense Support to Civil Authorities, NORTHCOM and PACOM must maintain situational awareness of any unusual activities or events occurring within their areas of responsibility. This requires a coordinated effort with civilian agencies to ensure that information is shared in a timely manner.

For medical, food, and agricultural issues affecting the NORTHCOM area of responsibility, the office of the Command Surgeon employs a cadre of medical planners, preventive medicine, environmental health, and operational medicine officers as well as a veterinary officer to monitor current events and trends and plan for future support missions. In addition, the command veterinarian actively engages with the U.S. Department of Agriculture/the Animal and Plant Health Inspection Service, the U.S. Department of Agriculture/Plant Protection and Quarantine, the U.S. Department of Agriculture/the Food Safety Inspection Service, the Food and Drug Administration, and the Department of Homeland Security regarding food and agriculture issues.

Training and Exercises

Training and exercises are important in preparing emergency responders for an agroterrorist incident and ensuring the response plans are reasonable and effective. Currently, the DoD does not train for agroterrorist events on a broad scale. To address these shortfalls, the DoD must assess the type and scope of training.

An example of a training shortfall is the education of military veterinary personnel in foreign animal disease diagnosis. Every year, the U.S. Department of Agriculture conducts several Foreign Animal Disease Diagnostician (FADD) courses at the Plum Island Animal Disease Center, Plum Island, NY. The Plum Island center is operated jointly by the U.S. Department of Agriculture and the Department of Homeland Security. Although limited numbers of military veterinarians have attended these courses along with the U.S. Department of Agriculture employees and other veterinarians, the number of military veterinarians attending these courses should be expanded to further enhance DoD's capability to support a foreign animal disease event in the United States. Likewise, refresher Foreign Animal Disease Diagnostician courses for veterinarians should be instituted.

A second example of a training shortfall is the shortage of personnel in DoD response roles, especially those in the veterinary services, who do not understand the new Incident Command Structure (ICS) instituted under the National Incident Management System (NIMS). Homeland Security Presidential Directive 5 (HSPD-5) directed the Secretary of Homeland Security to develop and administer the National Incident Management System.[27] Subsequently, DHS published the National Incident Management System March 1, 2004. The NIMS "represents a core set of doctrine, concepts, principles, terminology, and organizational processes to enable effective, efficient, and collaborative incident management at all levels." [28] HSPD-5 requires all federal departments and agencies to adopt the National Incident Management System and use the Incident Command Structure to manage domestic incidents.[29]

DoD organizations who may be tasked to conduct DSCA should understand the Incident Command Structure and should be prepared to integrate into the disaster response system. This is particularly true in an agricultural response because the requests for assistance may be for

individual veterinary specialists. Planners should identify specialty positions likely to be required and integrate the Incident Command Structure training into routine position training.

Once possible support needs and training requirements are identified and addressed, the detailed plans should be extensively exercised to identify gaps and facilitate communication between DoD and non-DoD personnel.

Impact of an Agricultural Event on the Department of Defense

A major natural or terrorist agricultural event could significantly impact the DoD. The scope of the impact should be considered when developing response plans—these impacts include the disruption of the food supply and troop movements which may hinder the military mission; stress on DoD forces due to added defense support to civil authorities requirements; activating Guard and Reserve forces; and general psychological impacts on DoD members and their families. Adequate consideration of these impacts will ensure a solid and dependable response plan.

Mission Assurance

An agricultural event could lead to a disruption of the food supply due either to shortages, transportation restrictions, or contamination, and impact the ability of the Department of Defense to carry out its mission of protecting the United States. DoD installations in the United States receive most of their food from prime vendors who supply commissaries and dining facilities on a "just in time" basis, similar to commercial grocery stores. Overseas forces may be supplied to some extent by local sources, but the majority of foodstuffs, both for commissaries and other facilities, come from the United States.

Combat rations for deployed forces may also be impacted by an agroterrorist event. Combat rations are produced at a very limited number of plants. Additionally, these rations are not stockpiled in large quantities. Therefore, long-term combat requirements cannot be met without regular replenishment. Generally, combat ration plants increase production only as demand goes up. Hence, a disruption in the supply of raw products could greatly degrade DoD's ability to complete overseas missions.

In addition, an agroterrorist attack could result in military movement restrictions both within the country and overseas. During the foot-and-mouth disease outbreak in the United Kingdom, a large scale coalition training exercise with the United States was disrupted when British soldiers and equipment were not allowed to deploy to North Carolina. During an outbreak of a highly contagious disease impacting either plant or animals, it is likely that interstate and/or international movement of equipment and people would be severely restricted to prevent spread of the disease. At a minimum, decontamination of equipment may result in delays and added expense to exercises or deployments.

Defense Support to Civil Authorities

DoD may be called on by the Principle Federal Official to support the U.S. Department of Agriculture during an agricultural crisis. Initial support requests would likely be for veterinary personnel but might expand to include a wide range of military assets, including transportation, equipment, and laboratory support. These support requests will add substantial stress to military forces especially in light of the high operations tempo due to the Global War on Terrorism.

Guard and Reserve

Effects on National Guard and Reserve assets could also be significant during an agricultural emergency. The National Guard is one of a governor's key assets during a crisis. With current contingency operations, many states have a high percentage of National Guard personnel deployed for federal missions. This limits the availability of these personnel for state service. Conversely, a situation in which a governor activates National Guard assets for a state emergency would limit the President's ability to deploy these assets for federal contingencies.

Adding to this delicate balance in use of resources, there is a disproportionate number of first responders who are also members of the Guard or Reserve. In a crisis, these personnel would be either unavailable to the Guard because of their civilian jobs, or unavailable as first responders because of other Guard and Reserve obligations. Potentially, this puts leadership in the unenviable position of having to choose where to best deploy these limited resources between two vitally needed areas of

support. Emergency response planners must use caution to avoid "double counting" personnel who are dual-hatted, serving in both the Guard or Reserve and as civilian first responders.

Psychological

Perhaps another impact of a disruption of the food supply on DoD is the psychological effect food contamination or a food shortage would have on the public in general, and on DoD personnel and their families in particular. Within the continental United States, a large percentage of military members and dependents live outside military installations and would be affected just like the rest of the general public by agricultural emergencies. Additionally, it would be extremely difficult for military personnel both deployed, overseas, or stationed stateside to remain focused on their mission while contemplating the dangers to the safety and well-being of their families.

Conclusion

Disruptions to the agricultural and food supply systems of the United States, whether intentional or unintentional, could significantly affect the DoD. These effects could range from local food shortages and movement restrictions to widespread economic and social damage impacting many aspects of American life including the ability of DoD to perform its mission to defend the United States. It is vital that DoD work with other agencies to plan for threats to food and agriculture.

Notes

1. United States Department of Agriculture, *Animal and Plant Health Inspection Service Website*, On-line, Internet, 10 January 2005, available from www.aphis.usda.gov/lpa/about/welcome.html.

2. United States Department of Agriculture, *Food Safety Inspection Service Website*, On-line, Internet, 10 January 2005, available from www.fsis.usda.gov/About_FSIS/index.asp.

3. United States Department of Agriculture, *Animal and Plant Health Inspection Service, Plant Protection and Quarantine Website,* On-line, Internet, 13 December 2004, available from www.aphis.usda.gov/ppq/ppqmission.html.

4. *United States Food and Drug Administration Website*, On-line, Internet, 10 January 2005, available from www.fda.gov/opacom/morechoices/mission.html.

5. United States Department of Commerce Website, On-line, Internet, 7 November 2005, available from http://www.osec.doc.gov/bmi/budget/DOCSTPLAN.htm.

6. Homeland Security Presidential Directive/HSPD-7, *Critical Infrastructure Identification, Prioritization, and Protection*, Office of the Press Secretary, The White House, December 17, 2003, 3.

7. Ibid., 2.

8. Homeland Security Presidential Directive/HSPD-9, *Defense of United States Agriculture and Food*, Office of the Press Secretary, The White House, February 3, 2004, 1.

9. Homeland Security Presidential Directive/HSPD-7, 4.

10. Department of Defense Directive 6400.4 (DODD 6400.4), *DoD Veterinary Services Program*, Department of Defense, November 24, 2003, 1.

11. Ibid., 3.

12. Army Regulation 40-657/NAVSUPINST 4355.4F/MCO P101110.316, *Veterinary/Medical Food Inspection and Laboratory Service*, Headquarters, Departments of the Army, Navy, and Marine Corps, Washington, DC, November 6, 1997, 7.

13. National Response Plan, *Department of Homeland Security*, December, 2004, 46.

14. Department of Defense Directive 3025.1 (DODD 3025.1), *Military Support to Civil Authorities (MSCA)*, Department of Defense, January 15, 1993, 8.

15. PFO designates a staff or agency, not an individual person.

16. "Supported Command" refers to the command that prepares operations plans or operation orders in response to requirements of the Chairman of the Joint Chiefs of Staff. "Supporting Command" refers to the command that provides augmentation forces or other support to a supported command or develops a supporting plan. Joint Publication 1-02 (JP 1-02), *DoD Dictionary of Military and Associated Terms*, Department of Defense, 12 April 2001, as amended through 31 August 2005, 515-516.

17. National Response Plan, ESF 11, *Department of Homeland Security*, December, 2004, ESF #11-1.

18. *National Animal Health Emergency Response Plan for an Outbreak of Foot-And-Mouth Disease or Other Highly Contagious Animal Disease (NAHERP)* (Draft), United States Department of Agriculture, Animal and Plant Health Inspection Service, September 19, 2002, 5.

19. "The Economy Act of 1932, as amended (31 USC 1535), authorizes an agency to place orders for goods and services with another government agency when the head of the ordering agency determines that it is in the best interest of the government and decides ordered goods or services cannot be provided as conveniently or cheaply by contract with commercial enterprise." *Economy Act of 1932*, On-line, Internet, 14 November 2005, available from http://www.lanl.gov/orgs/dod/doingbusiness/economyact.shtml.

20. Further information about the Stafford Act can be found at the *FEMA Library*, Online, Internet, 14 November 2005, available from www.fema.gov/library/stafact.shtm.

21. Army Regulation 40-657/NAVSUPINST 4355.4F/MCO P101110.316, 1.

22. Army Regulation 40-905/SECNAVINST 6401.1A/ARI 48-131, V*eterinary Health Services*, Headquarters, Department of the Army, Department of the Navy, Department of the Air Force, Washington, DC, August 16, 1994, 1.

23. Briefing by Major General Mason Whitney, the Adjutant General of Colorado, presented at the U.S. Northern Command Surgeons Conference, U.S. Air Force Academy, Colorado Springs, CO, July 2004.

24. Department of Defense Directive 6400.4, 2.

25. Department of Defense Directive 3025.1, 2.

26. Deputy Secretary of Defense Memorandum, *Subject: Implementation Guidance Regarding the Office of the Assistant Secretary of Defense for Homeland Defense*, Washington, DC, March 25, 2003, 1.

27. Homeland Security Presidential Directive/HSPD-5, *Management of Domestic Incidents*, Office of the Press Secretary, The White House, February 28, 2003, 3.

28. Ibid., 5.

29. Ibid.

CHAPTER 4

Military Manpower Assessment

John R. Herbold

The Department of Defense (DoD) has a long history of providing technical, logistical, and manpower support to multiple federal agencies. One area of special military support has been its response to natural threats to our agricultural industry. For example, military aviation assets have been used for aerial insecticide dispersal flights to control insect-borne maladies since the inception of the Army Air Corps.

Later, in the Cold War era, the United States Army developed Venezuelan equine encephalitis (VEE), Eastern equine encephalitis (EEE), and Western equine encephalitis (WEE) vaccines for biological warfare defense. The Army released the stockpiled vaccine for veterinary applications in the early 1970s when the southern U.S. borders and the national equine industry were threatened by the natural spread of VEE from Central America into North America through Mexico.[1]

During the avian velogenic viscerotrophic Newcastle disease outbreak in southern California in 1971-1973, DoD provided assets for an extended period of time to assist in surveillance and eradication of that threat to the poultry industry.[2] The historic record reflects opportunities during which the military provided vital support during agricultural emergencies.

This vital agricultural support may be more difficult to achieve given today's expectation that the U.S. military will defend the U.S. homeland against terrorism while maintaining forces capable of deterring global aggression; and combating aggression in two regions simultaneously. Current U.S. Government expectations for response to agricultural emergencies regarding resource sharing and availability of dedicated DoD assets are based on assumptions based on the much more robust DoD force structure of the early 1970s. This 1970's force included a large standing army, mostly in garrison, and substantial Reserve and Guard

Forces. Both of these were replenished by the military draft and bolstered by internal, organic DoD support services and equipment.

DoD's forces have changed drastically over the past 30 years with changing threats to U.S. national security. Since we are no longer fighting a Cold War, we no longer have a large proportion of our forces in garrison waiting for the proverbial "balloon to go up!" The size of the armed forces has been reduced substantially, and many combat functions have been moved to reserve components. Additionally, many support functions have been civilianized and/or outsourced to contractors entirely.

Yet, expectations for the DoD to provide significant support in national agricultural catastrophes have not waned. In fact, with the perception of an increased agroterrorism threat since September 11, 2001, state and federal expectations have greatly increased of DoD support in an agroterrorist event. Due to the smaller forces that DoD now commands, the Department of Defense may not be able to meet the current expectations of supported state and federal agencies. Most likely, the Active Duty, Reserve, and National Guard forces may only provide small numbers of personnel in specific specialties in response to an agroterrorism event. The availability of DoD resources and forces during a national agricultural emergency should be thoroughly reviewed to determine the actual DoD response capability. This chapter details the current DoD capabilities and manpower that could be utilized during such an agroterrrorist event.

Agroterrorism Response: Training, Organizing, Equipping

In order to assess the ability of the current DoD manpower to respond to an agroterrorism event, the federal directives, memorandum of understanding (MOU) between DoD and the United States Department of Agriculture, and other DoD directives should be reviewed and updated. This chapter focuses primarily on the military medical specialist support areas for an agroterrorism event.

Federal emergency response directives identify the DoD as the lead purveyor of generic logistical support in the case of a national declaration of a natural disaster.[3,4] The most recent MOU concerning DoD agricultural emergency support is dated June 2, 2000, and signed by DoD, the General Services Administration (GSA), and the United States Department of

Agriculture Animal and Plant Health Inspection Service (APHIS), with APHIS acting as the lead agency. The MOU states that "receiving prescribed support in the event that the presence of animal/plant diseases and/or pests constitutes an actual or potential emergency situation as determined by the United States Department of Agriculture Animal and Plant Health Inspection Service. The pest or disease may be endemic or exotic in nature. For the purposes of this MOU, an emergency is defined as any sudden negative economic impact, either perceived or real, such as a Foreign Animal Disease event or a natural disaster that threatens the viability of American animal agriculture and thereby the food supply of the United States."[5] Clearly, an agroterrorism event would be considered a natural disaster. However, the decision as to whether DoD assets will be used lies with the Secretary of Defense.

The U.S. Department of Agriculture and the DoD have also historically shared memoranda of understanding outlining their responsibilities in support of naturally occurring agricultural threats to the nation. The current MOU between DoD and the United States Department of Agriculture regarding military veterinary services assets availability and support is limited to technical support and consultation. Specifically, the MOU pertains to the current organic assets of the U.S. Army Veterinary Services. DoD agrees to provide:

- a senior Army Veterinary Corps Officer to function as a liaison to the Deputy Administrator, Veterinary Services, the United States Department of Agriculture Animal and Plant Health Inspection Service;
- an Army Veterinary Corps Officer as liaison to the Regional Emergency Animal Disease Eradication Organization (READEO) and/or the Veterinary Field Investigation Unit (VFIU);
- military specialists trained in foreign animal disease diagnosis, laboratory diagnosis, epidemiology, microbiology, immunology, entomology, pathology, and public health;
- laboratory support augmentation including Armed Forces Institute of Pathology (AFIP), U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID), U.S. Army Center for Health

Promotion and Preventive Medicine (USACHPPM), and the DoD Veterinary Laboratory;

- assistance in the development of response plans; and
- participation in exercises.

While this MOU appears to thoroughly describe the role of DoD support, the training, organization, and equipping of DoD assets and personnel must be further defined through DoD directives. The DoD Veterinary Services Program is described in DoD Directive Number 6400.4, August 22, 2003.[6] Under this directive, the Secretary of the Army is designated as the DoD Executive Agent for the program. Further, the authority to train, organize, and equip Veterinary Services Program assets is delegated to the Surgeon General, U.S. Army. The Surgeon General's responsibilities included under the Veterinary Services Program are to:

- control animal diseases communicable to man;
- provide military veterinarians for research, development, training and education;
- provide laboratory examination of food products; and
- provide other aspects of food safety regulation.

Under today's force structure, the Army Medical Department would provide the preponderance of military specialist support assets such as foreign animal disease diagnosis, animal disease and food borne pathogen laboratory diagnosis, veterinary epidemiology, veterinary microbiology, veterinary immunology, veterinary pathology, and veterinary public health.

DoD Support: Type and Magnitude of Support

Military manpower strengths and force specialty mix are driven by the United States National Security Strategy and National Military Strategy. DoD medical specialist support in national agricultural scenarios will be dependent on the available Active Duty and Reserve Component manpower strengths and specialties, and further modified by DoD

doctrine, interagency agreements, and other competing military requirements in the world.

Active duty military medical assets are generated to support the war-fighter. Therefore, the active duty military medical personnel mix is tied to the size of the overall force structure. Simplistically, more ships at seas means more shipboard medics needed. Fewer military personnel and their families garrisoned overseas equates to less in-country food procurement and a decreased requirement for military veterinary services. Likewise, more deployments of small units to foreign locations require more imbedded military preventive medicine and public health assets, including veterinary services.

Due to the requirements to support the war-fighters, the magnitude of military support in a national agricultural emergency will be limited, regardless of area of military specialty requested. Additionally, manpower intensive organic assets such as clerical support, food service, heavy equipment operators, and logisticians have largely either been transferred to Reserve Components and/or outsourced to contractors entirely. This further reduces military agroterrorist support. Many veterinary medical technical areas inherently specialized in nature (such as laboratory animal medicine and veterinary pathology) have been civilianized or contracted out. To demonstrate, a conceptual view of "then" (1970) and "now" (2005) relative to military veterinary medical assets is depicted in Table 4.1.[7]

Table 4.1 Conceptualization of Changes in Military Force Structure 1970 / 2005

Military Veterinary Corps Personnel			
Component	**Active**	**Reserve**	**Guard**
Army	"400" / "400"	"100s" / "50"	"100s" / **Zero**
Air Force	"300" / **Zero**	"100s" / **Zero**	"100s" / **Zero**

The data have been rounded to the nearest hundred. First numbers indicate force structure in 1970 while second numbers indicate structure in 2005. Although the USAF Veterinary Corps was abolished in the late 1970s, approximately 100 Doctors of Veterinary Medicine are on active duty in today's Air Force serving in a variety of roles (i.e., Military Public

Health Officer, Staff Biomedical Scientist), but not specifically as military veterinarians.

The limited manpower resources DoD has to respond to a national agricultural event can be seen with current staffing data.[8] There were approximately 409 licensed veterinarians on active duty in the Army in 2004. The distribution and title of their professional area of concentration is shown in Table 4.2. Additionally, there were 64 Food Inspection Specialists in the Warrant Officer Ranks.

Table 4.2 U.S. Army Veterinary Corps Manpower 2004

Military Occupational Specialty (MOS)	Title	Number
64A	General Veterinary Officer	166
64B	Veterinary Preventive Medicine	119
64C	Laboratory Animal Medicine	44
64D	Veterinary Pathology	41
64E	Veterinary Comparative Medicine	19
64F	Veterinary Clinical Medicine	20
	Total	409

U.S. Army Veterinary Corps Officers technical consultation and support is further specialized by Board Certification in the specialties recognized by the American Veterinary Medical Association (AVMA). The distribution of Board Certified specialists is shown in Table 4.3. Additionally, approximately 100 of the current active duty Army Veterinary Corps officers have also received United States Department of Agriculture training and certification as Foreign Animal Disease Diagnosticians (FADD).

Table 4.3 U.S. Army Veterinary Corps Board Certification 2004

AVMA Specialty	# Certified
Veterinary Preventive Medicine	110
Veterinary Pathology	29
Laboratory Animal Medicine	31
Veterinary Practitioner	5
Veterinary Internal Medicine	4
Veterinary Emergency Medicine & Critical Care	3
Veterinary Surgery	3
Veterinary Radiology	1
Veterinary Microbiology	2

Another potential military medical personnel resource for agroterrorism response is the small cadre of military medical entomologists assigned to the Army, Navy, and Air Force. Military medical entomologists provide technical guidance to prevent and control disease and damage caused by a variety of medically and economically important insect vectors and pests.[9] By virtue of their everyday responsibilities, they are familiar with agricultural and stored product pest issues. Although small in number, they are a significant technical resource with special skills often transferable to dealing with agroterrorism.

Unfortunately, the Air Force has only 15 individuals in the medical entomology career field. Army and Navy medical entomological capacities are more robust; however, actual numbers are declining since certain categories of medical specialist manpower have been targeted for reduction and/or elimination.[10] To exacerbate their small numbers, medical entomologists also have competing duties. While much of their focus centers on stored product pest control and quality assurance of food products procured by DoD, because they are generalists in preventive medicine and public health, their duties may also be administrative and only tangentially related to entomology.

Other military medical personnel categories may be applicable to an agroterrorism response. For example, Army Environmental Science Officers, Navy Environmental Health Officers, and Air Force Public

Health Officers have some shared skills similar to Army Veterinary Corps Officers. Each of these military occupational specialties, although valuable, constitutes a very small proportion (in the hundreds) of the U.S. military medical personnel. Regardless of which additional military medical assets are identified as relevant to agroterrorism response, focused training and joint exercises with USDA units would be required to make these personnel an effective part of the national response plan.

Conclusions and Recommendations

The DoD is not an endless resource. Our national leaders discovered in the early 1980s that we had a scarcity of retrovirologists to unravel the mysteries of the acquired immune deficiency syndrome (AIDS) epidemic and then in 1999 a scarcity of medical entomologists when faced with West Nile virus. History may repeat itself, and the DoD will find itself ill-prepared. Preparation for agroterrorism prevention and response must become a priority to avoid a national agricultural emergency.

Due to limits in military manpower, the DoD may be able to only provide small numbers of personnel in specific specialties to respond to an agroterrorism event. Despite these potential limitations, the DoD should consider the role of the military in response to challenges with regards to an agroterrorist event. The military must build an infrastructure capable of its obligation to support U.S. national security. Following are recommendations to enable the DoD to more effectively address the agroterrorism manpower concerns.

Redefine Manpower Requirements to Support Agroterrorism Response

The Department of Defense organization structure and manpower assets reflect perceived current and future DoD policy and requirements. Military institutions and organizational structures with unclear relevance to shifting national defense doctrine will need to redefine themselves. In some cases, missions may be deleted or the mission shifted to other agencies in order to support homeland security initiatives. Senior DoD analysts must consider the role of the military in an agroterrorist event and plan manpower assets accordingly. Likely, this will mean increases in

multiple medical specialties and a significant increase in the DoD's involvement in agroterrorism exercises.

Ensure Support of Multiple Federal Agencies for Agroterrorism Defense Research and Response

Agroterrorism issues are multidisciplinary and involve multiple agencies. Efforts must be made to avoid "warehousing" agroterrorism research and response assets in one institution or agency based on the current perception of risk. Additionally, individual skill sets required for agroterrorism research and response may encompass only a small subset of a governmental agency's overall mission. No one expected that the "War on Cancer" and institutional resources of the National Cancer Institute would provide the technical retroviral expertise needed to unravel the complexity of the AIDS infectious disease epidemic. This is one example reflecting the need for the involvement of multiple agencies in complex research and responses. Agroterrorism defense research initiatives at U.S. Army Medical Research Institute of Infectious Diseases and other DoD organizations should be funded and expanded to ensure robust agroterrorism research and response capabilities.

Generate Federal and State Training Plans

Multiple federal, state, and private agencies employ individuals with the skill sets required to respond to an agroterrorism incident. Due to a changing force structure, the DoD manpower assets are less robust than 30 years ago but remain critical to support a major agroterrorist event. A well-funded federal and state cooperative training plan to develop and maintain a resource pool from the DoD, federal, and state agencies for national emergencies would serve the needs of multiple federal agencies.

Address Agroterrorism Coordination and Response Challenges

Agroterrorism events present a potentially unfamiliar response scenario to most in the U.S. Government. For instance, agroterrorism incidents may be insidious and covert hindering detection and response, similar to a bioterrorist incident. In addition, response coordination through the National Incident Management System and Incident Command Structure may not be

familiar to the animal industry and agriculture response systems. Finally, concepts and standard operating procedures for surveillance, epidemiology, quarantine, and mitigation may not be shared widely between the DoD, the United States Department of Agriculture Animal and Plant Health Inspection Service, and state and local response entities to ensure early disease and contamination detection, and containment. Adequate training and exercises should be required to ensure all parties involved in an agroterrorist response are cooperative and coordinated.

DoD veterinary medical and entomological manpower assets and institutions already in place are a valuable resource for a national response to agroterrorism. Increasing these assets will preserve a national resource that is needed for homeland security and national defense, as well as global response to any agroterrorist event. The DoD should conduct an examination of the total military assets to assess the military's overall preparedness to support response to such events.

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CHAPTER 5

Plant and Crop Response

Howard F. Schwartz

Abundant, affordable, and safe food supplies are largely taken for granted. It is hard for Americans to imagine a world in which radical shortages of food could not be quickly remedied by a trip to the local Wal-Mart Super Center. A simple, elegant attack on a few U.S. crops could result in a ripple through our food sector and economy with devastating consequences. An agroterrorism event would cause economic losses to individuals, businesses, and the U.S. Government as a result of the costs to contain and eradicate the disease, and to dispose of contaminated products. Is the U.S. military organized, trained, and equipped to defend against such an agroterrorism event?

The potential of terrorist attacks against agricultural targets such as plants and crops is a threat to U.S. national security due to its impact on the U.S. economy. Today, multiple federal agencies effectively fill critical roles in the response to natural and man-made crop disease epidemics. The role of the U.S. military, however, is unclear and therefore little has been accomplished to prepare for military support in the event of a terrorist act against crop and plant resources. Nevertheless, the threat of agroterrorism is real, and the adverse impacts on the U.S. security could be staggering without considerable Department of Defense (DoD) preparation.

Plant and Crop Economics

Agriculture and food industries are very important to the social, economic, and political stability of the United States. In 2002, the food and fiber sector contributed $1.2 trillion, or 11% to the gross domestic product. Gross farm sales exceeded $200 billion in a relatively concentrated area throughout the Midwest, parts of the East Coast, and California. Production is split nearly evenly between crops and livestock.

Although farming employs less than 2% of the country's workforce, 16% of the workforce is involved in the food and fiber sector.[1,2,3]

Despite the large numbers of people employed in the agriculture and food industry, the production assets are relatively localized and thus present a lucrative target for a terrorist. Although the number of farms in the 2002 Census of Agriculture totaled 2.1 million, 75% of the value of production occurs on just 6.7% or 143,500 of these farms reflecting the concentrated nature of this strategic resource. This subset of farms has average sales of $1 million annually, and averages 2,000 acres in size.[4] As crop production and harvesting technology, and genetic engineering progresses, the number of farms will decrease since fewer people and farms are required to produce the necessary food.

An agroterrorism attack on crops would have tremendous impact on U.S. exports. The U.S. produces and exports a large share of the world's grain. In 2002, U.S. exported $53 billion in agricultural products. The U.S. share of world production was 39% for corn, 38% for soybean, and 8% for wheat. The United States accounted for 23% of global wheat exports, 54% of corn exports, and 43% of soybean exports.[5] Thus, protection of this U.S. resource is critical to maintaining our economic health in the world market.

Unique Characteristics of Agriculture

Agriculture has several characteristics that pose unique problems for managing an agroterrorism threat. First, agriculture production is geographically dispersed in unsecured environments, such as open fields and pastures throughout the countryside, making crops an easy target to sabotage. Second, the presence, or rumor of presence, of certain pests or diseases in a country can reduce demand or quickly stop all exports of a commodity which can take months or years to resume. An additional result of pests or diseases can be a decline in the demand for some foods based on the products targeted in the attack (e.g., grains, fruits, or vegetables), while demand for other types of food may increase due to the resulting food substitutions. Finally, crop and plant disease outbreaks are difficult to detect, which makes an agroterrorist event even more challenging to manage.

A recent example of export related economic consequences caused by an agricultural pathogen and its disease is karnal bunt, caused by the

fungus *Tilletia indica*. Although the disease does not have a significant effect on crop yield, nearly 80 countries banned wheat imports from regions with karnal bunt infection. When the disease was discovered in Arizona and surrounding areas in 1996 (presumably from an accidental introduction from Mexico), there was an immediate threat to the overall $6 billion per year U.S. wheat crop, of which 50% is exported. From 1996 to 1998, the U.S. Department of Agriculture Animal and Plant Health Inspection Service spent over $60 million on the eradication effort, and growers in this small affected area lost well over $100 million from decreased sales and increases in production costs.[6]

Plant and crop disease outbreaks are difficult to detect. Even if a farmer closely monitors his crops, a lack of direct experience with foreign plant diseases may delay recognition of symptoms in event of an outbreak. Recognition is made more difficult because the number of lethal and contagious biological agents is greater for plants than for humans. In addition, it may be hard to distinguish a biological attack from a natural disease outbreak. Signs of infection may be manifested slowly, delaying effective response by individuals and/or authorities.[7,8] Next, most of these diseases are environmentally resilient, endemic in foreign countries, and not harmful to humans – making it easier for terrorists to acquire, handle, and deploy the pathogens. Finally, limited genetic diversity in most U.S. agriculture species may make those species particularly vulnerable to specific pathogens. Thus, the general susceptibility of the agriculture and food industry to agroterrorism is difficult to address in a systematic way.[9,10,11,12,13,14]

Potential Agroterrorism Targets

The disquieting characteristics described above are manifested in five potential targets of agricultural bioterrorism. These potential targets include:

1. field crops;
2. farm animals;
3. food items in the processing or distribution chain;
4. market-ready foods at the wholesale or retail level; and
5. agricultural facilities.

The fifth potential target includes processing plants, storage facilities, wholesale and retail food outlets, elements of the transportation infrastructure, and research laboratories. The agricultural industry's widespread vertical integration, in which a single company controls much of the commodity production, processing, and distribution system, also facilitates the geographical spread of pathogens and contributes to United States vulnerability.[15,16] Examination of these targets reflects that America is exceedingly susceptible to agroterrorism.

From the economic impact, characteristics, and targets described here, it is obvious that preparation for and response to an agroterrorist attack against crops is complex and critical to our national well-being. The preparation and response involves the cooperative efforts of multiple state and federal agencies, including the DoD.

Agroterrorism Response: Roles & Responsibilities of Federal Agencies

The goal of the U.S. animal and plant health safeguarding system is to prevent the introduction and establishment of exotic pests and disease, to mitigate their effects when present, and to eradicate them when possible. In an outbreak, damage is proportional to the time it takes to first detect the disease. If a foreign pest disease is introduced, responsibility for recognizing initial symptoms rests with farmers, producers, veterinarians, plant pathologists and entomologists. The last line of defense, and the costliest, is the isolation, control, and eradication of an epidemic.[17]

The U.S. Government has published the Public Health Security and Bioterrorism Preparedness and Response Act and the Homeland Security Presidential Directive 9 to direct the appropriate federal agency to act in protection of agriculture. These documents and several responsible federal agencies are detailed in this section.

The Public Health Security and Bioterrorism Preparedness and Response Act (Public Law 107-188, June 12, 2002) contains several provisions important to agriculture, including:[18]

- expand Food and Drug Administrations (FDA) authority over food manufacturing and imports;

- tighten control of biological agents and toxins through rules issued by the U.S. Department of Agriculture Animal and Plant Health Inspection Service and the Centers for Disease Control and Prevention (CDC); and
- authorize expanded agricultural security activities and security upgrades at USDA facilities.[19]

Homeland Security Presidential Directive-9 (HSPD-9) established a national policy to protect against terrorist attacks on agriculture and food systems.[20] This directive instructs agencies to develop awareness and warning systems to monitor plant and animal diseases, food quality, and public health through an integrated diagnostic system. Animal and commodity tracking systems are included, as is gathering and analyzing international intelligence. Vulnerability assessments throughout the sector help prioritize mitigation strategies at critical stages of production or processing, including inspection of imported agricultural products.[21]

The U.S. Environmental Protection Agency (EPA) has established a permanent National Homeland Security Research Center based in Cincinnati, Ohio, with the following divisions:

- threat and consequence assessment;
- decontamination; and
- consequence management and water infrastructure protection.

In this center, the Environmental Protection Agency will ensure effective design, implementation, and oversight of the research. Additionally, the Environmental Protection Agency will provide clear lines of communication and facilitate interaction within the Environmental Protection Agency and other federal agencies, universities, and private sector and research partners.[22]

The National Plant Diagnostic Network (NPDN) is a consortium of five regional networks and a national database (Figure 5.1). The National Plant Diagnostic Network was established in June 2002 by the United States Department of Agriculture and the U.S. Department of Homeland Security (DHS) as a key component of a national plant biological security program.[23] The National Plant Diagnostic Network is linked to the National Agricultural Pest Information System (NAPIS) to facilitate the rapid exchange of diagnostic information, trends, and alerts.[24] A secure

agricultural system requires rapid detection of outbreaks, accurate diagnoses of problems, and prompt response to minimize impact. The National Plant Diagnostic Network must be supported and enhanced to improve the diagnostic and detection system in the event of a deliberate or accidental disease outbreak.[25,26,27]

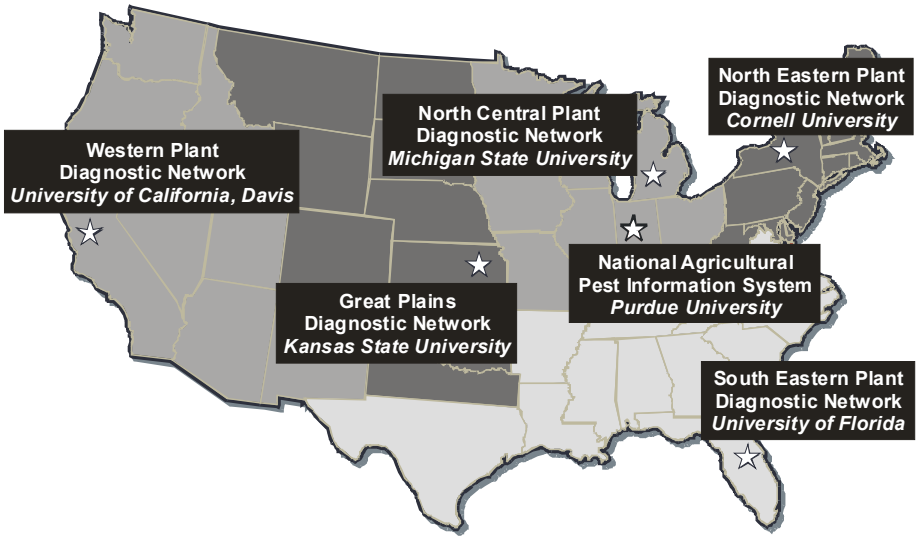

Figure 5.1 National Plant Diagnostic Network Regional Centers

The Animal and Plant Disease and Pest Surveillance & Detection Network was established in response to the charge from the Secretary of Agriculture to Cooperative State Research, Education and Extension Service (CSREES) to develop a network linking plant and animal disease diagnostic facilities across the country. The National Plant Diagnostic Network focuses on the plant disease and pest aspect of the program. The network is a collective of Land Grant University plant disease and pest diagnostic facilities from across the United States. Lead universities have been selected and designated as Regional Centers to represent five multi-state regions across the country. The National Agricultural Pest Information System has been designated as the central repository for archiving select data collected from the regions. Colorado State University is one of nine state members of the Great Plains Diagnostic Network Regional Center coordinated from Kansas State University.[28]

Despite the extensive protection offered by the agencies detailed here, the DoD may provide critical assets and capabilities to enable more thorough protection and response.

Type and Magnitude of Military Support

DoD has no clear responsibility for responding to terrorist attacks on U.S. civilian personnel and facilities. While DoD would assume primary leadership in the event of terrorist attacks on domestic military installations and personnel, the probable collateral effects on civilian populations (particularly if biological weapons are employed) would necessitate shared responsibilities and close coordination with civilian agencies. Many authors have proposed involving multiple federal strategies to respond to the agroterrorism threat. Components of these strategies proposed should include involvement of the Defense Department to develop a more effective defense.

In 2002, Dr. Henry Parker defined a federal strategy to meet the agroterrorist threat.[29] He proposed *Preventive Measures* which include:

- intelligence measures (identify potential threats and perpetrators, motivations, predict behavior);
- monitor programs (detect and track specific pathogens and diseases);
- targeted counter-terrorism research;
- international counterproliferation treaties, protocols, and agreements;
- creation of agent-specific resistance in livestock, poultry, and crops;
- vaccination against specific biological weapons agents;
- modification (where possible) of vulnerable U.S. food and agricultural practices to minimize impacts of terrorist acts; and
- education and training (federal, state, and local).

Dr. Parker also proposed *Response Measures* that should focus on:

- consequence management;
- early detection of specific biological weapons agents, delivery mechanisms, origins, and targets;
- early management to stop disease spread and minimize infection;
- epidemiology and treatment;
- various responses (diplomatic, military, legal, economic), compensation and indemnification;
- education and training (federal, state, and local); and
- public awareness and education programs.

After reviewing these prevention and response measures, several can be seen to include a military component. For instance, the DoD could provide assets in support of the *Prevention Measures* of intelligence and monitoring programs. In addition, the military could assist in the military response aspects of *Response Measures*. Finally, in addition to these measures, the DoD could provide assets, manpower, and experience in the Command, Control and Communication arena. Each of these potential military roles will be address in detail here.

Intelligence and Monitoring

A national strategy to protect food and agriculture must be strongly linked to other national security and counterterrorism programs. It should also involve strategic partnerships with other federal, state, and local agencies and non-governmental organizations. For example, the DoD should assist in the development of well-coordinated federal interagency mechanisms for gathering, assessing, and sharing sensitive intelligence information among the Federal Bureau of Investigation (FBI), Central Intelligence Agency (CIA), the United States Department of Agriculture, and DoD concerning hostile threats to U.S. food and agriculture.[30]

The DoD utilizes multiple sources of space-based monitoring to collect intelligence data. To enable real-time detection of agroterrorism, the DoD should enhance intelligence monitoring to include a 24-hour network of remote sensing satellites and ground truth support in priority crop areas and food processing/distributing centers. These areas could

include primary acreage for commodities such as corn, wheat, rice and soybean (Figure 5.2) in addition to more specific vegetable and fruit production areas that are typically located close to major metropolitan areas (e.g., Los Angeles, Seattle, Denver, Phoenix, Chicago, St. Louis, Dallas, New York, and Miami).[31] Currently, the United States Department of Agriculture uses remote sensing to observe seasonal variations in plant vegetation (Figure 5.3).[32] Enhanced satellite monitoring by the DoD would enable a more accurate sensing of initial plant pest outbreaks and agroterrorism.

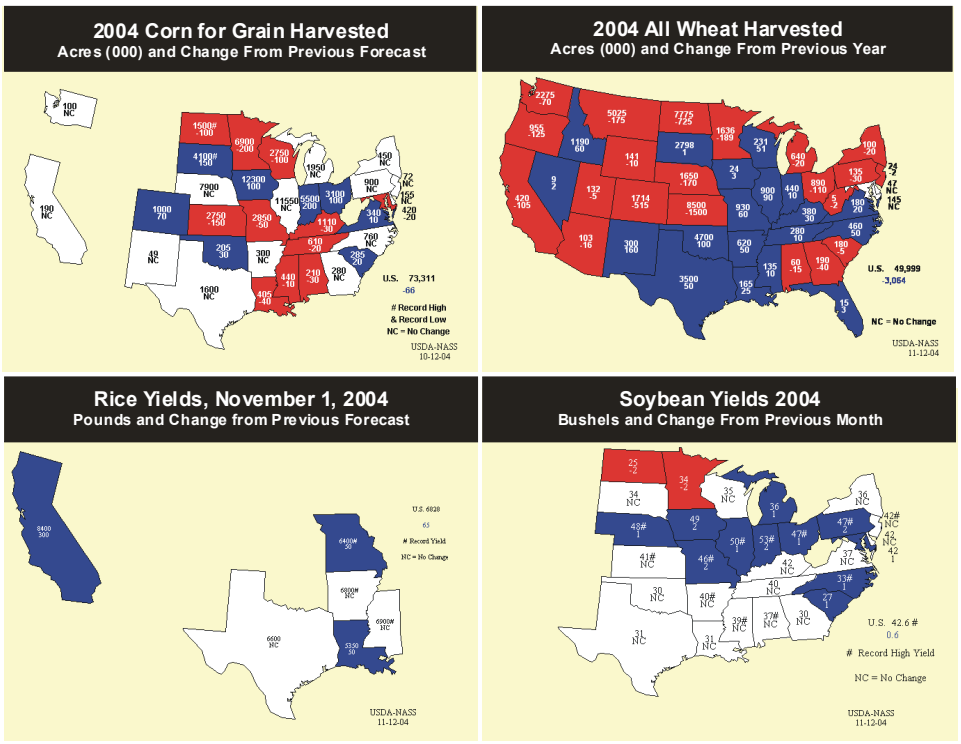

Figure 5.2 United States Crop Production Centers, 2004

These graphics illustrate crop production figures collected by the United States Department of Agriculture; colors denote a decrease (light gray), increase (dark gray), or no change (white) in production values from the previous season.[33]

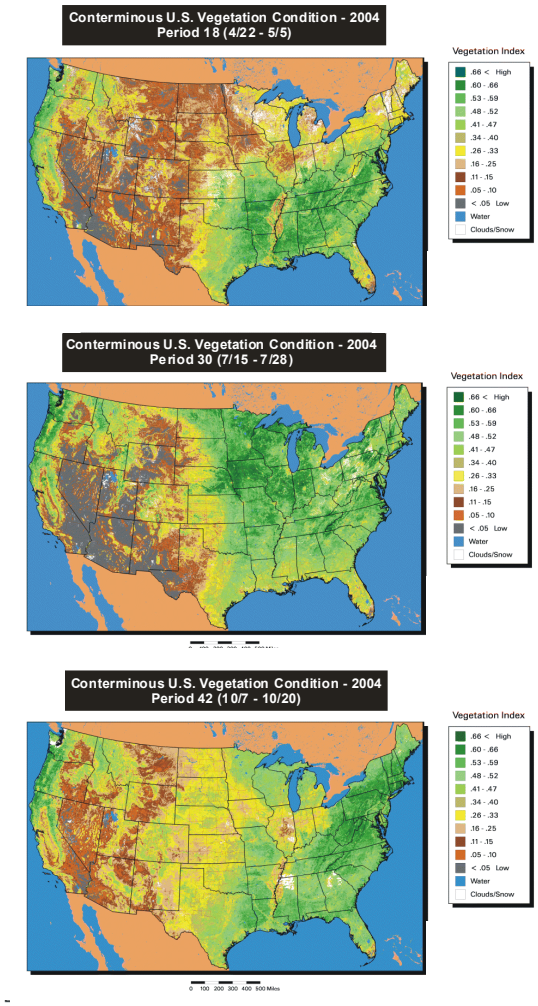

Figure 5.3 Remote Sensing of Plant Vegetation and Monitoring for Initial Plant Pest Outbreaks, 2004

These figures illustrate continental U.S. ground vegetation for selected 14-day periods during 2004. Higher resolution versions of these satellite images on a 24-hour monitoring basis could detect initial agro-terrorist events that impacted crop health, and contribute to more rapid and successful mitigation efforts.[34]

One of the best defenses against the introduction of new plant diseases, by either accidental or deliberate means, is rapid detection. One mission of the plant pathology research program of the United States Department of Agriculture Animal Research Service (ARS) Foreign Disease-Weed Science Research Unit at Ft. Detrick, Maryland, is development of rapid molecular-based systems for detection of naturally introduced foreign pathogens for use by the Animal and Plant Health Inspection Service, DoD, federal and state agencies, and universities. There are more than 500 pathogens that can cause major disease losses. Thus, a reliable methodology for rating and prioritizing those pathogens of the highest risk is essential.[35,36] Members of the DoD should be identified, trained, and equipped to serve in this anticipated monitoring capacity.

Plant diseases can materialize or be spread due to the weather. The DoD utilizes military meteorologists in its daily operations. These meteorologists could monitor regional, national, and international weather patterns (especially wind and moisture) which could contribute to a pest outbreak. More importantly, the personnel could rapidly identify downwind movement and targets that could be threatened by the secondary spread of a pest(s). Only minimal training would be required to enable DoD meteorologists to assist in determining conditions conducive to pest outbreaks or conditions and a greater spread of disease.

Military Response Measures

The U.S. military, especially state National Guard forces, could be used as a manpower resource to assist in the depopulation (eradication) and disposal of infested plant materials and food products. In the event of an agroterrorist attack, it may be necessary to complete a large scale eradication of infested plant materials and food products, and decontamination (fumigation, sterilization) of infested equipment and infrastructure (e.g., grain elevators, train cars) affected by the agents. Detailed coordination between the United States Department of Agriculture and National Guard forces must be accomplished to ensure an accurate assessment of capabilities the state can expect from the DoD.

In response to a real or perceived threat, Guard personnel may also be used to provide security for resources such as chemicals, equipment, personnel, and implementation of quarantine and containment actions. In

addition, security forces can safeguard regional supplies for the protection of un-infested crops near major agricultural production and food product handling centers to mitigate the spread of the pest(s) from the initial outbreak foci.

For all military responses, the DoD and USDA should create and maintain a network of regional centers near major agricultural production regions to support a rapid, 24 to 48 hour, response.

Command, Control, and Communication

Effectively coordinated and rapid responses require integrated electronic field diagnostic and communication systems and emergency control centers that can take advantage of the very latest information and data management technology. The DoD has extensive capabilities and experience in developing effective Command, Control, and Communication systems. The DoD could assist in the development of a coordinated, nationwide electronic communications and data management network to link the private agribusiness community with emergency management staff; field response personnel; and key DoD, federal, state, and local agencies. This network could facilitate pathogen monitoring, reporting and tracking diseases, and communicating response measures and their effectiveness.

Conclusions

In order to affect a comprehensive agroterrorist capability to protect plant and crop resources, DoD needs to develop strategic plans and establish partnerships between the United States Department of Agriculture (the United States Department of Agriculture Animal Research Service, the Animal and Plant Health Inspection Service, Cooperative State Research, Education and Extension Service), DoD, CIA, FBI, Department of Homeland Security, state and local government agencies, private sector commodity groups, universities, and professional societies like the American Phytopathological Society. Establishing and strengthening these partnerships with resources and trained personnel could expand the national infrastructure and enhance operations support and rapid response.

In terms of crop and plant response, the military's role must be pervasive and interwoven throughout the nation's homeland security fabric and strategies. A safe and dependable supply of food for our citizens is one of the most critical operative mandates for the Department of Defense. The military's defense strategies must encompass comprehensive and state-of-the art approaches to reduce opportunities for agroterrorist events. Military response strategies must also encompass aggressive and timely actions to mitigate and eradicate the impact of agroterrorism on our plant and crop resources. A strong and well-trained military will not only provide the backbone for U.S. homeland defense infrastructure but will also enhance the implementation of Department of Homeland Security strategies dealing with national and international intelligence, monitoring, security, mitigation, and communication networks.

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CHAPTER 6

Carcass Disposal

John A. Scanga, Wendie A. Phelps, and Barbara E. Powers

The most recent U.S. animal inventories reported December 2003 and January 2004, show that there are 94.9 million head of cattle, 60 million swine, 6.09 million sheep, and 449 million birds (poultry).[1] The estimated mortality of cattle averages near 2.9%, adult sheep 3.5%, feedlot lambs 2.6%, and swine 3.3%.[2] The potential annual mortality of all livestock (cattle, pigs, sheep, poultry, and horses) in the United States according to Sparks Companies 2002 was 105,345 head per day or over 3.3 million pounds.[3] There are many factors that contribute to these mortalities, such as common illnesses, infections, and respiratory ailments frequently associated with young animals and confined stock. Producers, veterinarians, and animal shelters must find secure, expedient, and economical means for disposal of these animals, road kill, and infectious wastes. In addition, livestock processors, wholesalers, and retailers must dispose of processing offals (meat waste) in the same efficient and economical manner.

An agroterrorist event involving livestock could result in enormous numbers of animal carcasses requiring disposal. These carcasses would likely be harboring an infectious agent regardless of whether the animals died from exposure to an agroterrorist agent or from euthanization to prevent suffering from or transmission of disease. The method of carcass disposal utilized will depend on a number of factors including: quantity of carcasses, cause of death, stability of potential infectious agents, local or regional environmental conditions, availability of equipment and fuel, cost, and public perception. There are a number of methods currently used to handle diseased or dying animals, their carcasses, and slaughter offals, which can potentially be applied to an emergency agroterrorist event.

One means of disposal is a form of recycling waste into otherwise useable products. Prior to the 1997 ban on feeding mammalian-derived protein sources to ruminants, and the growing concerns related to

transmissible spongiform encephalopathies (TSE), the practice of converting non-consumable animal "waste" (diseased, dead, dying and disabled animals, slaughter offal, supermarket waste, and restaurant grease) into functional meat and bone meal and tallow (i.e., rendering) consumed approximately 40 billion pounds of raw material annually.[4]

Proper and timely removal of these biological wastes in an effective manner is crucial for maintaining the health of other stock and sanitation of processing facilities.[5] Carcasses left in proximity to the herd or flock may transfer illnesses and result in further losses. They can also serve as water and environmental contaminants and expose humans to harmful bacteria such as anthrax and *Salmonella*, viruses, or protozoa such as Giradia and Cryptosporidia, or other infectious disease.[6]

Rapid and effective removal and destruction is especially important in an agroterrorist event since these carcasses can potentially propagate the spread of disease. Researchers have achieved significant progress in the search of new disposal methods such as chemical[7,8] and anaerobic digestion,[9] total de-polymerization,[10] composting,[11] and uses of recycled by-products.[12]

Carcass Disposal Methods

Past experiences with highly publicized disease outbreaks such as foot-and-mouth disease (FMD) of cloven hooved animals in the United Kingdom (UK), Chronic Wasting Disease of cervids (of the deer family) in Colorado, and exotic Newcastle disease of poultry in California, have demonstrated need for cost-effective, safe, fast, complete, and environmentally acceptable disposal methods. There are several alternative methods of biological waste disposal that can be employed. The rendering method selected should be based upon operational objectives and state and/or federal regulations. These regulations are generally based upon the method's impact upon disease control and air and water quality. While state laws regarding livestock disposal vary widely, most require disposal to take place within 24 to 48 hours. Nationally, the approved methods include: rendering, composting, burial, landfilling, incineration, and tissue digestion. Each of these disposal methods has useful attributes, but also possesses undesirable qualities.[13]

Rendering

Rendering is an economically viable and effective means of recycling biological waste into usable products for the feed and oleo chemical industries. "In 2002, 36 million head of cattle, 100 million pigs, and nearly nine billion chickens and turkeys were slaughtered in the United States, yielding 85.5 billion pounds (38.8 million metric tons) of meat, an increase of 3.3 percent over 2001, and 18.8 billion pounds (8.5 million tons) of rendered product, an increase of 3.4 percent."[14] Daily, the rendering industry processes biological waste, converting this unusable material into edible fats and oils; and inedible lard, tallows, greases, meat meal, meat and bone meal, and dry rendered tankage. These products and other derivatives of the rendering industry are vital in manufacturing plastics, tires, antifreeze, jet fuel, biodiesel, lotions, soaps, candles, and numerous other common household items.[15]

The current rendering industry is divided between two types of facilities—independent plants and integrated rendering plants which are associated with livestock and poultry packing/processing facilities. While the source of animal by-products from an integrated plant is "known" material generated from the processing plant, independent renderers gather "unknown" materials from numerous sources including very small processing plants, restaurants, animal shelters, feedlots, dairies, and ranches.[16] Currently, 70% of all products are rendered at integrated rendering plants.[17] Many independent companies have been acquired by larger independent renderers, or have gone out of business. A great deal of this change in business structure is due to the Food and Drug Administration's (FDA) implementation of Title 21 Part 589.2000 of the Code of Federal Regulations, August 4, 1997, which prohibited the use of most mammalian protein in feeds for ruminant animals.[18]

Composting

Composting is a natural process in which bacteria and fungi decompose organic material in an aerobic environment. As microorganisms break down the organic material, energy, in the form of heat, is produced. This heat, when sustained between 130°F and 150°F for one week, will kill weed seeds and bacterial pathogens found in raw

organic matter,[19] and results in compost, which resembles humus.[20] Compost can be used as a soil amendment on farms, parks, and lawns and can be especially beneficial to "organic" farmers as a soil nutrient source. However, the composition of the finished compost can vary greatly due to differences in management and input materials.[21] Composting of carcasses has been an effective alternative to pit burial because it reduces waste volume and the recycled waste can be subsequently reused.[22]

Composting biological waste produces a usable end product, but the success of composting depends on proper site planning and monitoring of the operation.[23] Management issues include raw material, moisture and temperature control, and proper proportions of nitrogen and carbon sources.[24] Optimally, the internal temperature will remain at or above 130°F for three consecutive days such that pathogenic bacteria are destroyed. If temperatures exceed 150°F, all bacteria can be destroyed, ceasing the composting process. Odor from compost is another concern which can be regulated by balancing the carbon and nitrogen content at or above a 25:1 C:N ratio.[25]

Facility design should also address odor control and appropriate compost site location.[26] While regulations vary by individual states, in general, safely composted products must meet the following criteria before being sold or distributed:[27]

1. Minimum of two heat cycles with temperatures reaching 130°F during each cycle,
2. No visible soft tissue in finished compost, and
3. Handling and storage of the compost must adhere to state or local regulations.

Burial

Instances of livestock burial date back 6,000 years.[28] This method is inexpensive and requires only the use of common farm implements. Burial can be used to avoid attracting predators and scavengers and as a means for preventing further spread of contagious diseases. Burial sites should be monitored for evidence of disturbances by coyotes, rodents, and flies. Burial sites should also be capped with a mound of dirt; and grass should be reintroduced to prevent erosion.[29] While burial does not initially reduce

the volume of biological waste, over time carcasses naturally decompose into humus through microbial and chemical processes.

One effective type of carcass burial is trench burial. As described by the Utah State University Extension Service, trench burial can be accomplished by digging a trench seven feet wide and nine feet deep and as long as necessary for the desired number of mature cows. The cows are placed in the trench and covered with a layer of dirt. The Utah State University Extension Service contends that deeper burial controls odors, helps to prevent the spread of disease, and keeps the carcass out of sight.[30]

In recent years, much concern has arisen over environmental contamination due to burial. Potential contamination of water and soils with diseases, chemicals, and bacteria are major concerns. In addition to hazardous environmental risks, urbanization rates have created an issue of recovering and removing buried animal remains prior to selling property. Burial, while inexpensive and readily employed for years, may no longer be considered a responsible option for animal disposal in many locales.

Landfilling

Landfilling animal remains in solid municipal waste areas is widely used, however regulations are inconsistent from county to county and state to state. These landfill waste areas must have a permit for operation, and be licensed to accept these types of waste. Landfills have authority to limit the number of dead animals accepted and can assign a fee to accept biological waste. Many older landfills that have evolved from former town or county dumps, may not yet comply with newer Environmental Protection Agency standards for landfill design. Therefore, the potential exists for the introduction of landfill pollutants to land or surface water. Modern landfills, which are capped to prevent water entry and lined to prevent to migration of leachate to groundwater, have minimized the groundwater pollution concerns.[31] A major concern with landfilling is the issue of space. According to the Environmental Protection Agency, 70% of U.S. landfills will reach capacity by 2025.[32]

Incineration

Incineration is among the most biologically safe methods of animal disposal included in this discussion with respect to destruction of infectious

agents.[33] Incineration effectively destroys all infectious agents, transforming organic material into inorganic material through the exposure to high (1652°F) temperatures.[34] Incineration poses minimal threat to water quality and effectively prevents the transmission of infectious diseases, including transmissible spongiform encephalopathies-causing prions. Ash generated from these processes can be safely disposed in controlled landfills or utilized as aggregate or other construction materials.[35]

To facilitate greater capacity, larger incinerators are being put into use. These larger incinerators produce more particulate matter and therefore must incorporate equipment to minimize emissions of particulate matter, heavy metals, and acidic gases.[36] Any burning done for disposal purposes must abide by clean-air standards regulated by the Environmental Protection Agency and is subject to regular inspections to ensure proper maintenance and function of equipment.[37]

Tissue Digestion (Alkaline Hydrolysis)

Chemical tissue digestion is a newer method of animal disposal primarily used by diagnostic laboratories such as those located near veterinary research centers and teaching hospitals. These digesters use boiling sodium or potassium hydroxide solutions to degrade protein and fat into a neutral solution of amino acids, peptides, sugars, and soap that is suitable for release into a municipal sewage system; and sterile calcium phosphate residue from teeth and bones that can be disposed of in an approved landfill.[38] The large volume of effluent that is released into the sewer can pose a difficult challenge due to high biological oxygen demand that may overwhelm city sewer systems. While this tissue digestion process does eliminate infectious agents, it is volume limited (up to 7,000 lbs) and time consuming (greater than 4 hours), and requires large capital expenditures for equipment and facilities. New generation tissue digesters have the potential to increase volume capacity, reduce effluent handling difficulties, and lower initial capital costs of equipment.[39]

Type and Magnitude of Military Support

Following an agroterrorism attack, there are several factors which will determine the type and magnitude of support required. Those factors

include: the epicenter of the event, the surrounding livestock populations, the surrounding human populous, and what species were involved. Individual events will vary widely in terms of climate, geographical terrain, and livestock and people densities.

In actual global disease outbreak situations (UK and Uruguay), the military was called upon to provide human, security, and logistical resources to the 2001 foot-and-mouth disease outbreaks. The involvement of the military in both instances has been viewed as successful and integral in the rapid control and eradication of the disease. The role of the military in responding to the 2001 foot-and-mouth disease outbreak in the UK was viewed as favorable, particularly, their expertise in emergency, logistical and operational management.[40]

In many infectious foreign animal disease events, the disease of concern is often not ultimately responsible for the death of livestock. Often, depopulation is utilized as a means of preventing additional spread of the agent. In these scenarios the contribution of trained individuals who can assist with large-scale livestock depopulation would be valuable.

Because effective and accepted methods of carcass disposal require some type of infrastructure, the actual process of disposal may be outside the reaches of the military. However, the military may provide access to heavy equipment and transportation mechanisms needed to mobilize disposal equipment and supplies. Additionally, the military may ensure secure transportation of carcasses to a central disposal location. The Department of Defense (DoD) could potentially assist in contracting these resources from the private sector.

Excavation equipment and operators for onsite development of the site and handling of carcasses would be needed if burial, pit incineration, or composting were employed in the disposal operation. These resources would likely be contracted from the private sector with the assistance of DoD contracting agents and specialists. Additionally, for any operation requiring real estate resources, there is a possibility of the U.S. Army Corps of Engineers employing their Contingency Real Estate Support Team for the purposes of rapidly securing land leases and finalizing real estate transactions.

Conclusions and Follow-up Actions

The first question that must be addressed is: "When should the Department of Defense become involved?" Based on the debriefings from Uruguay and the UK, it is clear that the DoD should be informed of the emergency at the onset. The DoD involvement would be determined based upon the scale (single state, multi-state, national, international), magnitude (number of people, livestock, or farms affected) and scope of each individual event. In some instances, DoD may not have, or be able to supply support, given the current status of the agricultural event and military resources.

In the circumstance that DoD resources are needed and available, the likely areas of support would involve security, contracting (private sector support and real estate), organization, and emergency response expertise through incident command type structures. For instance, the following DoD communication channels and areas of involvement in an animal emergency response should be explored:

1. *Who or what office is the first point of contact for the DoD?*

   This individual or office should be contacted at the onset of any emergency animal response, regardless of cause. The involvement of DoD would then be determined based upon the current situation and needs.

2. *What personnel and security resources are available?*

   In both the UK and Uruguay events, early military involvement in area quarantine and restriction of animal movement were critical in minimizing the spread of the infectious agent. These resources would likely be short-term, immediate needs of the response effort.

3. *Who is the contact for contracting?*

   The most probable DoD resource that would be utilized in any emergency response would be contracting expertise. Service and equipment needs will likely be provided through USDA or DoD contracts with third party providers.

4. *Who is the contact person for the United States Army Corps of Engineers?*

   For large-scale animal disposal, the United States Army Corps of Engineers has infrastructure in place to oversee and administer real property, geological analyses and engineering and potential construction (i.e., landfill or compost site).

An attack on our U.S. agriculture has the potential to generate millions of carcasses requiring immediate disposal. Current civilian facilities may not be able to transport and process these great quantities of biological waste without federal assistance. The DoD possesses critical capabilities and manpower which can be utilized in the event of an agroterrorist event or major natural outbreak of disease in the United States. These capabilities and manpower must be identified and employed to prevent further propagation of agroterrorist or naturally occurring diseases.

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CHAPTER 7

Summary, Shortfalls, and Recommendations

Jim A. Davis and Donald L. Noah

The specter of agroterrorism is on the rise across the United States. Many organizations and governmental agencies are gaining a better understanding of the vulnerabilities of our nation, potential capabilities of our adversaries, and the catastrophic effects of a well executed agroterrorist attack. Because of this expanding awareness, many agencies are considering the role the Department of Defense would play in such an event.

Many questions must be answered quickly so the United States is not caught unprepared and so the DoD can use its resources and capabilities most effectively. Should the Department of Defense step forward in a more aggressive fashion to prepare for an agroterrorist event? Are there other governmental agencies or resources that are better suited or fully capable of handling the mission without the assistance of the DoD? Would the Department of Defense's involvement in pre-attack preparations hinder responsible agencies from building truly independent capabilities to deal with a national agroterrorist event? Or, is the threat so insignificant that it has little effect on the national security of the United States? If the Department of Defense is needed to respond to an agroterrorist event at the national level, how can it prepare now and what will be expected from the DoD when it does respond?

Agroterrorism is a threat to U.S. national security, as clearly detailed in the introductory chapter, yet the DoD has not gotten more involved in agro-defense or the planning to manage the aftermath of an agroterrorist event. Multiple reasons likely have driven the DoD to place this threat low on its list of concerns. The Department's increasingly global commitments, coupled with trends toward down-sizing and "homeland defense," stretch available forces and resources. Traditionally, the Department of Defense viewed its area of responsibility primarily as abroad and only recently has this focus shifted toward the continental

United States. The historic rarity of foreign incursions on U.S. soil and the *Posse Comitatus Act,* enacted after the American Civil War, have helped to root this foreign focus philosophy deeply in the mores of all military services.[1] The DoD defers to the U.S. Department of Agriculture, the Department of Homeland Security, and others as more appropriately suited to handle an agroterrorist event. Some in the DoD hold the opinion that supporting agroterrorism is simply "a kind of mission we have never done and is not our job." Others in the Department of Defense, however, assume that we are already capable of contributing to the response to an agroterrorist event. In our experience, leaders in other federal agencies expect DoD to provide support, however unspecified, following such an event. This is the crux of this report: Will the Department of Defense be prepared and able to provide such support if and when it is needed?

Is DoD's Role Mandated in an Agroterrorist Event?

The National Response Plan, released in 2004 by the Department of Homeland Security, provides an all-hazards approach to national catastrophes (man-made or natural). Using the National Incident Management System, it provides much-needed clarity to tactical, operational, and strategic leaders as they prepare their respective agencies. To a certain extent it also defines how the Department of Defense is to be involved in various responses. In the incident annexes dealing with biological, catastrophic, and terrorism incidents, the DoD is listed as a "cooperating [support] agency." Although the annex on food and agriculture incident has not yet been released, a similar role for Department of Defense is expected.[2]

Additionally, the DoD has a memorandum of understanding regarding veterinary services with the United States Department of Agriculture and the General Services Administration (GSA) – further detailed in Chapters 2 and 4 of this report. In this Memorandum of Understanding, the DoD has agreed to assist in developing contingency plans and exercises as well as participate in other missions such as pest control, laboratory support, vaccine development, and providing a wide range of medical specialists.[3]

In 2003, the Department of Defense established the U.S. Northern Command (NORTHCOM), headquartered at Peterson Air Force Base, Colorado Springs, Colorado. It was established as a single unified

command with an area of responsibility encompassing Canada, the United States (excluding Hawaii), Mexico, and the surrounding waters out to approximately 500 miles. It also includes the Gulf of Mexico and several islands in the Atlantic and Caribbean.[4] Although NORTHCOM would provide the key military support in the event of a major agroterrorist event in the continental United States (as detailed in Chapter 3) there is only one person assigned to NORTHCOM who is tasked to plan for such a response.[5] However motivated and qualified, a single individual faces a truly mammoth task.

Although traditionally trained to seize, secure, or destroy by force, U.S. military forces have increasingly shifted to peacemaking and peacekeeping operations. If a major agroterrorist event occurred and the military was called upon to enforce an animal quarantine, they might be perceived as law enforcement agents in our homeland. Are U.S. forces sufficiently trained for such a mission—and in sufficient numbers? The military's ability to integrate with state and local government agencies will be honed only through meticulous planning and realistic exercises.

Another concern centers on the number of military personnel potentially available to respond to a domestic incident. With significant operations on-going in Iraq and Afghanistan, will the military be available to help domestically with an agroterrorist event? Clearly, iterative planning efforts should include an estimation of the forces required for various contingencies, the appropriateness of existing interagency agreements, and clear lines of communication between respective offices within DoD, the Department of Homeland Security, the U.S. Department of Agriculture, and the Department of Health and Human Services.

Shortfalls within DoD to augment a National Level Agroterrorist Event

This study has identified at least four categorical deficiencies within the DoD regarding readiness for an agroterrorism event.

1. **Planning.** As yet, there is no clear plan for integrating specific military capabilities into the overall response effort. While the Army maintains communication with USDA regarding animal diseases, this has not resulted in an integrated response plan.

2. **Personnel.** NORTHCOM has only a single planner focused on this contingency. Moreover, although there are significant numbers of trained and experienced veterinarians, laboratory technicians, epidemiologists, and specialized technicians in the military, there is no centralized mechanism for tracking their locations and availability in an agroterrorist event.
3. **Liaison.** Although the Department of Defense has a Memorandum of Understanding with the United States Department of Agriculture and the Food and Drug Administration, these relationships should be further solidified by creating permanent liaison positions.
4. **Mission.** Perhaps most importantly, the DoD has not specifically acknowledged the mission of providing forces and/or resources following an agroterrorism event. Although this may be included by implication under the rubric of "homeland defense," these shortfalls could be more easily remedied by senior-level commitment to this mission.

Recommendations for Action

This focused effort identified issues regarding the DoD's preparedness to contribute to the response to a major agroterrorist event. Senior leaders within the Office of the Secretary of Defense, the Joint Staff, NORTHCOM, and the Army should commission a more complete analysis of what should be the military's involvement following a major national agroterrorist event. The following milestones are offered as a template of action in determining the optimum military participation in response to the agroterrorism threat and ensuring its readiness.

1. Determine if this is a valid mission, at least in part, for the DoD. This likely is a NORTHCOM action, in coordination with the Office of the Secretary of Defense and the Joint Staff, and could be initiated by an extensive literature review of previous military involvement in agricultural disease outbreaks.
2. Identify categorical capabilities that the DoD might be called upon to provide. This could be facilitated by a series of interagency

tabletop and field exercises with participation from all levels (e.g., state, local, national, academic).

3. Evaluate the current capability of the Department of Defense to meet those identified requirements.
4. Assuming there is a delta between requirements and current capability, close the gap by fine-tuning military force structure, if possible, and/or military responsibilities as outlined in interagency agreements.

The recent questions raised concerning the use of the military for quarantine operations in the event of an avian influenza outbreak in the United States demonstrate that the roles of the military in an agricultural event are not clearly established. The capabilities of the military are broad, and can be easily adapted to enhance an effective response to an agroterror attack. This project provided local, state, federal, and DoD policy makers detailed information about current capabilities and future potential roles for the Department of Defense in helping the nation prepare for, respond to, and recover from a terrorist attack on U.S. agriculture.

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Robert P. Ellis, PhD, is the Colorado State University Biosafety Officer, and Professor, Department of Microbiology, Immunology and Pathology, Colorado State University, Fort Collins, CO. Dr. Ellis has organized and taught courses for the Eagleson Institute, American Biological Safety Association (ABSA) Summer Seminar Series, and the ABSA Annual Meeting (Arboviral Vector Containment in the BSL-3 Laboratory; and Design, Construction, and Management of a BSL-3 Laboratory Building). He initiated a 2 credit, graduate/undergraduate course at Colorado State University: Biosafety in the Research Laboratory. He earned his BS at the University of Wyoming, Laramie, (Microbiology), and his MS in Veterinary Microbiology and PhD in Immunology at Purdue University, West Lafayette, Indiana. Dr. Ellis is a Certified Biological Safety Professional, a Diplomate of the American College of Microbiology (Specialist Microbiologist, Biological Safety) and a Diplomate, American College of Veterinary Microbiologists (Honorary). He is the Executive Director of the Conference of Research Workers in Animal Diseases, and

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John R. Herbold, DVM, PhD, MPH, DACVPM is Associate Director of the Center for Biosecurity and Public Health Preparedness, University of Texas Health Science Center at Houston, and Associate Professor of Epidemiology, University of Texas School of Public Health Regional Campus at San Antonio. He holds an active commission in the Texas State Guard as Officer in Charge, Veterinary Unit, Alamo Group, Texas Medical Rangers. John Herbold's previous positions include: Defense Science Board ad-hoc Task Force on SARS Quarantine; Chair, Occupational & Environmental Sub-Committee Armed Forces Epidemiological Board; Senior Policy Analyst for Preventive Medicine and Health Promotion, Office of the Assistant Secretary of Defense (Health Affairs); Chief Scientist for the Air Force Armstrong Laboratory Directorate of Aerospace Medicine; Vice Commander, USAF Occupational and Environmental Health Laboratory; Chief of Disease Surveillance, USAF School of Aerospace Medicine; Medical Intelligence Officer, HQ U.S. Air Forces Europe (USAFE); Chief, Environmental Medicine Branch, HQ USAFE; Assistant to the Command Veterinarian, HQ USAFE; Chief of Veterinary Services, Zweibrucken Air Base, FRG; Chief of Veterinary Public Health, Hanscom Field, MA. John Herbold is a Fellow of the American College of Epidemiology and Diplomate of the American College of Veterinary Preventive Medicine. He was awarded Bachelor of Science and Doctor of Veterinary Medicine degrees from Texas A&M University, the Master of Public Health from the University of North Carolina at Chapel Hill, and the Doctor of Philosophy (Epidemiology) from The Ohio State University.

Colonel Donald L. Noah, USAF, DVM, MPH, DACVPM currently serves as the Department of Defense Liaison to the Centers for Disease Control and Prevention in Atlanta, Georgia. Col Noah's military

assignments include a base-level assignment in Japan; instructor at the U.S. Air Force School of Aerospace Medicine in San Antonio; infectious disease outbreak investigation fellowship at the U.S. Centers for Disease Control and Prevention; infectious disease analyst with the Defense Intelligence Agency at Fort Detrick, Maryland; liaison officer between the U.S. Air Force Surgeon General and the Central Intelligence Agency; medical epidemiologist at the U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID); and special assistant for biological defense at the Pentagon's Office of the Secretary of Defense. He is also a USDA-certified Foreign Animal Disease Diagnostician. In addition to his academic and military experiences, Dr. Noah also practiced in a large animal (predominantly dairy and swine) private practice in Ohio with his father for three years. Dr. Noah received his bachelor's and veterinary medical degrees from The Ohio State University and a Master of Public Health from the University of Minnesota. He is also a Diplomate of the American College of Veterinary Preventive Medicine.

Lieutenant Colonel Brian V. Noland, USA, DVM, MPH, DACVPM, is the Command Veterinarian, U.S. NORTHCOM, Peterson AFB, CO. LTC Noland is the subject matter expert for agricultural and food issues at U.S. Northern Command in Colorado Springs, CO. LTC Noland's previous assignments include Chief, Current Operations and Facilities Division, U.S. Army Veterinary Command, Fort Sam Houston, TX; Assistant to the Chief, Veterinary Corps, Fort Sam Houston, TX; Chief, UK/Ireland Division, Northern Europe Veterinary Detachment, RAF Feltwell, United Kingdom; Deputy Commander, Northern Europe Veterinary Detachment, Darmstadt, Germany; Deputy Commander, 110th Medical Detachment (VS), Frankfurt, Germany; Chief, Animal Medicine, Presidio of San Francisco, CA; Officer-in-Charge, Team E, 106th Medical Detachment, Taegu, S. Korea; and Chief, Animal Medicine Branch, Ft. Bragg, NC. He graduated from Utah State University with BS degrees in Animal Science and Bioveterinary Science. He received a Doctor of Veterinary Medicine degree from Colorado State University and a Master of Public Health degree from the University of Texas. He achieved Diplomate status in the American College of Veterinary Preventive Medicine. He is a graduate of the U.S.D.A. Foreign Animal Disease Diagnostic School.

Wendie A. Phelps, BS, is a graduate research assistant and student at Colorado State University. As an undergraduate, Ms. Phelps worked part-time in the Animal Physiology and Meat Science laboratories. She also had the opportunity to work and travel internationally, partaking in a study abroad/internship program at the Scottish Agricultural College in Edinburgh, Scotland, and as an intern with the U.S. Meat Export Federation-Mexico located in Mexico City, Mexico. Ms. Phelps earned her bachelors degree in Animal Science at the University of Arkansas.

Barbara E. Powers, DVM, PhD, MS, is the Professor and Director, Diagnostic Laboratory, Department of Pathology, College of Veterinary Medicine and Biomedical Sciences, Colorado State University (CSU). Dr. Powers' previous positions include Associate Professor and Director, Diagnostic Laboratory, Department of Pathology, College of Veterinary Medicine and Biomedical Sciences, CSU; Associate Professor and Director, Diagnostic Laboratory, Department of Pathology, College of Veterinary Medicine and Biomedical Sciences, CSU; Associate Professor, Department of Radiological Health Sciences, College of Veterinary Medicine and Biomedical Sciences, CSU; Assistant Professor, Department of Radiology and Radiation Biology, College of Veterinary Medicine and Biomedical Sciences, CSU; Joint Appointment, Diagnostic Laboratory, College of Veterinary Medicine and Biomedical Sciences, CSU; post-doctoral fellow in Radiology and Radiation Biology, CSU. Dr. Powers holds a BS in Agriculture Science, MS in Veterinary Anatomy, and DVM from Purdue University; and a PhD in Veterinary Pathology from CSU. Dr. Powers is the Immediate Past-President, Colorado Veterinary Medical Association; and Vice-President, American Association Veterinary Laboratory Diagnosticians (AAVLD).

Lieutenant Colonel (Select) Tasha L. Pravecek, USAF, BSC, PhD, is the Chief of CBRNE Education, Research and Analysis at the USAF Counterproliferation Center. Previously, Lt Col (Sel) Pravecek was a student at Air Command and Staff College. She also served as the 354th Medical Group, Bioenvironmental Engineering Commander at Eielson AFB, AK. Other previous positions include Chief, Chemistry and Toxicology Branch, Air Force Center for Environmental Excellence,

Brooks AFB, TX; Instructor of Chemistry, USAF Academy; and Chief Cell and Tissue Culture Section and Research Toxicologist, Toxicology Division, Wright-Patterson AFB, OH. Lt Col (Sel) Pravecek has a Doctorate in Environmental Science and Engineering from the University of North Carolina at Chapel Hill and MS degrees in Biological Chemistry from Wright State University and Military Operational Art and Science from Air Command and Staff College. She received her BS degree from the U.S. Air Force Academy, Colorado Springs, CO.

John A. Scanga, PhD, is an Assistant Professor and Extension Meat Specialist at Colorado State University, Ft. Collins, CO. He also oversees the day-to-day operations of the Meat Science Teaching Laboratory, where he conducts research pertinent pre-harvest, post-harvest and post-processing red meat safety, red meat quality, international trade issues and carcass disposal technologies. His previous research includes the use of postmortem marination treatments to improve beef tenderness and implicated the usefulness of these techniques in beef total quality and palatability management systems. In addition, Dr. Scanga's research from several commercial cattle feeding operations which included production records, feedlot performance data, and carcass performance allowed him to make recommendations to the beef industry to help feeders reduce economic losses due to dark cutting beef. Dr. Scanga was appointed to the Editorial Board for the Journal of Animal Science in 2002. He sits on the Colorado Beef Quality Assurance Council, the American Society of Testing and Measures F10 Committee on Livestock, Meat and Poultry Evaluation Systems, CSU's Public Policy Institute and the advisory board for CSU's Veterinary Diagnostic Laboratory. Dr. Scanga earned his BS degree in Animal Science, MS degree in Meat Science, and PhD in Animal Science at Colorado State University.

Howard F. Schwartz, PhD, is a Professor of Plant Pathology & Associate Department Head, Department of Bioagricultural Sciences and Pest Management at Colorado State University (CSU). His current work emphasizes disease management of vegetable crops. Dr. Schwartz's previous positions include Associate Professor of Plant Pathology, CSU; Assistant Professor of Plant Pathology, CSU; and Senior Staff Scientist, Plant Pathologist, Centro Internacional de Agricultura Tropical

(International Center for Tropical Agriculture, CIAT) Bean Program, Cali, Colombia. He has been awarded the Colorado County Agents Association, Friend of Colorado County Agents Award; Rocky Mountain Bean Dealers Association Foundation, Regis Daily Award for Outstanding Service; Colorado State University, Oliver P. Pennock Distinguished Service Award; Cooperative Extension, Epsilon Sigma Phi Visionary Leadership Award; and American Phytopathological Society, Excellence in Extension Award. Dr. Schwartz has a BS in Agronomy (Business Minor) from the University of Nebraska at Lincoln, an MS in Plant Pathology (Plant Breeding Minor) from the University of Minnesota, St. Paul, and a PhD in Life Sciences (Plant Pathology) from the University of Nebraska.

Workshop Attendees

As part of this project, a workshop was held at Colorado State University, Fort Collins, Colorado, on December 9, 2004. The purpose of the workshop was to provide a forum to critique the chapters published in this publication and help the authors expand the content and scope of their chapters. In addition to the authors, there were invited guests from the U.S. Department of Agriculture, Colorado Department of Agriculture, and other agencies present to hear the authors' presentations and provide input. Many of their comments were included in the final product. Therefore, their names and affiliations are presented here to recognize their valued contributions. The authors and editors thank them for their interest and comments regarding this agroterrorism project.

Don Coates, DVM, is a retired US Air Force Colonel. Dr. Coates received his DVM from the Colorado State University, College of Veterinary Medicine and Biomedical Sciences.

Kevin Dennison, DVM, is the Director Colorado State Animal Response Team (SART), Colorado Veterinary Medical Foundation, Denver, Colorado. Dr. Dennison received his DVM from Colorado State University.

Hank Gardner, PhD, is the Associate Vice President for Research, and Professor, Environmental and Radiological Health Sciences, Colorado State University. Dr. Gardner's academic credentials include an MS in Public Health from Tulane University, and a Doctor of Public Health in environmental health from the Johns Hopkins School of Public Health.

Dan Harpster, DVM, is the Area Emergency Coordinator for Ohio, Michigan, Indiana, Kentucky, and Tennessee. Dr. Harpster received his DVM from The Ohio State University College of Veterinary Medicine.

Marc Johnson, PhD, is the Vice Provost for Agriculture and Outreach, and the Dean of the College of Agricultural Sciences at Colorado State University. Dr. Johnson earned his MS degree and master's of technology and international development in economics from North Carolina State University, and his doctorate in agricultural economics from Michigan State University.

Roger Krogwold, DVM, MS, MPH, DACVPM, is the Ohio and West Virginia Area Epidemiologist for USDA, APHIS, Veterinary Services. Dr. Krogwold received his DVM from the University of Minnesota, his MS from The Ohio State University, and his MPH from the University of Oklahoma. He is the ACVPM representative to the AVMA's American Board of Veterinary Specialties.

Michael Logan, DVM, MPH, DACVPM, is the Area Epidemiologist for the USDA, APHIS, Veterinary Services, in Flowood, MS. Dr. Logan received his DVM from the University of Missouri and his MPH from Tulane University School of Public Health and Tropical Medicine.

Krista Martin, DVM, MPH, is an Area Epidemiology Officer for the USDA, APHIS, Veterinary Services. Dr. Martin received her MPH from the University of Washington, and DVM from the University of Wisconsin.

Michael Martin, DVM, MPH, is the USDA, APHIS, Veterinary Services Area Epidemiologist for South Carolina and a technical consultant to the National Animal Health Laboratory Network for HL7 messaging and terminology standardization. Dr. Martin received his DVM from Missouri and his MPH from Harvard.

Lance Perryman, DVM, PhD, is the Dean of the College of Veterinary Medicine and Biomedical Sciences, Colorado State University, Fort Collins, CO. Dr. Perryman received his DVM and PhD from Washington State University and his MS from The Ohio State University.

Venaye Reece, DVM, is the Area Emergency Coordinator for South Carolina, Georgia, Alabama, and Mississippi for the USDA, APHIS, Veterinary Services. Dr. Reece received her veterinary degree from University of Georgia, College of Veterinary Medicine.

Ian Stewart, MS, DVM, is the Colorado Area Epidemiologist for the USDA, APHIS, Veterinary Services. Dr Stewart received his BS degree in Microbiology, his MS degree in Microbiology and Immunology, and his DVM degree from Colorado State University.

Sherrilyn Wainwright, DVM, MPH, is the Senior Staff Epidemiologist and co-lead for the Emergency Management Response System (EMRS) at the Center for Epidemiology and Animal Health, USDA, APHIS, in Fort Collins, CO. She received her MPH at Johns Hopkins School of Hygiene and Public Health, Baltimore, MD, and her DVM from Texas A&M University.

Jim Williams, DVM, is the Nebraska and Colorado Area Emergency Coordinator, USDA, APHIS, Veterinary Services. Dr. Williams received his DVM degree from Colorado State University.