Homeland Food Defense

Objectives

The objectives for this module are:

1. Describe the risk that intentional contamination presents to egg products plants.
2. Define key food defense terms.
3. Describe the purpose of each food defense procedure with respect to identifying potential food defense vulnerabilities in egg products plants.
4. Identify the steps taken to encourage an egg product plant to enhance its food security measures when food defense vulnerabilities are identified.

References

1. *Food Defense Guidelines for Slaughter and Food Processing Establishments*, USDA, FSIS publications.
2. *Security Guidelines for the Transportation and Distribution of Meat, Poultry and Egg Products and Consumers*, USDA, FSIS publications.
3. *FSIS General Food Defense Plan*, USDA, FSIS publications.
4. *Food Defense Self Assessment Checklist for Slaughter and Processing Facilities*, USDA, FSIS publications.

Introduction

This module will address food defense activities in FSIS. First, we will cover an overview of what food defense means and then we will talk about your role and inspection activities that are related to food defense.

Let us start by reviewing the mission and vision of FSIS, because it is this infrastructure that has been tasked with addressing food terrorism. As you know, FSIS is USDA's public health regulatory agency that ensures that meat, poultry, and egg products are safe, wholesome, and accurately labeled. These products account for one third of consumer spending for food, with an annual retail value of $120 billion.

The FSIS infrastructure is extensive. There are approximately 6,500 federally-inspected and 2,550 state-inspected meat and poultry (slaughter and processing) establishments in the United States. There are over 7,600 inspectors assigned to the federally-inspected establishments and import facilities alone. There are approximately 1,200 veterinarians assigned to work in one or a number of federally-inspected meat and poultry plants. Furthermore, there are 85 federally-inspected egg products plants nationwide, with approximately 130 egg products inspectors. We have an enormous responsibility to ensure that we provide the safest food possible for the American public.

Prior to September 11, 2001, FSIS focused primarily on protecting meat, poultry, and egg products from contamination that is not premeditated, but unintentional. The events of that day, however, brought the issue of the vulnerability of our food supply to the forefront. This means that FSIS has had to add functions to protect the food supply against intentional harm (for more information, refer to Attachment 1 – FSIS Food Defense Strategies). Here are reasons why the food supply is a plausible and possible target:

- Security of facilities and personnel is low.
- 100% of our population eats.
- Food terrorism can cause sickness and death.
- Food terrorism can cause disruptions in the food supply without deaths.
- Food terrorism can destroy brand names.
- Food terrorism can be used for economic gains on the futures markets.
- Deliberate contamination that is designed to harm people may be difficult to distinguish from situations that occur unintentionally.

Food Defense Terminology

Food Security – when all people at all times have both physical and economic access to enough food for an active, healthy life. Food security includes both physical and economic access to food that meets people's dietary needs and food preferences. Therefore, the concept of food security certainly includes but encompasses much more than the idea of food defense.

Food Terrorism – an act or threat of <u>deliberate</u> contamination of food for human consumption with chemical, biological, or radio nuclear agents for the purpose of causing injury or death to civilian populations or disrupting social, economic, or political stability (for more information, see Attachment 2 – Bioterrorism Overview). Within FSIS, food terrorism is further focused down to how terrorism relates to meat, poultry, and egg products.

Food Safety – means guarding against <u>unintentional</u> contamination of food. The food industry developed food safety measures that are developed based on what can be predicted to happen if prevention measures are not taken at the critical steps during processing to guard against unintentional contamination. While the United States has a well-functioning *food safety* infrastructure to protect the public against the unintentional contamination of food, *food defense* encompasses a broader range of considerations.

Food Defense – is the protection of food products from intentional contamination or adulteration where there is an intent to cause public health harm or economic disruption. Food defense encompasses a broad range of considerations with chemical, biological, physical, or radiological agents. Food Defense is an integral part of FSIS's mission in protecting public health.

Defending food from intentional contamination requires measures in addition to food safety, because it is hard to predict how the terrorist might manage an attack on the food in a particular operation. A food defense plan considers how someone might get into a particular operation and how some agent could be added to the process. Dealing with issues involving the possible intentional contamination of food due to a terrorist act requires addressing these factors:

- Physical security of buildings,
- Surveillance activities to identify/prevent acts intended to disrupt the food supply,
- Personnel security,
- Emergency response.

Critical Infrastructure – The Patriot Act of 2001 defined critical infrastructures as systems and assets, whether physical or virtual, so vital to the United States that the incapacity or destruction of such systems and assets would have a debilitating impact on security, national economic security, national public health or safety, or any combination of those matters. The critical infrastructures specified by the Patriot Act of 2001 were:

- Agriculture and Food
- Water
- Public Health
- Emergency Services
- Government
- Defense Industrial Base
- Information and Telecommunications
- Energy
- Transportation and Shipping
- Banking and Finance

- Chemical/Hazardous Material Industry
- Postal Service
- National monuments and icons

Supply Chain - continuous process including each step involved in food production and food reaching the consumer; often referred to as farm-to-table or farm-to-fork.

Agricultural Bioterrorism - use of biological, chemical, radiological, or other agents against food and fiber production to produce fear, cause economic damage, harm public health, or have some other adverse impact.

Incident Command System (ICS) – a nationally established management system used to respond effectively to an emergency involving one or more jurisdictions.

The National Terrorism Advisory System

On January 27, 2011, the Department of Homeland Security (DHS) announced that it would discontinue the color-coded Threat Condition alerts of the Homeland Security Advisory System. On April 27, 2011, DHS initiated a new system, the National Terrorism Advisory System (NTAS). Under the NTAS system, DHS coordinates with other federal entities to issue formal, detailed alerts when the Federal government receives information about a specific or credible terrorist threat. These alerts include a clear statement that there is an “imminent threat” or “elevated threat.” The alerts also provide a concise summary of the potential threat, expiration date, information about actions being taken to protect public safety, and recommended steps that individuals, communities, businesses, and governments can take.

The NTAS alerts are based on the nature of the threat. In some cases, alerts are sent directly to law enforcement or affected areas of the private sector. In others, alerts are issued more broadly to the American people through official and media channels – including a designated DHS webpage (National Terrorism Advisory System), as well as social media tools, including Facebook and Twitter (through the official DHS Facebook and Twitter account). Additionally, NTAS has a “sunset provision,” meaning that individual threat alerts are issued with a specified end date. Alerts may be extended if new information becomes available or if the threat evolves significantly.

In addition, samples of NTAS alerts and bulletins, as well as current and expired advisories can be accessed through the DHS webpage.

FSIS Directives

Now, let us talk more specifically about inspection personnel duties related to food defense. These duties are covered in FSIS Directives. There are ten FSIS Directives related to Homeland Security:

- 5420.1 – Food Defense Verification Tasks and Threat Notification Response Procedures for the Office of Field Operations
- 5420.2 – Homeland Security - Handling of FSIS Laboratory Samples under Declared Heightened Threat Conditions
- 5420.3 – Food Defense Surveillance Procedures and National Terrorism Advisory System Alert Response for the Office of Program Evaluation, Enforcement, and Review
- 5420.5 – Homeland Security Threat Condition Response: Intelligence Reports and Communications
- 5420.6 – Homeland Security Threat Condition Response: Information Technology Monitoring Procedures
- 5420.7 – Homeland Security Threat Condition Response: Human Health Monitoring and Surveillance
- 5420.8 – Homeland Security Threat Condition Response: Communication and Public Affairs Procedures
- 5500.2 – Significant Incident Response
- 5500.3 – Incident Investigation Team Reviews
- 5500.4 – Products Intentionally Adulterated with Threat Agents

When reviewing any of these Directives, make sure that you have the most recently issued version by downloading the particular Directive from the FSIS website or PHIS – Home Page – My Dashboard tab. These may be modified frequently to reflect new threat information gained through intelligence-gathering activities conducted worldwide. Therefore, it is imperative that you review these directives following notification of any modifications or updates.

FSIS conducts verification activities throughout the food production process, which consists of a series of processes along the farm-to-table chain. The order of these processes is:

- Production – is the growth of food products and shipping them to slaughter or processing facilities. The shipping portion of this process also accounts for imported products, which is reviewed by the FSIS Policy Development Staff
- Processing – is the slaughter and processing steps

- Distribution – is the movement of the processed product into commerce
- Retail/Consumption – is the final step, when the product reaches the retail or food service industry (hotels, restaurants, institutional facilities and/or grocers – consuming public)

The FSIS in-plant inspection team's major area of responsibility falls within the processing part of the system. The first Directive in the Food Defense series outlines the duties that are relevant to the in-plant inspection team under an imminent threat or elevated threat alert. The other Directives in this series cover the duties of other FSIS officials regarding distribution, communications, information technology, human health monitoring, public affairs, etc.

FSIS Directive 5420.1

Let us look at Directive 5420.1 in more detail. First, this directive describes Food Defense Verification (FDV) tasks that Inspection Program Personnel (IPP) is to perform in the Public Health Information System (PHIS) and the frequency with which these procedures are to be performed. These tasks have a priority 6 in the Establishment Task List. The frequency with which these tasks are to be performed is based on factors that affect the vulnerability of the food product to intentional adulteration:

- Nature of the food product – in general, the following characteristics are associated with foods most vulnerable to intentional adulteration:
  - large batch size
  - uniform mixing
  - short shelf life
  - accessibility to the product

- Product volume – establishments/plants that produce a greater volume of product may be a more desirable target for intentional adulteration because a greater volume of adulterated product can lead to greater public health consequences.

Functional Food Defense Plan

A functional food defense plan (FDP) is an approach to mitigate vulnerabilities. A functional FDP is a set of procedures or practices that an egg products plant uses to reduce the risk of intentional adulteration of its incoming raw materials or outgoing products. An FDP is functional when:

- the plan is written
- the measures in the written plan are implemented
- the plan is tested periodically, and

  - the plan is reviewed annually or when changes occur within or outside the plant that could affect the vulnerability of the product produced (e.g., new products produced or current process is modified)

Note: If the plant were not implementing elements of its FDP, then FSIS would not consider the plant to have a functional FDP.

The absence of a functional FDP may increase a plant's vulnerability to intentional adulteration because important security measures needed to protect facility, product, and employees may not be in place. Functional FDPs are voluntary in official FSIS-regulated plants (i.e., not mandated by regulation). Nonetheless, FSIS considers such plans to be an important tool that can reduce the risk of intentional adulteration of food products.

FSIS encourages plants to develop a functional FDP as a means to prevent, protect, mitigate, respond to, and recover from intentional adulteration incidents (for more information go to Attachment 1 – Industry Outreach section below). Consequently, a plant does not have to provide IPP access to its FDP or any associated documents (e.g., employee personnel files). It is beneficial if inspection personnel are permitted access to the plan, as it may be useful in identifying how the plant is addressing food defense. If the plant shares its plan, IPP are not to keep or make copies of the written plan. IPP also cannot show or share anything about the plan with any outside source because it includes sensitive security information.

An egg products plant may choose to develop a functional FDP at any time or decide to share the plans they developed with IPP. In such cases,

- During an FDP survey or whenever IPP become aware of a change in the status of the plant's FDP, IPP are to discuss such plans or the observed change with plant management at the next weekly meeting and document the discussion in the weekly meeting MOI, as described in PHIS Directive 5030.1 and 5010.1 (IPP are to determine through these discussions whether the plan is functional).

- Do not take enforcement action if a plant is not implementing all of the elements in its FDP because there is no regulatory requirement for such plans (see note above).
  - IPP should document missing elements of the FDP under the "Finding" tab – check the Non-regulatory concern box in the Food Defense task being performed, and create a food defense MOI as this may represent a vulnerability

- Update the Establishment profile if the plant has a functional FDP (under Establishment Profile – "General" tab – "Other" tab – place a check mark after the question, "Does the establishment have a written Foo Defense Plan?")

Threat Notification

Directive 5420.1 describes the actions that the FSIS Office of Data Integration and Food Protection (ODIFP) will take, when the alert affects food or agriculture, to notify employees, stakeholders, and the public, as appropriate, when DHS issues an NTAS alert or when an NTAS alert ends. Inspectors-in-Charge (IIC) are to ensure that any notifications distributed to field employees pursuant to this directive are available to IPP, and to inform plant management of the NTAS alert status. In case of a significant incident, the FSIS Emergency Management Committee may be alerted or activated and other response actions taken pursuant to Directive 5500.2, Significant Incident Response.

When the Federal government receives information about a specific or credible terrorist threat to food or agriculture, the frequency of the Food Defense tasks will increase, and additional actions may be needed to reduce the threat of intentional adulteration of food products. Given what is required in responding to a credible threat of a terrorist attack, IPP must clearly understand their roles and what will be required of them to respond properly to that threat.

If IPP observe a potential significant incident that presents a grave, or potentially grave, threat to public health or to the safety of FSIS-regulated products or to personnel, they are to report it through supervisory channels. IPP are to follow instructions provided in FSIS Directive 5500.2

Food Defense Activities

IPP in egg products plants are to perform the routine Food Defense Verification (FDV) tasks at the frequency prescribed in Table 1 of Directive 5420.1 to identify potential vulnerabilities within or outside the plant that could lead to deliberate adulteration of a food product.

IPP are responsible for determining:

- if the plant has a functional food defense plan, IPP need to update the plant's establishment profile, which IPP are to review annually after the completion of the FDP survey, or when the status of the plant's FDP changes

- if the plant does not have a functional FDP, IPP are to inform their immediate supervisor and let plant management know that FSIS has developed a General Food Defense Plan that can be adopted by the plant

- what the level of vulnerability is for the plant and complete the FDV tasks

- if an NTAS Alert has been issued, then IPP need to perform additional FDV directed tasks

In the case of an NTAS alert identifying an elevated or imminent threat to food or agriculture, the IIC will receive specific instructions from the District Office (DO) on other measures, if any, that the inspector is to take based on the information received about the specific threat to a product or process. Such measures may include sampling of specific products, to protect public health, and deploying IPP to egg products plants producing the products to ensure that FSIS has an on-site presence during any type of operational activity.

Food Defense Verification Tasks

PHIS will automatically generate <u>one</u> routine FDV task of each type per week to the establishment's task list. IPP will need to schedule additional directed FDV tasks when a specific or credible terrorist threat to food or agriculture is received; PHIS does not automatically increase the frequency under these conditions.

IPP in egg products plants are to perform FDV tasks as described in Directive 5420.1, Section IX – Table 1. The purpose of these verification tasks is to identify potential weaknesses in a plant's food defense measures that could make its products vulnerable to intentional adulteration. A potential weakness can be any part of the food production or storage system where a protective measure should be implemented to protect a product from intentional adulteration, but such a measure is found to be missing or not in place. Examples may include unrestricted access to a water system or to a processing room, or uncontrolled access to a restricted ingredient area, to mention a few.

Under the Establishment Task List, there are four FDV tasks that IPP are to perform in PHIS. Following is a brief description of each (refer to FSIS Directive 5420.1 for more detail description):

- <u>Water System FDV Task</u>: to assess vulnerable points for this task, IPP are to verify whether the plant restricts access to water systems and associated activities on the premises.

- <u>Processing/Manufacturing FDV Task</u>: to assess vulnerable points for this task, IPP are to verify whether the plant restricts access to processing and manufacturing areas and associated activities on the premises.

- <u>Storage Areas FDV Task</u>: to assess vulnerable points for this task, IPP are to verify that storage areas are secure from intentional adulteration activities.

- <u>Shipping and Receiving FDV Task</u>*:* to assess vulnerable points for this task, IPP are to verify whether the plant restricts access to shipping and receiving areas and activities on the premises.

Frequency and Number of Food Defense Verification Tasks

As mentioned previously, PHIS will automatically generate the minimum number of routine FDV tasks to the Establishment Task List (one per week) unless a threat notification is issued. Table 1 provides the frequency for which IPP are to perform FDV tasks based on threat notification status. Following is a summary version of Table 1, as per Directive 5420.1, followed by a description for each notification status:

Plant Details	No Threat Notification has been issued	Elevated Threat Notification has been issued	Imminent Threat Notification has been issued
Domestic Establishments – Most Vulnerable; High Volume	One/week	Four/day + the routinely scheduled weekly task	Four/day + the routinely scheduled weekly task
Domestic Establishments – Most Vulnerable; Low Volume	One/week	two/day + the routinely scheduled weekly task	Four/day + the routinely scheduled weekly task
Domestic Establishments – Least Vulnerable; Regardless of Volume	One/week	Two/day + the routinely scheduled weekly task	Four/day + the routinely scheduled weekly task

Table 1

<u>No Active NTAS Alerts or No Threat Notification has been issued:</u>

- IPP in egg products plants that produce the most vulnerable products in high volume plants are to perform one randomly selected FDV task per week. Plant details: are domestic plants producing any product other than thermally processed – commercially sterile (e.g., canned) product (i.e., most vulnerable) in a combined volume greater than 8,000 lbs/day for egg products (i.e., high volume)

- IPP in egg products plants that produce the most vulnerable products in low volume plants are to perform one randomly selected FDV task per week. Plant details: are domestic plants producing any product other than thermally processed – commercially sterile (e.g., canned) product (i.e., most vulnerable) in a combined volume less than 8,000 lbs/day for egg products (i.e., low volume)

- IPP in egg products plants that produce the least vulnerable products at any volume are to perform one randomly selected FDV task per week.

Plant details: are domestic plants producing thermally processed – commercially sterile (e.g., canned) product (i.e., least vulnerable) regardless of volume

When threats have been issued, in addition to routinely schedule FDV tasks, IPP are to schedule the prescribed number of directed FDV tasks, identified in Table 1, to their task calendar for the types of product being produced and claim those tasks that day, unless otherwise directed by the DO.

NTAS Alert with Elevated Threat Notification has been issued:

- IPP in egg products plants that produce the most vulnerable products in high volume plants are to perform four FDV tasks per day, in addition to the routinely scheduled weekly task. Plant details: are domestic plants producing any product other than thermally processed – commercially sterile (e.g., canned) product (i.e., most vulnerable) in a combined volume greater than 8,000 lbs/day for egg products (i.e., high volume)
- IPP in egg products plants that produce the most vulnerable products in low volume plants are to perform two FDV tasks per day, in addition to the routinely scheduled weekly task. Plant details: are domestic plants producing any product other than thermally processed – commercially sterile (e.g., canned) product (i.e., most vulnerable) in a combined volume less than 8,000 lbs/day for egg products (i.e., low volume)
- IPP in egg products plants that produce the least vulnerable products at any volume are to perform two FDV tasks per day in addition to the routinely scheduled weekly task. Plant details: are domestic plants producing thermally processed – commercially sterile (e.g., canned) products (i.e., least vulnerable), regardless of volume?

NTAS Alert with Imminent Threat Notification has been issued:

- IPP in egg products plants that produce the most vulnerable products in high volume plants are to perform four FDV tasks per day, in addition to the routinely scheduled weekly task. Plant details: are domestic plants producing any product other than thermally processed – commercially sterile (e.g., canned) product (i.e., most vulnerable) in a combined volume greater than 8,000 lbs/day for egg products (i.e., high volume)
- IPP in egg products plants that produce the most vulnerable products in low volume plants are to perform four FDV tasks per day, in addition to the routinely scheduled weekly task. Plant details: are domestic establishments producing any product other than thermally processed – commercially sterile (e.g., canned) product (i.e., most vulnerable) in a combined volume less than 8,000 lbs/day for egg products (i.e., low volume)

- IPP in egg products plants that produce the least vulnerable products at any volume are to perform four FDV tasks per day, in addition to the routinely scheduled weekly task. Plant details: are domestic plants producing thermally processed – commercially sterile (e.g., canned) products (i.e., least vulnerable), regardless of volume

Note: Frequency of task performance based on the nature of the food product and product volume, recognizing that certain product types produced at higher volumes may be more vulnerable to intentional adulteration. For plants producing multiple product types and volumes, additional tasks should be scheduled based on the most vulnerable product produced (i.e., products other than thermally processed – commercially sterile product and products produced at a higher volume per day).

Documenting Food Defense Verification Activities

After scheduling tasks to the IPP's PHIS task calendar, he/she is to perform the FDV task and document the findings in the following manner:

1. Under the "Vulnerable Points" (Vul Pts) tab, check the boxes for each vulnerable point verified and applicable to the plant's operation and observed when conducting the task.

2. Under the "Activity" tab, select the applicable verification activity (Review & Observation, Record Keeping, or Both).

3. If IPP do not find a food defense vulnerability or concern, record the task as performed (click on the "Completed Inspection" box) and "Save".

4. If IPP identify a food defense vulnerability or concern, and there is no evidence of product adulteration, then IPP are to document their findings and complete a Food Defense MOI as follows, after first discussing their findings with plant management:

    a. Under the "Findings" tab, check the "Non-Regulatory Concern" box

    b. In the "Comments" box, add a brief description of the non-regulatory vulnerability point of concern observed

    c. Record the task as performed by clicking on the "Inspection Completed" box and then click "Save." The Create/Edit MOI button will be activated.

    d. Click the "Create/Edit MOI" button; this will activate the MOI List page. IPP then select/click on the "Add Food Defense OFO" and the "Domestic Food Defense MOI (FSIS Form 5420-1, "Food Defense

Memorandum of Interview")" page will open to access key functions of the MOI

i. Under the "Status" tab, select attendees (can select more than one); all other information in this field is automatically filled in the MOI

ii. Under the "Category" tab, choose the appropriate potential vulnerability (in this case, No product adulteration observed), the occurrence (1st, 2nd, or 3rd), the establishment size (very small, small, or large), and establishment type (meat, poultry, egg products, or equine);

NOTE: For a finding to be reported as the second or third occurrence of vulnerability, it has to be for the same vulnerability under the performed Food Defense Task that occurred previously. IPP will need to review the previous MOIs to determine if the vulnerability is recurring.

iii. Indicate the vulnerability point of concern applicable to the FDV task under the "Processing" or "Storage" tab. As an illustration, in the Processing tab – check the appropriate boxes depending on the FDV task (Water System or Processing Area/Manufacturing) IPP are performing. Alternatively, in the Storage tab, check the appropriate boxes, depending on the FDV task (Storage Area or Shipping and Receiving) IPP are performing.

iv. Check the "Finalize" box and click "Save" to complete the Food Defense MOI. At the next weekly meeting, provide a finalized copy of the Food Defense MOI (see Attachment 1) to plant management. Discuss the food defense findings with management, including its proposed mitigation actions, and document in the weekly meeting MOI.

5. When IPP perform an FDV Task and find that there is a food defense vulnerability or concern, and there is <u>evidence of product adulteration</u> (e.g., regulatory non-compliance), IPP will schedule and perform a directed Egg Products Food Safety Verification task or other appropriate inspection task to record the observed non-compliance and cite the applicable regulations. In addition, IPP are to:

a. Immediately retain the affected product by attaching a retain tag or detain tag, then notify plant management and discuss the findings

b. After informing plant management, report any potentially significant incident through supervisory channels, in accordance with FSIS Directive 5500.2

c. Add the appropriate inspection verification task to the task calendar in PHIS, perform the task, and document the observed product contamination in a Noncompliance Record (NR), citing the applicable regulations in accordance with FSIS Directive 5030.1.

d. Complete the FDV task in PHIS. Refer to step four above for completing the task. IPP are to mark “Adulterated Product Observed” for Category of Potential Vulnerability (under the Category tab).

   Note: When completing the Food Defense MOI, IPP in egg products plant will not have the option to select a product type under the “Product” tab.

e. After completing the MOI, IPP are to immediately provide a finalized copy to plant management and inform management that a NR will also be issued describing the adulterated product and potential vulnerability point or concern.

If the same food defense vulnerability or concern is found a second and third time under the FDV task, IPP are to meet with plant management and complete a second or third food defense MOI, respectively, and note on the form that it is the second or third occurrence of this vulnerability.

If, after the third occurrence, the plant shows no intention of addressing the vulnerability or concern, then IPP are to notify the DO through supervisory channels (Front Line Supervisor [FLS]). IPP are not to further review or document the specific potential vulnerability identified in the three issuances of the food defense MOIs until the DO provides further instructions. If the food defense task is randomly selected, IPP are to direct food defense verification tasks to plant activities other than the one specifically identified in the third food defense MOI.

Food Defense Plan Survey

FSIS has conducted FDP surveys since August 2006. The purpose is to determine whether an establishment or plant has a written FDP, and, if so, whether the plan is functional. The Agency uses the results of each FDP survey to guide outreach efforts, develop or revise food defense tools, or revise FDV tasks.

At least annually, IPP will receive an alert through PHIS indicating that the FDP survey task has been added to the establishment task list. When IPP open the inspection results page for this inspection task after receiving the alert, the "Qnaire" tab will be active, indicating the presence of a questionnaire.

Only one survey is to be completed per egg product plant. In multiple shift plants, the immediate supervisor will determine which IPP is to conduct the food defense survey task. Complete the task following the instructions in Section XII of the directive.

Summary

Defending the food supply against intentional attacks is a critical function. Field personnel, both in and outside of egg products plants, serve as an early alert system. Implementation of food defense verification procedures serves to protect the public, which is essential to our mission, and ensures the security of our food, a vital component of homeland security. Report any suspicious activities in egg products plants to the district manager through supervisory channels or call the FSIS 24-hour emergency hotline at 1-866-395-9761.

Attachment 1 – FSIS Food Defense Strategies

Tommy Thompson, a former Secretary of the Department of Health and Human Services (DHHS), has stated, “For the life of me, I cannot understand why the terrorists have not attacked our food supply because it is so easy to do.” Bill Frist, a physician, former Senator, and one of the original sponsors of the Bioterrorism Preparedness Act signed into law in 2002, has stated that “…as we consider bioterrorism, we are most vulnerable in our food supply.” We in FSIS must make consideration of the “unusual” a part of how we routinely conduct business by remaining ever vigilant of possible attacks on the food supply and wary of situations that appear out of the ordinary. We must accept the fact that an attack on our food supply is plausible.

FSIS has identified food defense and emergency response activities that the Agency is doing to meet the challenges of food defense. In addition, FSIS has taken steps to promote the adoption of preventive strategies by the private industries to ensure the security of the U.S. meat, poultry, and egg products supply. Following is an overview of the activities FSIS has taken to ensure that meat, poultry, and egg products are protected from intentional harm.

Examples of Attacks on the Food Supply

History has shown that terrorists can, and will, use food as a weapon. A review of a few noteworthy intentional food-borne disease outbreaks provides insight into the following:

- The kinds of foods and the points in their production where intentional contamination could have catastrophic consequences
- The potential magnitude of the public health impact of a carefully planned intentional attack on the food supply
- Some of the types of individuals who might intentionally attack the food supply and their motives

In 1972, members of a U.S. fascist group called Order of the Rising Sun were found in possession of 30-40 kilograms of typhoid bacteria cultures, with which they planned to contaminate water supplies in Chicago, St. Louis, and other Midwestern cities.

In 1984, two members of an Oregon cult headed by Bhagwan Shree Rajneesh cultivated *Salmonella* (food poisoning) bacteria and used it to contaminate restaurant salad bars in an attempt to affect the outcome of a local election. Although some 751 people became ill, and 45 were hospitalized, there were no fatalities.

In early March 1989, someone created a scare that grapes from Chile imported into the USA would be contaminated with cyanide. On March 11, the United

States Food and Drug Administration (FDA) spotted three suspicious-looking grapes on the docks in Philadelphia, in a shipment that had just arrived from Chile. Two of the grapes had puncture marks. They were tested and found to contain low levels of cyanide. The FDA impounded 2 million crates of fruit at ports across the country and warned consumers not to eat any fruit from Chile, which included most of the peaches, blueberries, blackberries, melons, green apples, pears, and plums that were on the market at the time.

In October 1996, a former laboratory employee at the St. Paul Medical Center in Dallas pleaded guilty to engaging in her own personal act of food-borne terrorism by intentionally contaminating pastries. She had access to the highly toxic bacteria, *Shigella dysenteriae*, stored in the laboratory; she contaminated the pastries and left them in an employee break room, and she sent a bogus e-mail message from her supervisor's computer notifying laboratory employees of the free snacks in the break room. Her activities were discovered when she tried to alter hospital records to cover her tracks.

In 1996, police received an anonymous call from a worker at a rendering plant in Wisconsin. The caller said liquid fat from the plant had been contaminated. It was determined that chlordane was the contaminant, an organochlorine pesticide that is environmentally stable, accumulates in the fat of animals, and is considered a food adulterant at very low levels (0.3 ppm in animal fat). This fat found its way to feed manufacturers and eventually onto nearly 4,000 farms in Wisconsin, Minnesota, Michigan, and Illinois. Within two days, all major customers were notified and the feed was replaced. Luckily, milk samples taken from some of the dairy herds that had eaten the affected feed were negative or contained levels well below those that pose a health hazard to humans. The total costs for disposing of the contaminated feed (4,000 tons) and fat (500,000 pounds) was almost $4 million; however, as numerous state and federal agencies became involved in dealing with this issue, the final price tag was likely much higher.

On January 3, 2003, the Michigan Department of Agriculture's Food and Dairy Division and the U.S. Department of Agriculture (USDA) were notified by a supermarket of a planned recall of approximately 1,700 pounds of ground beef because customers had complained of illness after eating the product. The contaminant in the ground beef returned by customers with reported illness was identified as nicotine from a nicotine-based pesticide used by the supermarket. An employee of the supermarket was arrested and charged with deliberately poisoning the ground beef at the supermarket.

Lessons Learned from Vulnerability Assessments

Being aware of what terrorists do, how they do it, and when and where they do it can help us be more effective in identifying and preventing their activities. How can a terrorist organization gain technical capability? Can they recruit American food system workers? Can they gain knowledge by talking with food system workers using what appear to be simple and innocent questions about their jobs while sitting at a baseball game or standing in line at a grocery store? Food system workers are a prime information target; this includes you.

What must a terrorist have to carry out an attack? To conduct food terrorism activities, a terrorist must:

- have access to the food for a sufficient amount of time to tamper with it
- be technically capable of introducing a contaminant
- be able to perform the operation without discovery
- be competent enough to avoid detection of the adulterated product down-stream in the product's distribution life cycle

Based upon its vulnerability assessments, FSIS has identified foods with certain characteristics as being at higher risk of intentional contamination. These characteristics include:

- large batch size
- uniform mixing
- short-shelf life
- ease of access

Large batch size places a food product at high risk because it facilitates the contamination of a large quantity of product at one time. In turn, a large number of individuals may consume the contaminated product. The larger the number of consumers eating contaminated food, the greater the potential for a larger number of deaths or illnesses. For instance, contamination of a 5,000-gallon commercial kettle could negatively affect a much larger number of individuals than contamination of a 5-gallon food service pot.

Uniform mixing places a product at high risk for contamination because adding agents before or during mixing steps results in contamination of all of the servings in a batch, improving the efficiency of an attack.

Short shelf life places a food product at risk because these products may be consumed before public health officials are able to identify the cause of illness and to take action to prevent further illnesses.

Ease of access increases a product’s risk for adulteration, because carrying out an act requires access to the product or its raw materials. The more accessible a site is, the more likely it is to be a target.

The intentional food contamination incidents above also provide some examples of the types of individuals that might be motivated to adulterate food products.

- Attacks from internal sources are possibly the most difficult to prevent because the perpetrators typically know what procedures are followed in the plant and often know how to bypass security controls that would detect or delay an external intruder. Disgruntled insiders are generally motivated by their own emotions and self-interests. They may be mentally unstable, operating impulsively with minimal planning. This may be the most difficult group to stop, because they may have legitimate access to the product.

- Criminals who are sophisticated may possess relatively refined skills and tools, and are generally interested in high-value targets. Unsophisticated criminals have more crude skills and tools and typically have no formal organization. They are generally interested in targets that pose a low risk of detection.

- Protestors are usually politically or issue oriented. They generally act out of frustration, discontent, or anger. They are primarily interested in publicity for their cause, and, as a result, generally do not intend to injure people, but may be superficially destructive. They are usually unsophisticated in their tactics and planning. However, some protest groups have adapted tactics similar to terrorists. These groups may be moderately sophisticated and moderately destructive. In fact, they may target individuals for harm.

- Subversives, also known as saboteurs, assassins, guerrillas, or commandos are sophisticated, highly skilled, and capable of meticulous planning. Subversives typically operate in small groups with objectives including death, destruction, and targeting of personnel, equipment, and operations.

- Terrorists are usually politically or ideologically oriented. They typically work in small, well-organized groups. They are usually well funded, sophisticated, and capable of efficient planning. Terrorists may use other types of aggressors to accomplish their goals. Their objectives include death, destruction, theft, and publicity.

Consequences/Impacts

Food security has economic, health, societal, psychological, and political significance. Deliberate contamination of the food supply could cause significant public health consequences and widespread public fear. It could also have a devastating economic impact and result in the loss of public confidence in the safety of our food and in the effectiveness of government.

Intentional and unintentional breeches in food security can lead to increased health care expenses, lost wages, decreased consumer confidence, trade embargoes, etc. The Centers for Disease Control and Prevention (CDC) report three potential economic effects of an act of food terrorism:

- Direct economic losses attributable to responding to the act, including medical costs, lost wages for the victims, containment cost, decontamination costs, and disposal costs
- Indirect multiplier effects from compensation paid to affected producers and the losses suffered by affiliated industries, such as suppliers, transporters, distributors
- International costs in the form of trade embargoes imposed by trading partners

FSIS Food Defense Strategy

The Nation's awareness of terrorism has been heightened and there is an intense focus on ensuring the protection of the Nation's critical infrastructures. Section 332 of the Public Health Security and Bioterrorism Act of 2002 established that the Secretary of Agriculture might utilize existing authorities granted by the FMIA, PPIA, and EPIA to give high priority to enhancing and expanding the capacity of FSIS to conduct activities related to food defense. Homeland Security Presidential Directive (HSPD) 7 established a national policy for Federal departments and agencies to identify and prioritize critical infrastructures and key resources and to protect them from terrorist attacks. HSPD-9 established a national policy to defend the agriculture and food system against terrorist attacks, major disasters, and other emergencies. HSPD-9 outlines roles and responsibilities for the USDA, the Department of Health and Human Services (DHHS), and the Environmental Protection Agency (EPA) in planning for, preventing, and responding to such emergencies.

An example of applying the expectations of Section 332 of the Bioterrorism Act occurred at the beginning of the war in Iraq, when the Federal government was on heightened alert. We had real concern that our nation would be the subject of a terrorist attack in retaliation for the war. “Liberty Shield” was the code word for the government’s heightened alert reactions. During that time, FSIS put into effect a number of prevention measures that would be the basis of our future actions and response to changes in threat conditions. For example, Inspectors-In-Charge (IIC) initiated new security-based inspection measures as part of the Performance Based Inspection System (PBIS). Import inspectors also increased security oversight. Laboratory sampling was increased so that 50% of all samples included analysis for a threat agent, and the Consumer Complaint Monitoring System (CCMS) increased its coverage. FSIS epidemiologists enhanced their surveillance efforts for human illnesses, looking for possible links to unusual disease signs.

During Operation Liberty Shield, instructions were provided to field Public Health Veterinarians and inspectors to replace certain non-food safety inspection procedures with targeted inspection and sampling for approximately a dozen biological, chemical, or radiological agents. Since then, FSIS continues to randomly test for these agents on an ongoing basis to maintain surveillance and monitoring for terrorism.

The example of Operation Liberty Shield points to the fact that efforts to improve the security of the food supply in particular must focus on prevention, early detection, containment of contaminated product, and mitigation and remediation of any problems that do occur. These efforts are not without significant challenges, including the following:

- There is no strong statutory authority to mandate security measures.
- As a discipline, food defense is in its infancy; therefore, development of education and training, surveillance methods, and data analysis techniques is ongoing.
- Many points along the farm-to-table continuum could be targets of agricultural bioterrorism in general and food terrorism in particular.

FSIS created the Office of Food Defense and Emergency Response (OFDER) in 2002 to coordinate the Agency's food defense activities. The mission of OFDER was to develop and coordinate all FSIS activities to prevent, prepare for, respond to, and recover from non-routine emergencies resulting from intentional and non-intentional contamination affecting meat, poultry, and egg products. This office was later renamed the Office of Data Integration and Food Protection (ODIFP). ODIFP serves as the agency's central office for homeland security issues and ensures coordination of its activities with the USDA Homeland Security Office, the White House, the Department of Homeland Security (DHS), the Food and Drug Administration (FDA), and other Federal and State government agencies with food-related responsibilities, and industry. ODIFP has a comprehensive strategy for dealing with food defense challenges including:

- Vulnerability assessments
- Emergency preparedness and continuity of operations (COOP) planning
- Surveillance and data analysis
- Outreach and training
- Promoting food defense research

Vulnerability assessments, which are similar to risk assessments, help to prepare for, prevent, and mitigate the effects of an attack on the food supply in several ways. First, they can be used to identify products most at risk for adulteration. Second, they can be used to identify likely threat agents for attacking the food supply. Third, they can identify potential sites of contamination within a food processing system that are the most attractive targets. Finally, they can facilitate the development of countermeasures to minimize or reduce risks. In doing so, vulnerability assessments can focus limited resources towards the foods and agents of greatest concern.

In response to President George W. Bush's issuance of the Homeland Security Presidential Directive that called for establishing a single, comprehensive national incident management system, FSIS, along with other agencies, has adopted the Incident Command System (ICS). ICS was designed in the early 1970s. It is a standardized, on-scene incident management concept that allows responders from multiple agencies to adopt a flexible, integrated organizational structure to cope with an emergency. The organizational structure is specific to the ICS concept, and does not necessarily align with the organizational structure of any of the responding agencies. Thus, the Incident Commander may not be the head of any particular agency, and those he/she commands may not all be from one agency. ICS utilizes the skills of those most qualified to take command of the particular situation until the emergency has been abated. To ensure a seamless FSIS response, certain FSIS employees (District Office [DO] and above) have been required to complete the ICS training. ICS courses are available through AgLearn. To date, FSIS has entered into cooperative agreements with the Department of Homeland Security, the Department of Health and Human Services, Food and Drug Administration, and the National Association of State Departments of Agricultures (NASDA) to ensure that a prevention and response mechanism between Federal and State agencies could be enacted under the ICS system.

ODIFP developed the FSIS supplement to the USDA's Continuity of Operations Plan (COOP). A COOP identifies critical essential functions, succession and delegation of authority, and essential documents. It then attempts to define how the Agency will maintain mission-critical functions and capabilities, communications, and security under non-routine circumstances. Examples of non-routine circumstances might be a large-scale attack on the country, a natural disaster, or an avian influenza pandemic. If there were an attack on headquarters in Washington, DC, for example, the headquarters COOP enables other parts of the Agency to take over the functions of headquarters at other locations. Regarding an avian influenza pandemic, ODIFP has done extensive planning to ensure the safety and health of FSIS employees and the delivery of essential functions. More generally, FSIS has identified and developed response plans, including procurement of analytical detection equipment, to help protect employees from exposure to bioterrorism agents.

FSIS has established the Emergency Management Committee (EMC), a standing committee that may be activated at any time to address and manage the Agency's response to a non-routine incident involving the adulteration of FSIS–regulated product or to manage a significant event or potential public health issue that requires coordination and sharing of resources among program areas. The National Biosurveillance Information System (NBIS) tracks and manage significant incidents. A significant incident presents a grave or potentially grave threat to public health involving FSIS-regulated product. Examples of significant incidents include the following:

- Widespread, or life-threatening, human illnesses potentially implicating FSIS-regulated product
- Deliberate contamination of FSIS-regulated product
- Alerts with Elevated or Imminent threat to food or agriculture
- Widespread animal disease with potentially significant public health implications for FSIS-regulated product
- Ineligible foreign product in the United States
- High-risk products in the US as identified by Customs and Border Protection
- Suspicious activities observed by program personnel while performing their normal duties
- Natural disasters (e.g., hurricanes, tornadoes, earthquakes)
- Terrorist attacks on the Nation's critical infrastructures
- Other Incidents of National Significance (INS) that result in the activation of the Emergency Support Function-11 (ESF-11) are described in the Agriculture and Natural Resources Annex to the National Response Plan

From time-to-time, the EMC may need to form an Incident Investigation Team (IIT) to investigate and provide information regarding a particular emergency incident. These IIT reviews typically would be in response to an illness or outbreak in which a meat, poultry, or egg product produced by an establishment has been implicated; significant or repetitive contamination or adulteration incidents; or repetitive microbiological sampling failures in either Agency or establishment testing (e.g., *Escherichia coli* O157:H7, *Listeria monocytogenes*, or *Salmonella*). These teams would utilize specially developed protocols and methodologies to gather the necessary information.

FSIS also has a number of surveillance activities underway. For example, FSIS continues to enhance the CCMS, a surveillance system that monitors and tracks food-related consumer complaints. It is a potentially powerful tool that serves as a sentinel system for terrorist attacks on the food supply. FSIS also participates in FoodNet and maintains a regulatory sampling database. FSIS has a liaison at the CDC in Atlanta. Some of these are activities were established for food safety reasons, but can be used for food security, as well.

The Office of Public Health and Science (OPHS) Epidemiology Officers offer another source for surveillance. The Epidemiology Officers, with District Office oversight, have taken on an important surveillance and response role for food defense. They conduct regular surveillance activities and have specialized roles to respond to food defense emergencies.

Enhanced laboratory capability was established with FERN (The Food Emergency Response Network). FERN was established in February of 2005. Working with FDA, FERN's mission is to expand and manage an existing group of more than 90 Federal, State, and local laboratories with the capability to detect and identify biological, chemical, and radiological agents. FERN is located alongside the FSIS Eastern Lab. In its own laboratories, FSIS has conducted security assessments, improved security, obtained screening equipment and methods for threat agents, and developed protocols that ensure proper chain of custody and other controls on all samples taken at official establishments. FSIS continues to develop a Biosafety Level 3 laboratory to test for threat agents in food products (such as *Mycobacterium tuberculosis*, St. Louis encephalitis, and *Bacillus anthracis*).

For international food defense, the activities are as follows:

- Conducting vulnerability assessments of imported products.
- Participating in the Federal-wide International Trade Data System (ITDS), a multi-department, multi-agency initiative to establish a single, automated system for sharing data on the inspection and certification of products moving in foreign commerce.

FSIS workforce training in food defense has primarily focused on prevention of terrorist activities, rather than responding to an event. The training covered a multi-dimensional team approach to homeland security, involving the interaction of personnel from the local, State, Federal, and private sectors, as well as our field employees. The training emphasizes reinforced reporting lines for suspicious activities.

Training materials currently available include FSIS Directives 5420.1 (food defense verification activities for domestic federal inspected establishments), which provides instruction on policy for field personnel. There may still be computer-based food defense training on CDs available in plants; however, much of the information is outdated and the training is in the process of being updated. An online course on food defense awareness, developed cooperatively by the FDA and USDA, is available at

http://www.fda.gov/ora/training/orau/FoodSecurity/default.htm.

As part of FSIS's continuing effort to enhance the awareness and understanding of food defense issues among field personnel, ODIFP develops fictional scenarios, called Security Information Knowledge Exchange (SIKE), to stimulate discussion and aid field employees as they address these issues.

For those interested in ICS training, which is currently not mandatory for in-plant inspection personnel, AgLearn offers several courses on ICS. AgLearn can be accessed through http://www.aglearn.usda.gov. USDA eAuthentication credentials are required to login.

Training and education initiatives for industry are discussed below under the heading Industry Outreach.

FSIS has identified high-priority areas for research and development pertaining to food defense, such as testing methods for threat agents. The Agency is working with the Department of Homeland Security's National Biodefense Analysis and Countermeasures Center (NBACC) and the interagency Technical Support Working Group (TSWG) on several studies pertaining to the use of certain threat agents in food. The results of these research activities influence the Agency's capability of testing for different threat agents, the amount of testing done, and agents for which to test. The research also informs vulnerability assessments.

Industry Outreach

Currently there are no regulatory requirements specific for food defense; however, FSIS encourages the private industry to develop and implement food defense plans aimed at minimizing its risk of a food terrorism incident. Key components of such food defense plans are:

- Improved physical security to limit unauthorized access
- Improved personnel security
- Conducting food defense awareness training for employees
- Monitoring product loading, unloading, and silo/tanker cleaning
- For transportation firms - confirming eligibility, training, and background information of both company and contract drivers
- Enhancing process security through system monitoring procedures
- Monitoring water/ice used in emulsification and solution preparation processes
- Requiring product integrity and chain of custody information
- Using tamper-evident packaging for products
- Enhancing recall systems to ensure that food that has been intentionally adulterated can be accurately and efficiently tracked and detained

FSIS routinely conducts Regulatory Education sessions, which include a presentation on food defense. The food defense presentation is intended to heighten awareness and encourage processors to consider seriously the potential for and consequences of attacks on the food supply, so that they will implement strategies designed to minimize the chances of such an attack. In an effort to help private industry minimize its risk, FSIS has developed publications to promote food defense activities by all food businesses. These publications encourage industry to take steps to ensure the security of its operations; the publications have been designed to be especially helpful to small and very small establishments that may not have the resources of larger corporations. Food defense publications that are currently available are summarized below.

- *Food Defense Self-Assessment Checklist for Slaughter and Processing Facilities:* FSIS created this self-assessment checklist to provide a tool for establishments to assess the extent to which they have secured their operations.
- *Food Defense Guidelines for Slaughter and Processing Establishments*: created to assist Federal- and State-inspected establishments that produce meat, poultry, and egg products in developing preventive food defense measures. While many establishments may utilize guidelines from other government and private sector organizations and agencies, businesses and plants that do not have access to this specialized security-planning advice should find these guidelines helpful in improving and preparing food security plans. These guidelines are currently voluntary, but plant officials will be well served by adopting and implementing them because they are developed to meet the particular needs of meat and poultry processing establishments and egg products plants. FSIS has provided these guidelines to its field employees who will assist in directing establishments and plants that seek further clarification or advice.
- *General Food Defense Plan*: FSIS has urged establishments to develop functional food defense plans with control measures to help prevent intentional adulteration of products. A functional food defense plan has the following characteristics:
    - it is written
    - the measures described in the plan are implemented
    - the measures are periodically tested
    - the plan is reviewed at least annually and revised if needed

If the establishment is not implementing elements of its plan, IPP cannot take action on that fact because there is no regulatory requirement for such plans.

- *Guidelines for Transportation and Distribution of Meat, Poultry, and Egg Products*: Similar to the “FSIS Security Guidelines for Food Processors,” these guidelines are voluntary and designed to assist small shippers and distributors by providing a list of safety and security measures that these entities should take to strengthen their food safety and food security plans.

Protecting food during transportation and storage is a critical component in our defense against all types of food-borne contaminants. These guidelines address points in the transportation and distribution process where potential contaminants could be introduced, including loading and unloading, and in-transit storage. FSIS encourages shippers, transporters, distributors, and receivers to develop and implement controls to prevent contamination of products through all phases of distribution, and to have plans in place in the event of accidental or deliberate contamination. Both of these guidelines are available on the FSIS website in several languages.

These publications are available for download at the following web page:

Food Defense and Emergency Response

If you have questions or need clarification about the above referenced materials, you can contact the FSIS Policy Development Staff by electronically posting your question at http://askfsis.custhelp.com.

While functional food defense plans are not mandatory, they are strongly encouraged and sometimes may be required by a processor’s customers. Food defense plans do not need to be lengthy to be effective. In fact, depending on the complexity of an operation, the plan may be as short as one page. The three basic steps in developing a food defense plan are:

1. Assess the operation for possible vulnerabilities
2. Develop a plan to minimize identified vulnerabilities
3. Implement the plan

In addition to the resources that FSIS provides, the food defense verification procedures described below are a means by which inspection personnel can help an establishment identify potential vulnerabilities in a particular operation and encourage establishment management to take action to minimize those vulnerabilities.

Attachment 2 – Bioterrorism Overview

This appendix discusses various forms of bioterrorism. Beyond just food terrorism, bioterrorism is often defined as the use of biological agents that target humans, plants, or animals, and was exemplified by anthrax letters that were used in 2001 against the American people. It is important for FSIS personnel to be aware of the various form of bioterrorism, because the Agency serves as a first line of monitoring for animal diseases of great economic significance that could be introduced through an act of terrorism and public health threats that could be introduced through the food supply.

Weapons of Mass Destruction

Terrorists often use Weapons of Mass Destruction (WMD). These include chemical, biological, radiological agents, or high yield explosives. Some examples of chemical weapons used by terrorists are arsenic, cyanide, and pesticides. Examples of biological weapons that terrorists use include anthrax, botulinum, and toxin. Radiological agents used by terrorists include Cesium-137, Strontium-90, and Cobalt-60. WMD have four possible areas of impact. They include:

- harm to the economy
- disruption of society
- psychological disturbance
- political disturbance

Chemical agents

Chemical agents are used to target the human body: You should be aware of some of the typical ways in which the chemical agents used by terrorists affect the human body. Here are some examples:

> **Blistering:** Terrorists may use a chemical agent that acts as a vesicant, such as a powder. These agents burn and blister the skin or any other part of the body they contact. They act on the eyes, mucous membranes, lungs, skin, and blood-forming organs. They damage the respiratory tract when inhaled and cause vomiting and diarrhea when ingested.
>
> Examples:
>
> *Sulfur mustard* in its pure state is colorless and odorless. It is extremely toxic to the unprotected eyes, skin, and respiratory system. If a victim survives the initial encounter, the mustard continues to destroy the body’s immune defenses and can complicate treatment of acquired infection.

Nitrogen mustards are more toxic than sulfur mustards and are easily manufactured.

Lewisite placed on the skin causes immediate burning sensation, and its odor is readily apparent. Severe damage to the eyes occurs almost immediately after exposure. Lewisite vapors irritate the mucosa of the nasal and upper respiratory system. Lewisite is absorbed into the body, and distributed as a systemic poison to various organs.

Blood: Chemical agents also affect the blood. A typical effect of a chemical agent is that it prevents blood from carrying O_2 effectively.

Examples:

Arsine: Arsenic can react with zinc and sulfuric acid to form arsine, which is a colorless gas with an unpleasant odor similar to garlic. Arsine targets the blood, but it is referred to as a nerve poison due to its secondary effects. Arsine causes the destruction of red blood cells and, subsequently, the tissues of the kidney, liver, and spleen. Arsine is used today for industrial processing of gallium arsenide chips in the semiconductor industry.

Choking/Pulmonary: Some chemical agents cause choking and affect the pulmonary system in humans, but they are not food related.

Incapacitating: Some chemical agents can be introduced in food to incapacitate people.

Example:

BZ, 3-quinuclidinyl benzylate, is a member of the belladonna group of compounds (glycolates) that includes atropine, scopolamine, and many others.

Vomiting: Chemical agents known as emetics induce vomiting when ingested or inhaled.

Examples:

Diphenylchlorarsine (DA), diphenylcyanoarsine (DC), and adamsite (DM): Are among the vomiting agents that have the most significant effects. These agents can be dispersed as aerosols and produce their effects by inhalation. Some minor eye irritation also might occur. Emetics produce a feeling of pain and sense of fullness in the nose and sinuses. This is accompanied by a severe headache, intense burning in the throat, tightness and pain in the chest, irritation of the eyes and lacrimation.

Coughing is uncontrollable, and sneezing is violent and persistent. Nausea and vomiting are prominent. Mild symptoms, caused by exposure to very low concentrations, resemble those of a severe cold. The onset of symptoms may be delayed for several minutes after initial exposure, especially with DM. Therefore, effective exposure may occur before the presence of the smoke is suspected. If an individual puts on a protective mask after these symptoms are noticed, the symptoms will increase for several minutes, despite adequate protection. Consequently, the victim may believe the mask to be ineffective and remove it, causing further exposure. On leaving the scene of the attack, the victim's symptoms subside rather rapidly, and the severe discomfort vanishes after about one-half hour. At high concentrations, effects may last for several hours. Because of their arsenical properties, when these chemical agents are introduced, the affected foods become poisonous.

Tearing: The chemical agents used for terrorism that cause tearing are not typically introduced through food.

Chemical agents that target the nervous system: Some of the nerve agents that can be used by terrorists to affect food products include the following:

- Tabun (GA) - volatile, liquid/vapor
- Sarin (GB) - volatile, liquid/vapor
- Soman (GD) - volatile, liquid/vapor
- VX - low volatility, liquid
- Pesticides - methyl parathion, malathion, diazinon

All of these agents are cholinesterase inhibitors when they are ingested or inhaled. Cholinesterase is an enzyme needed for the proper functioning of the nervous systems of humans, other vertebrates, and insects. They are all pesticides, which act like organophosphates and carbamates to inhibit cholinesterase. Nerve agents are the most toxic and rapidly acting of the known chemical warfare agents. They are similar to pesticides called organophosphates in terms of how they work, and the kinds of harmful effects they cause. However, nerve agents are much more potent than organophosphate pesticides.

Heavy metals: can also be used by terrorists to affect food products. The most dangerous ones include the following:

- Arsenics
- Mercury
- Cyanide
- Thallium

Arsenic: The primary symptoms of acute inorganic arsenic poisoning in humans are painful dysesthesia, decreased deep tendon reflexes, and decreased pain, touch, and temperature sensation. Individuals who have arsenic poisoning may also experience nausea, anorexia, vomiting, epigastric and abdominal pain, and diarrhea. These symptoms are so severe that they often end in death. Chronic exposure to low levels of arsenic has led to nasal septum perforation, dermatological symptoms (lesions, necrosis, etc.), and an increase in the incidence of lung and lymphatic cancers.

Mercury: The heavy metal mercury is not absorbed well by the human gastrointestinal tract, but there is good pulmonary absorption of mercury vapors, especially methyl mercury.

Cyanide: Cyanide is rapidly absorbed from the stomach, lungs, mucosal surfaces, and unbroken skin. In addition, it is a rapidly acting poison that can exist in various chemical forms. Examples of simple cyanide compounds include hydrogen cyanide, sodium cyanide, and potassium cyanide. Hydrogen cyanide is a colorless gas with a faint, bitter, almond-like odor. Sodium cyanide and potassium cyanide are both white solids with a bitter, almond-like odor in damp air. Cyanide and hydrogen cyanide are used in electroplating, metallurgy, and production of chemicals, photographic development, making plastics, fumigating ships, and some mining processes. Effects begin within seconds of inhalation and within 30 min of ingestion. A bitter almond odor may be detected on the breath. Later effects include coma, convulsions, paralysis, respiratory depression, pulmonary edema, arrhythmias, bradycardia, and hypotension. Antidotal therapy: Amyl nitrite, sodium nitrite, and sodium thiosulfate with high-dose oxygen should be given as soon as possible.

Thallium: Thallium is a toxic heavy metal. Most cases of thallium toxicity occur after oral ingestion. Gastrointestinal decontamination, activated charcoal, and Prussian blue (potassium ferric hexacyanoferrate) are recommended in thallium ingestion.

Biological Agents and Toxins

Before we discuss the diseases caused by biological agents and toxins, it is important to understand the weaponization of an agent. If an agent has been “weaponized,” characteristics of the pathogen may have been altered to make it a more effective weapon.

For example:

- transmission of a pathogen may be enhanced or the virulence increased
- the organism may have been altered to make it resistant to antibiotics it would otherwise be susceptible to

- the organism may be altered to allow it to evade the normal protective immunity induced by vaccine or change the clinical signs of illness

However, reviewing what we currently know about biological agents and toxins is still important for our enhanced awareness of these agents.

The CDC divides biological agents and toxins into three categories:

- Category A - High priority
- Category B - Second highest priority
- Category C - Third highest priority

Be aware that the CDC changes the agents listed in these categories as additional information becomes available. Let us discuss each of these in more detail.

Category A

The biological agents and toxins that fall into Category A can be easily disseminated or transmitted person-to-person. They cause high mortality, with potential for major public health impact. Their introduction might result in public panic, and social disruption. They require special action for public health preparedness. Following are the agents and toxins that are currently listed in Category A:

- Anthrax (*Bacillus anthracis*)
- Botulism (*Clostridium botulinum* toxin)
- Plague (*Yersinia pestis*)
- Smallpox (*Variola* major)
- Tularemia (*Francisella tularensis*)
- Viral hemorrhagic fevers (e.g., Ebola)

<u>Anthrax</u>

Anthrax results from infection by *Bacillus anthracis*, a spore-forming gram-positive aerobic rod. Anthrax can be found as a spore in the soil worldwide; it is particularly common in parts of Africa, Asia, and the Middle East. In the United States, foci of infection occur in South Dakota, Nebraska, Mississippi, Arkansas, Texas, Louisiana, and California, with smaller areas in other states.

Spores can remain viable for decades in the soil or animal products, such as dried or processed hides and wool. Spores can also survive for 2 years in water, 10 years in milk, and up to 71 years on silk threads. However, the vegetative organisms are thought to be destroyed within a few days during the decomposition of unopened carcasses (exposure to oxygen induces spore formation).

There are three forms of the disease in humans:

1) Cutaneous anthrax that develops after skin infections. This form is characterized by a papular skin lesion, which becomes surrounded by a ring of fluid-filled vesicles. Most lesions (malignant carbuncle) are non-painful and resolve spontaneously, but disseminated, fatal infections occur in approximately 20% of cases.

2) Intestinal anthrax develops after eating contaminated meat. The initial symptoms may be mild malaise and gastrointestinal symptoms. Severe symptoms can develop and rapidly progress to shock, coma, and death.

3) Pulmonary anthrax occurs after inhaling spores in contaminated dust. Natural infections are mainly seen among workers who handle infected hides, wool, and furs (Wool Sorter's Disease). Symptoms may include fever, tiredness, and malaise; a nonproductive cough and mild chest pain may be present. These symptoms are followed by an acute onset of severe respiratory distress, with fatal septicemia and shock within one to two days. Fatalities may be prevented if treated early; however, when symptoms are flu-like and non-specific, early treatment is not sought.

Among animals, sheep, cattle, and horses are very susceptible, while dogs, rats, and chickens are resistant to disease. In ruminants, sudden death may be the only sign. However, the disease may manifest as flu-like symptoms; chronic infections often have edema.

In the 1950's and 1960's, *B. anthracis* was part of the U.S. bioweapons research program. In 1979, there was an accidental release of aerosol anthrax from a military compound in the Soviet Union. The neighboring residents experienced high fevers, difficulty breathing, and a large number died. Fatality estimates ranged from 200 to 1,000. In 1992, Russian President Boris Yeltsin finally acknowledged that the release occurred from a large-scale military research facility. In 1991, Iraq admitted it had done research on *B. anthracis* as a bioweapon.

There are several characteristics of *B. anthracis* that make it attractive as a bioweapon. It is widely available and relatively easy to produce. The spores are infective, resistant, and remain infective when aerosolized. A lethal dose for inhalation of spores is low and mortality is high; the case-fatality rate for inhalational anthrax could approach 100 percent. Untreated pulmonary and intestinal infections are usually fatal, especially if recognized too late for effective treatment. Person-to-person transmission of anthrax is very rare and has been reported only in cases of cutaneous anthrax.

Vaccines are available for humans who have a high risk of infection. The efficacy of the vaccine against inhalation of *B. anthracis* is unknown, and reactogenicity of the vaccine is mild to moderate. Vaccines are available for livestock. Natural strains of *B. anthracis* are usually susceptible to a variety of antibiotics, but effective treatment depends on early recognition of the symptoms. Treatment for cutaneous anthrax is usually effective, but pulmonary and intestinal forms are difficult to recognize and mortality rates are much higher. Prophylactic antibiotics are appropriate for all exposed humans. Anthrax spores are resistant to heat, sunlight, drying, and many disinfectants, but are susceptible to sporicidal agents or sterilization.

<u>Botulism</u>

Toxins produced by *Clostridium botulinum* cause botulism, or “limber neck,” in waterfowl. It is a gram positive, spore-forming, toxin-producing obligate anaerobic bacillus. The spores are ubiquitous in soil.

A German physician, Justinius Kerner, first discovered botulism in 1793. He found the substance in spoiled sausages and called it “wurstgift.” During this period, sausage was made by:

1. filling a pig’s stomach with meat and blood
2. boiling it in water
3. storing it at room temperature

These are ideal conditions for clostridial spores to survive. Botulism gets its name from “botulus,” which is Latin for sausage.

The United States established federal regulations for food preservation following several outbreaks of botulism. In the U.S., botulism spores germinate and release seven different antigenic types of neurotoxins; classified as A through G. Different neurotoxin types affect different species.

Only a few nanograms of the toxin can cause severe illness. Neurological clinical signs, including generalized weakness, dizziness, dysphagia, and flaccid paralysis are similar in all species affected. In humans, gastrointestinal symptoms may precede the neurological symptoms because the preformed toxin is ingested. In animals, many species of mammals and birds can be affected. Clinical disease is most often in wildfowl, poultry, mink, cattle, sheep, and horses. Ruminants and horses will often drool, while humans experience dry mouth. Paralysis of the respiratory muscles, leading to death, may occur in 24 hours in severe cases. Waterfowl are especially sensitive, and pigs, dogs, and cats are resistant.

Botulinum toxins are known to have been weaponized by several countries and terrorist groups in the past. It was part of the U.S. bioweapons program. Iraq has produced large volumes of this toxin, and the Aum Shinrikyo cult in Japan tried unsuccessfully to use it in 1990. Botulinum toxin is extremely potent and lethal, and is the single most poisonous substance known. Signs of a deliberate release of the toxin; via aerosol, food, or water, is expected to cause clinical illness similar to food-borne illness. Additionally, uncommon toxin types, such as C, D, F, or G, may be the culprits, and thus, raise suspicion of an intentional release.

Antidotal therapy: In endemic areas, toxoids are typically used in horses, cattle, sheep, and goats. Investigational toxoids are available for high-risk laboratory workers. However, these toxoids are not effective for post-exposure prophylaxis. Botulinum antitoxin (trivalent) is sometimes used in animals, but response depends on the type of toxin causing the disease and the species of animal. In humans, if given early, the antitoxin may decrease the severity of disease and shorten the duration of symptoms. It has severe side effects, and is used only on a case-by-case basis. The U.S. Army has an investigational heptavalent antitoxin. Antibiotics may be warranted if a wound is involved, but immediate intensive care may be the only treatment. Botulinum toxins can be inactivated by sunlight in 1 to 3 hours, as well as by bleach, sodium hydroxide, or chlorinated water. The spores are very resistant in the environment, but moist heat (120°C for at least 15 min) will destroy them.

Tularemia

Tularemia, or “rabbit fever,” is caused by *Francisella tularensis*, a gram negative bacteria. The disease can be transmitted by:

- ingestion of infected, undercooked meat (rabbit)
- bites from infected ticks or, less commonly, deerflies
- direct contact with blood or tissues of infected animals (especially rabbits)
- inhalation of contaminated dust

Initial symptoms are flu-like, and they include fever, chills, headache, and myalgia. In humans, there are six clinical forms of tularemia. Glandular and ulceroglandular are the most common presentations of this disease. An ulcer may or may not be present at site of infection, and local lymph nodes are enlarged.

Oculoglandular occurs when conjunctiva become infected by rubbing eyes with contaminated fingers or by splashing contaminated materials in the eyes. The oropharyngeal presentation is caused by ingestion of organism in contaminated food (undercooked meat) or water.

Typhoidal and pneumonic forms usually occur following inhalation or hematogenous spread of the organism. Both of these forms tend to present as atypical pneumonia; most fatalities occur with these forms.

In animals, the full spectrum of clinical signs is not known. Sheep, young pigs, horses, dogs, and cats are susceptible to tularemia. Signs of septicemia such as fever, lethargy, anorexia, and coughing are most common. In wildlife, clinical disease is not often seen; animals are found dead or moribund. However, when infected hares and cottontails are observed, they behave strangely and are easily captured because they run slowly, rub their noses and feet on the ground, experience muscle twitch, are anorectic, have diarrhea, and are dyspneic. These lagomorphs are an important reservoir for human infection. Older swine and bovine seem to be resistant to disease and are asymptomatic.

In the 1950's and 1960's, the United States military developed weapons that aerosolized *F. tularensis*, and it is suspected that other countries may have included this organism in their bioweapons research programs as well. Many characteristics make *F. tularensis* a good agent for bioterrorism. It is stable, survives in mud, water, and dead animals for long periods, and has previously been stabilized as a bioweapon. Only a low dose is needed to cause inhalational disease. Case fatality rates of the typhoidal and pneumonic forms are reported to be 30-60 percent if untreated. In 1969, the World Health Organization (WHO) estimated that if 50 kg of virulent *F. tularensis* particles were aerosolized over a city with 5 million people, the result would be 250,000 illnesses and 19,000 deaths. Recently, the CDC estimated the economic losses associated with an outbreak of tularemia to be $5.4 billion for every 100,000 people exposed.

Person-to-person transmission has not been documented with a tularemia infection, so secondary spread is of little concern. However, infectious organisms can be found in blood and other tissues; care must be taken when handling infected material.

Antidotal therapy: Antibiotics are generally effective if given early in the infectious process, and as a prophylaxis. A live, attenuated vaccine (given intradermally or by scarification) is available to individuals at high risk of exposure to the bacteria. The vaccines efficacy against high dose respiratory challenge is unknown. Disinfection of the bacteria is easily accomplished with many common disinfectants. However, the bacteria are stable at freezing temperatures for months to years.

Category B

The biological agents and toxins that fall into Category B are moderately easy to disseminate. They cause moderate morbidity and low mortality. They require specific enhancements of the CDC's diagnostic capacity and enhanced disease surveillance. The following agents and toxins are in Category B:

- Brucellosis (*Brucella* spp)
- Epsilon toxin (*Clostridium perfringens*)

- Food threats (*Salmonella,* E. *coli O157:H7, Shigella*)
- Glanders (*Burkholderia mallei*)
- Melioidosis (*Burkholderia pseudomallei*)
- Psittacosis (*Chlamydia psittaci*)
- Q Fever (*Coxiella burnetii*)
- Ricin toxin (castor beans)
- Staphylococcal enterotoxin
- Typhus (*Rickettsia prowazekii*)
- Viral encephalitis (VEE, WEE, EEE)
- Water safety threats (*Vibrio cholera, Cryptosporidium parvum*)

<u>Brucellosis</u>

Brucellosis, or undulant fever, is caused by various species of *Brucella,* a gram negative, facultative intracellular rod. The organism can persist in the environment and can persist indefinitely if frozen in aborted fetuses or placentas. Transmission occurs via:

- Ingestion of infected food or infected unpasteurized milk or dairy products
- Inhalation of infectious aerosols (a means of infection in abattoirs)
- Contact with infected tissues through a break in the skin or mucous membranes

Brucellosis can involve any organ or organ system, and have a very insidious onset with varying clinical signs. The one common sign in all patients is an intermittent/irregular fever with variable duration; thus, the term undulant fever.

There are three forms of the disease in humans. In the acute form (<8 weeks from illness onset), symptomatic, nonspecific, and flu-like symptoms occur. The undulant form (< 1 yr. from illness onset and symptoms) includes undulant fevers and arthritis. In the chronic form (>1 yr. from onset), symptoms may include chronic fatigue-like syndrome and depressive episodes. Illness in people can be very protracted and painful, and can result in an inability to work and loss of income. In animals, the clinical signs are mainly reproductive in nature, such as abortions, epididymitis, orchitis, and fistulous withers in horses.

The following table indicates the specific brucellosis species, its host, and whether it is a human pathogen:

Species	**Hosts**	**Human Pathogen?**
Brucellosis abortus	Cattle, bison, elk or horses	Yes
Brucellosis melitensis	Goats, sheep or cattle	Yes
Brucellosis suis	Swine, hares, reindeer, caribou, or rodents	Yes
Brucellosis canis	Dogs or other canids	Yes
Brucellosis ovis	Sheep	No

Table 2

In the 1950's, when the U.S. bioweapons research program was active, *Brucella suis* was the first agent weaponized. The WHO prepared a bioterrorism scenario looking at aerosolized *B. melitensis* spread along a line with the prevailing winds with optimal meteorological conditions. *Brucellosis melitensis* is highly ineffective and stable in aerosol form, and has consequences that are more serious for humans than *B. suis*. It was assumed that the infectious dose to infect 50 (ID50) percent of the population would require inhalation of 1,000 vegetative cells. The case fatality rate was estimated to be 0.5 percent, with 50 percent of the people being hospitalized and staying an average of seven days. Incubation period in humans is one week up to several months, which often complicates the diagnosis due to the latency of clinical signs. Person-to-person transmission is very rare.

Antidote therapy: Prolonged antibiotics are necessary to penetrate these facultative intracellular pathogens. Combination therapy has shown the best efficacy for treatment in humans. Vaccinating calves has helped eliminate infection in these animals, thus decreasing possible exposure to humans. Strict adherence to Federal laws requiring the identification and segregation or culling of infected animals is essential to success. Inspectors should properly protect themselves to prevent exposure to tissues and body secretions of infected animals by wearing gloves, masks, goggles, and coveralls. Pasteurization or boiling of milk and avoiding unpasteurized dairy products will help decrease human exposure to brucellosis. The organism is susceptible to many disinfectants.

<u>Equine Encephalitis</u>

Encephalitis is the only viral group in the list of Category B agents. This group of equine encephalitis viruses is RNA viruses in the Alpha virus genus. Mosquitoes transmit Eastern, Western, and Venezuelan Equine Encephalitis viruses (EEE, WEE, VEE).

The female mosquito takes a blood meal from a viremic host – generally birds for EEE and WEE, and birds and horses for VEE. The virus replicates in the salivary glands of the mosquito and is transmitted back to birds or to dead end hosts, such as humans and horses, where overt disease occurs. In humans, infections can be asymptomatic or cause flu-like illness. In a small proportion of cases, viral encephalitis can occur and lead to permanent neurological damage or death.

Horses, donkeys, and mules have similar clinical signs as humans. The disease in these animals often precedes human cases by several weeks. EEE and VEE have mortality rates of 40 to 90 percent; WEE has a lower mortality rate, ranging from 20 to 30 percent. Birds are asymptomatic carriers. The detection of viremia in sentinel birds is detected via ELISA.

VEE was tested in the U.S. bioweapons program in the 1950's and 1960's. It is thought that other countries have also weaponized VEE. All U.S. stocks of VEE were destroyed, along with the other agents that were part of the program. VEE can be produced in large amounts by unsophisticated and inexpensive systems. The virus can be aerosolized or spread by releasing infected mosquitoes. Humans are highly susceptible. Approximately 90 to100 percent of exposed individuals could become infected and have clinical signs, although most are mild. Equids would also be susceptible, and disease would occur simultaneously with human disease. There is a low overall human case-fatality rate.

Antidotal therapy: Antibiotics are not effective for treatment, and there are no effective antiviral drugs available. Treatment involves supportive care. There is a trivalent formalin inactivated vaccine available for horses for WEE, EEE, and VEE in the United States; but, the human vaccines are limited to those who are researchers and at a high risk of exposure. All of the virus types are unstable in the environment.

Category C

The agents that fall into Category C include emerging pathogens that could be engineered for mass dissemination in the future because of availability, ease of production and dissemination, the potential for high morbidity and mortality rates, and major health impact. The following agents fall into Category C:

- Nipah virus
- Hanta virus

<u>Nipah</u>

Nipah virus (a Paramyxovirus) was discovered in Malaysia in 1999. It causes a severe respiratory disease in pigs and severe encephalitis in humans. The reservoir for the virus is thought to be fruit bats, which are called flying foxes. Suspected transmission of the virus occurs from bats roosting in fruit trees close to pig confinements. The virus then spreads rapidly through the swineherd by direct contact or aerosolization (usually coughing). It can then be passed to humans, dogs, cats, and other species.

Transmission can also occur from direct contact with infected body fluids. To date, no person-to-person or bat-to-person transmission has been reported. In humans, the incubation period is 3-14 days. Initial symptoms include fever, headache, dizziness, drowsiness, disorientation, and vomiting. Some cases show signs of respiratory illness. In severe cases, rapidly progressive encephalitis can occur, with a mortality rate of 40 percent.

In swine, Nipah virus is highly contagious and easily spread. Many pigs are asymptomatic. Clinical signs include acute fever (greater than 104˚ F), tachypnea, and dyspnea with open mouth breathing. A loud, explosive barking cough may also be noted. Occasionally, neurological signs can occur. Clinical signs in pigs were noted one to two weeks before illness in humans, making swine a sentinel for human disease. Disease in other animal species is poorly documented. Other species demonstrate respiratory and neurological signs.

Nipah virus is described as an emerging pathogen with potentially high morbidity and mortality, as well as a major health impact. Currently, transmission of the disease involves close contact with pigs, but aerosolization may be a possible method of dispersal in bioterrorism. The potential for Nipah virus to infect a wide range of hosts and produce significant mortality in humans makes this virus a public health concern.

Nipah virus is a very dangerous pathogen and is classified as a Biolevel 4 agent. If an outbreak is suspected, the state veterinarian and state public health veterinarian should be contacted immediately. All contact with potentially infected species (pigs, dogs, cats) should be avoided until the proper authorities are consulted. Detergents can readily inactivate Nipah virus. Routine cleaning and disinfection with sodium hypochlorite, or several commercially available detergents, is expected to be effective.

Radiological/Nuclear Agents

“Nuclear” involves a fission reaction (nuclear weapon, nuclear power plant, satellites, and waste processing facility). It requires special nuclear material, such as plutonium or uranium. “Radiological” involves radionuclides, which can be dispersed or deposited. Accidents such as the reactors at Three Mile Island in Pennsylvania (small release) and Chernobyl in Russia (large catastrophic release), have taught us about the effects on the agriculture and the food supply. Those lessons focus on making decisions to evacuate if plant conditions worsen or remain unstable. Additionally, the Federal government has extensive plans, and practices emergency response around nuclear facilities in the U.S.

Targets and Pathways

There are many methods of delivery and points in the agriculture process where an agent could be introduced. Covert, or stealth, introductions will go unnoticed for a longer period than overt introduction because we will be treating it as if it occurred under natural conditions. The simultaneous release of three to four highly contagious, foreign animal pathogens in several locations around the country at key points would be overwhelming.

High-density population areas represent tempting terrorist targets. Most lack even rudimentary monitoring capabilities. Some examples include:

- Urban population centers
- Business centers
- Transportation nodes
- Special events (e.g., political conventions, Super Bowl, Olympics, etc.)
- Agribusiness and national food supply infrastructure

Terrorists can exploit multiple pathways. They can introduce biological, radiological, chemical, or other types of harmful agents into the population in a variety of ways, including:

- Air dispersion (line and point source)
- Public transportation
- Water supplies
- Food distribution systems
- Mail distribution systems.

Consequences

While the topic of food defense is highly concerned with the intentional introduction of foreign agents, there is the possibility that international travelers might bring one or more microbial agents into the U.S. accidentally. At first onset, an intentional outbreak of a disease in animals or crops is hard to differentiate from a natural outbreak, which delays finding the true source. False claims and hoaxes can be introduced to diminish public confidence in food safety for particular commodities or products. A false report of one case of BSE occurring in the U.S. would send the beef industry into a tailspin for a brief time, losing perhaps tens of millions of dollars or more in overall costs. Foreign trading partners might hear of the rumor and implement a trade ban. Perpetrators rely upon the media to do the damage for them by spreading the rumors and presenting fiction as fact. Clues generated by an outbreak might point toward an intentional introduction.

The impact of a foreign animal disease such as Foot and Mouth Disease (FMD) in the U.S. could be severe. Harsh restrictions on movement would be enacted.

We would see road closures, quarantined farms, and animal movement ceased. Access to campsites, state parks, wilderness areas, lakes, city parks, and zoos could be denied.

The psychological impact and mental health of livestock producers, veterinarians, and the local community could be negatively affected if entire herds are quarantined and destroyed. The public could be shocked by some of the images the outbreak produces, and alter their buying habits as consumers. It is unlikely that a terrorist attack would create mass food shortages, but movement restrictions could complicate availability temporarily.

Workshop

Work with your group to respond to these questions.

1. What are the characteristics of a functional food defense plan?

2. According to Directive 5420.1, what are the three alert categories in the National Terrorism Advisory System?

3. List the PHIS food defense verification tasks. Give a brief summary of each of these.

4. What additional steps must IPP assigned to egg products plants take in cases where food defense vulnerability is identified?

5. How should you respond to suspicious activity in egg products plants?