The Food Supply and Biodefense: The Next Frontier of the Food Safety Agenda

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A Preview

• Our current food system
• Foodborne disease as a backdrop for understanding the potential for intentional contamination of our food supply;
  - Previous episodes of intentional contamination/terrorism
  - Potential agents of greatest concern
  - Foodborne disease detection and response
• A framework for prevention
• Food system attack scenario
Topics to Be Covered in the Food And Agroterrorism Symposium

• Methods for detection and characterization of foodborne pathogens
• Crop-related attacks
• Foreign animal diseases
“For the life of me, I cannot understand why the terrorist have not attacked our food supply, because it is so easy to do.”

Former Secretary Tommy Thompson
Health and Human Services

“I don't want to get up in public and say the sky is falling if it's not falling. I'm going to try to be very realistic and sensible and serious about the kinds of tradeoffs that we have to consider when we're making decisions about protecting ourselves.”

Secretary Michael Chertoff
Homeland Security
To conclude that the use of food as an instrument of terror is unlikely would be looking at the world of today through the prism of the past. The terror of these times is based on a different note on a different scale.”

Lester Crawford
Former Commissioner, FDA
Sept 6, 2002
The Food System

- It is the most complicated system of all industrial or infrastructure-related activities in the world
- A global food supply
- Safety has been a critical issue prior to concerns about intentional harm
The Food System

- Pre-farm inputs
- The farm
- Transportation
- Processing
- Wholesale distribution
- Retail/institutional/home
The New Global Food Supply

• US agricultural sector accounts for more than $1 trillion in economic activity;

• 2004 exports; $62.3 billion

• Exceeded agricultural imports by $9.6 billion

• 18% of domestic employment

• 13% of the US gross domestic product
The Problem: Global Food Systems
FDA Food Registrations: Bioterrorism Preparedness and Response Act
Food Expenditures as a Share of Disposable Personal Income, United States, 1974-2003

Source: USDA/Economic Research Service
National Restaurant Association 2000
Restaurant Industry Facts

- Sales $399 billion
- Locations 844,000
- Employees 11.3 million
- Restaurant share of the food dollar 46%
Where is this?
USA? PERU? MEXICO? CHILE?
Where is this?
USA? PERU?
MEXICO? CHILE?
Flow of Ice Cream Product To and Through the Schwan's Plant

- Suppliers
- Premix Transport
- Silos
- Flavor Vat
- Freezer
- Filler
- Packing & Distribution
Enumeration of *Salmonella enteritidis* in Positive Schwan’s Ice Cream Samples

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<th>Time+</th>
<th>MPN/Gram (95% CI)</th>
<th>MPN per 65 gram Serving</th>
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*Microbiologic testing conducted by the Minnesota Department of Agriculture*  
+Time finished product was packaged
Previous Intentional Attacks

• Canada 1970- A postgraduate student contaminated his room mates’ food with *Ascaris suum*, four persons became seriously ill and two suffered respiratory failure.

• Holland and Germany 1978- A dozen children hospitalized after citrus fruit from Israel was intentional contaminated with mercury

• Oregon 1984 - Members of the Rajneeshee cult contaminated a salad bar with *Salmonella*, causing 751 illnesses
On August 29, 1984, followers of the Bhagwan Shree Rajneesh, the Rajneeshee cult, tested a crude bioweapon in The Dalles, Oregon, giving water contaminated with *S. typhimurium* to public officials visiting the cult’s compound. The officials became ill. Later that year the cult sprayed the bacteria on ten restaurant salad bars.
Previous Intentional Attacks

• Texas 1996- A disgruntled lab worker contaminated food of coworkers with *Shigella dysenteria* type 2, 12 became ill and four were hospitalized
• China 2001- 120 people became ill when owners of noodle factory laced their food with rat poison
Lone Individuals – Use of a Biological Pathogen

In October 1996, Diane Thompson, a lab technician, infected 12 of her coworkers with Shigella dysenteriae Type 2 that she had placed in pastries in the office lunchroom. She was sentenced to 20 years.
Previous Intentional Attacks

- Starting in the fall of 2001 and continuing into spring of 2002, bulk milk tanks on dairy farms (14 total) were contaminated with antibiotics. This event may have been a test of the feasibility of an attack using the milk system as a delivery vehicle.

- China 2002 – Business owner poisons hundreds, kills 77, by spiking a competitor’s baked goods with tetramine-based rat poison

- Michigan 2003 – Contamination of 200 lbs of ground beef with a insecticide containing nicotine by a disgruntled employee in a supermarket results in 111 ill, including 40 children
In January 1998, Thomas Leahy, Janesville, WI, was sentenced to 6 years in Federal prison for having made deadly agents in his basement “lab.”

Search items later confirmed to be Ricin, Clostridium botulinum and weaponized Nicotine Sulfate.
Major Foodborne Attack Threats

- **Economic disruption**: Target agriculture with animal or crop diseases (e.g., FMD virus in livestock)
- **Mass human casualties**: Target food processing or transportation with Class A agents (e.g., botulinum toxin in tanker truck)
- **Mass anxiety**: Target popular restaurants, food products with “credible” hoax
Characteristics of an Ideal Food/Beverage Vehicle For A Foodborne Bioterrorism Attack

- Opportunities for perpetrator access
- Lack of subsequent adequate heat-treatment
- Large volume and/or maximum mixing
- Product environment for agent growth or toxin chemical preservation
- Rapid distribution to consumers
- Rapid consumption by consumers
- Disproportionate consumption by “high risk populations”
Agents of Concerns; Food-related Terrorism

• Biological
  – *Clostridium botulinum*
  – *Bacillus anthracis*
  – Enteric bacteria
  – Animal/plant specific agents

• Chemicals
  – “Fast acting”
  – “Slow acting”
The Food System and Biosecurity

Food biosecurity is the development of effective measures to prevent, detect and respond to a potential bioterrorist attack of the food system.
Identifying Food Bioterrorism

“Early detection of disease resulting from covert food terrorism depends on sensitive surveillance systems for communicable disease at the local and national levels, with close cooperation and communication among clinicians, laboratories and public health officials.”

World Health Organization (WHO), Terrorist Threats to Food, 2002.
Foodborne Disease Surveillance and the Public Health Response to Food Terrorism

• Will depend on the type of agent, efficiency of the attack and geographic distribution of cases
• Acute and unusual illnesses clustered by time and location will trigger immediate response
• Typical enteric-related foodborne disease, even if in large numbers of cases, if distributed nationally will be difficult to detect and identify the source in a timely manner
A Framework for Food Protection and Defense

• What Best Serves the Public Good?

• Who Determines Acceptable Risk?

• Food safety versus food protection and defense (i.e. food biosecurity)
HACCP for Food Safety:
Control of Hazards Reasonably Likely to Occur

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## Food Protection and Defense: Control of Severe Impact with Low Likelihood

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Food Protection and Defense

• Because food protection and defense systems target hazards that are unlikely to occur, these investments are *unlikely* to yield measurable benefits.

• How should these be viewed?
  - As public goods warranting public support?
  - Regulated as a condition for doing business?
  - Treated as a cost of doing business like insurance?
The Challenges of Food Protection and Defense

• What is the tolerable risk?
  - Zero risk is unachievable
  - Promoting “zero risk” creates a false sense of assurance and reduces overall food protection

• Who pays? Public vs. private good

• How do we implement food protection and defense most effectively and efficiently?
  - Mandate (regulation) vs. incentive
Effective response requires collaboration
Terrorist Profile

• **Who** is the threat (person/organization)?

• What are their **capabilities**?

• What is their **intent** (goals)?

• What is their prior **history** (past terrorist activities)?
“Fighting terrorism is like being a goalkeeper. You can make a hundred brilliant saves but the one shot that people remember is the one that gets past you.”

Paul Wilkinson, British scholar, Daily Telegraph, London, 9/1/92
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