Scan of documents taken from Afghanistan caves after September 11, 2001. (Jaax 2008)
Public health impacts

- Annual
  - 2,500 outbreaks of foodborne illness
    - 76 million illnesses
    - 325,000 hospitalizations
    - 5,000 deaths

Intentional could be greater

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Incidental contamination events

- In 1981, over 800 people died and 20,000 were injured in Spain because of a chemical contaminant in cooking oil.
- In 1985, approximately 170,000 people were sickened in the U.S. from pasteurized milk contaminated with *Salmonella enterica* Typhimurium.
- In 1988, nearly 300,000 people in China sickened by clams tainted with hepatitis A.
- In 1993, approximately 500 people were sickened and 4 died in the U.S. from consuming undercooked hamburger contaminated with *E. coli* O157:H7.
- In 1994, approximately 224,000 people affected in the U.S by ice cream pre-mix contaminated with *Salmonella enteritidis*.
- In 2006, approximately 200 people affected (2 adults and 1 child with HUS died) in the U.S. by fresh spinach products contaminated with *E. coli* O157:H7.
Food safety/food defense

- Food Safety: preventing incidental contamination of food.
  - Good Manufacturing Practices
  - Hazard Analysis and Critical Control Points (HACCP) programs.
  - Programs are mandatory

- Food Defense: preventing intentional contamination of food.
  - Programs are voluntary
Intentional food contamination

- **Who**
  - Disgruntled employees, criminals, activists, subversives and terrorists

- **Why**
  - Greed
  - Revenge
  - Political or ideological causes
  - Sabotage

- **How**
  - Biological or chemical agents
In 1970, 4 students in Canada consumed embryonated *Ascaris suum* eggs placed in their food by a disgruntled postdoctoral student.

In 1984, 751 people sickened in The Dalles, Oregon after eating at local salad bars that had been contaminated by The Rajneeshee cult with *Salmonella Typhimurium*.

In 1996, 12 hospital employees were sickened in Texas after eating intentionally contaminating pastries with *Shigella dysenteriae* by coworker.

In 2001, approximately 300 people became ill and at least 38 people-many schoolchildren-died, in China, after eating food contaminated with a powerful rat poison by a competitor.

In 2003, 15 people were sickened and 1 died in Maine from arsenic-laced coffee served at a church by a disgruntled parishioner.

In a 2003, 100 people were sickened by 200 pounds of meat at a Michigan grocery store contaminated with an insecticide by a disgruntled employee.

In 2008, four babies died and over 53,000 babies have been sickened, including 158 with acute renal failure in China after being fed milk formula fraudulently contaminated with melamine.
Economic impacts

- Food processor
  - Recalls
- Allied Industries
  - Chemical, Equipment
- Transportation
- Warehouse operators
- Retail outlets
- Restaurant chains
Loss of confidence in food supply and government

- 2007- Melamine in pet foods
  - hundreds of cats and dogs
- 2008- Melamine in dried milk products (infant formulas)
  - 53,000 illnesses (100 of them serious)
  - 13,000 hospitalizations
  - 4 deaths

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Policy approaches

- Department of Homeland Security
  - Homeland Security Presidential Directives
- Food and Drug Administration
  - Public Health Security and Bioterrorism Preparedness and Response Act of 2002
  - *Food Security Preventive Measures Guidance*
  - CARVER+Shock
- Department of Agriculture-Food Safety Inspection Service
  - *Security Guidelines for Food Processors*
  - *Industry Self-Assessment Checklist for Food Security*
  - *Guide to Food Defense in Slaughter and Processing Facilities*
### FSIS survey results
*(Establishments with a food defense plan)*

<table>
<thead>
<tr>
<th>August 2006 (Baseline data)</th>
<th>November 2007</th>
<th>August 2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>N=5121</td>
<td>N=5097</td>
<td>N=5012</td>
</tr>
<tr>
<td>27%</td>
<td>31%</td>
<td>41%</td>
</tr>
<tr>
<td>Change = +14%</td>
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</tr>
</tbody>
</table>

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Research objective

- The survey was designed to gain insight into the opinions and perceptions from various sized establishments across the nation about areas of food defense.
Survey methodology

- A web-based survey through KSU Axio survey system
  - 27 questions
- The population of interest: meat and poultry establishments
- Survey distributed:
  - 3 National trade organizations
Definition of establishment sizes

- Very small: up to 10 employees and annual sales less than $2.5 million
- Small: 10-499 employees
- Large: 500+ employees
Responses by zone

Zone 1 (n=17) (14%)
Zone 2 (n=21) (17%)
Zone 3 (n=35) (29%)
Zone 4 (n=31) (26%)
Zone 5 (n=10) (8%)
Zone 6 (n=7) (6%)
## Demographics

### Percent of respondents by establishment size (n=119)

<table>
<thead>
<tr>
<th>Establishment Size</th>
<th>Percent of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Small</td>
<td>15</td>
</tr>
<tr>
<td>Small</td>
<td>52</td>
</tr>
<tr>
<td>Large</td>
<td>33</td>
</tr>
</tbody>
</table>

### Percent of respondents by type of inspection (n=121)

<table>
<thead>
<tr>
<th>Type of Inspection</th>
<th>Percent of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal</td>
<td>93</td>
</tr>
<tr>
<td>State</td>
<td>7</td>
</tr>
</tbody>
</table>
How respondents perceive the definition of food defense within a given size

- **Very Small (n=18)**
  - Intentional: 61%
  - Unintentional: 17%
  - Neither: 11%
  - Both: 11%

- **Small (n=60)**
  - Intentional: 73%
  - Unintentional: 10%
  - Neither: 15%
  - Both: 2%

- **Large (n=39)**
  - Intentional: 64%
  - Unintentional: 15%
  - Neither: 15%
  - Both: 5%
How respondents perceive the importance of food defense

Establishment Size n=104

- Very small (n=14)
  - Not Important: 29%
  - Somewhat Important: 43%
  - Very Important: 29%

- Small (n=58)
  - Not Important: 5%
  - Somewhat Important: 29%
  - Very Important: 66%

- Large (n=32)
  - Not Important: 6%
  - Somewhat Important: 34%
  - Very Important: 59%
How many establishments have a food defense plan

**Overall**
- Yes: 74%
- No: 26%

**By establishment size**
- Very Small (n=18): 28% Yes, 72% No
- Small (n=62): 82% Yes, 18% No
- Large (n=39): 85% Yes, 15% No

Response n=121
Perceptions about the likelihood of an intentional contamination event

Overall

- Yes: 74%
- No: 26%

Response n=121

By establishment size

- Very Small (n=16): Not Likely 31%, Somewhat Likely 31%, Very Likely 38%
- Small (n=55): Not Likely 16%, Somewhat Likely 56%, Very Likely 27%
- Large (n=30): Not Likely 10%, Somewhat Likely 50%, Very Likely 40%

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Perception of an intentional contamination event in the respondents establishment

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Perceptions about the level of preparedness within each size

<table>
<thead>
<tr>
<th>Establishment Size</th>
<th>Not Prepared</th>
<th>Somewhat Prepared</th>
<th>Very Prepared</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Small (n=15)</td>
<td>20%</td>
<td>20%</td>
<td>60%</td>
</tr>
<tr>
<td>Small (n=56)</td>
<td>7%</td>
<td>34%</td>
<td>59%</td>
</tr>
<tr>
<td>Large (n=30)</td>
<td>17%</td>
<td>40%</td>
<td>43%</td>
</tr>
</tbody>
</table>
Conclusions

- Many establishments defined food defense as intentional contamination
  - small but important percentage of establishments that do not seem to understand the definition of food defense

- Many very small establishments do not have a food defense plan.

- Focus on these establishments to understand what assistance they may need to be prepared.

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It was on a short-cut through the hospital kitchens that Albert was first approached by a member of the Antibiotic Resistance. It was on a short-cut through the hospital kitchens that Albert was first approached by a member of the Antibiotic Resistance.