

Food Protection & Defense

Heartland Security Conference & Exhibition



Susan Nestegard
Sr VP & Chief Technical Officer

July 10, 2007

Food Protection & Defense



- ▲ Safety of the food supply is of critical importance
- ▲ The food industry as a target
- ▲ How can we learn from the past
- ▲ How can we better prepare for the future

Headlines On Recent Outbreaks

Supplier Expands Beef Recall Over Concerns of E. Coli Contamination

ASSOCIATED PRESS: NY Times, June 10, 2007

Toxic carrot juice paralyzes 2 in Toronto

CBC News October 9, 2006

Pet Food Recall Expanded to New Wet Food Brand

FoxNews: SUNDAY, APRIL 01, 2007

China shuts 180 food factories for using illegal chemicals

Associated Press, June 27, 2007

Another norovirus outbreak docks ship

World's largest cruise ship held in port to undergo intensive cleaning

MSNBC: Associated Press Dec 11, 2006

Salmonella Cases in Peanut Butter Top 600

CNN.com

Investigators trace spinach E. coli to cattle ranch in California

Associated Press: Minneapolis Star Tribune, March 23, 2007

Food Safety versus Food Defense

▲ Food Safety

- Unintentional
- Routine
- Real
 - 76 million foodborne illnesses
 - 325,000 hospitalizations
 - 5,000 deaths

▲ Food Defense

- Intentional
- Criminal
- Sporadic
- Plausible
- Unknown

What is Food Terrorism?

An act or threat of **deliberate** contamination of food for human consumption with chemical, biological, or radionuclear agents for the **purpose** of causing injury or death to civilian populations and/or disrupting social, economic or political stability.

Who are we concerned about?

- ▲ Disgruntled employees
- ▲ Violent activist groups
- ▲ Criminals / subversives
- ▲ International / government supported or directed groups or individuals

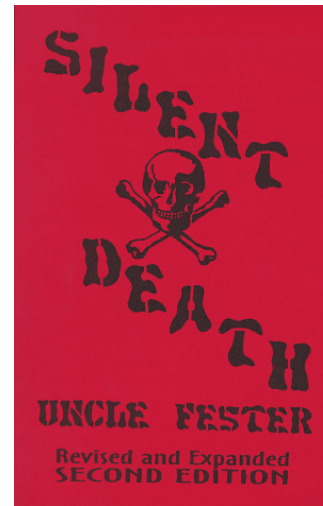


Why are we concerned about food terrorism?

Encyclopedia of Jihad

- ▲ No specific targeting information indicating attack on food supply is imminent
- ▲ Intelligence indicates that terrorists have discussed components of food sector
- ▲ Manuals for intentional contamination of food are widely available

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The Poisoner's Handbook, found in Kabul

Slide credit: IFT

Why are we concerned about food terrorism?

- ▲ Potential for significant economic and psychological damage
 - Food sector = \$1.24 trillion/year

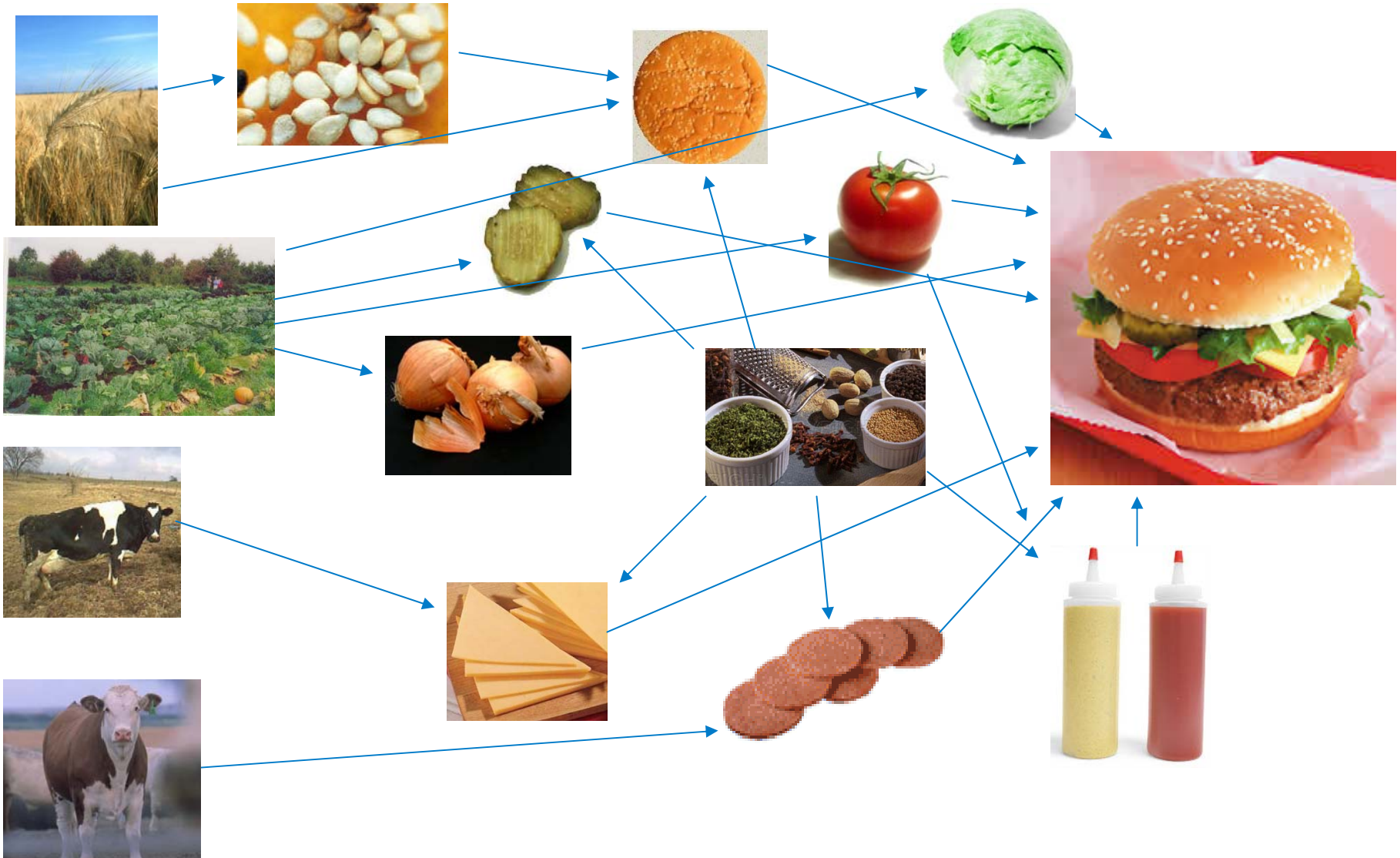


Why are we concerned about food terrorism?

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 - Food sector = \$1.24 trillion/year
- ▲ Efficient food distribution = potential for mass casualties



Supply Chain Complexity



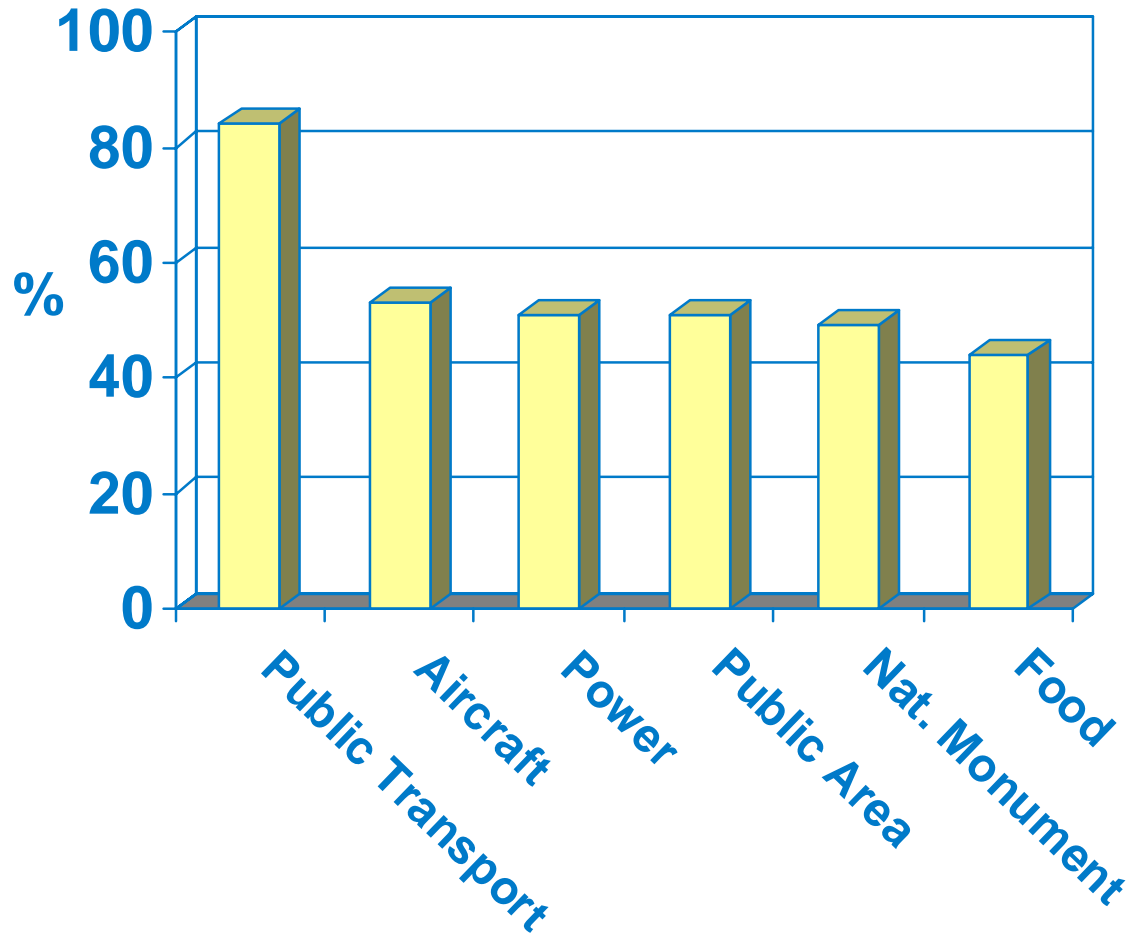
Slide credit: Shaun P. Kennedy, NCFPD

Why are we concerned about food terrorism?

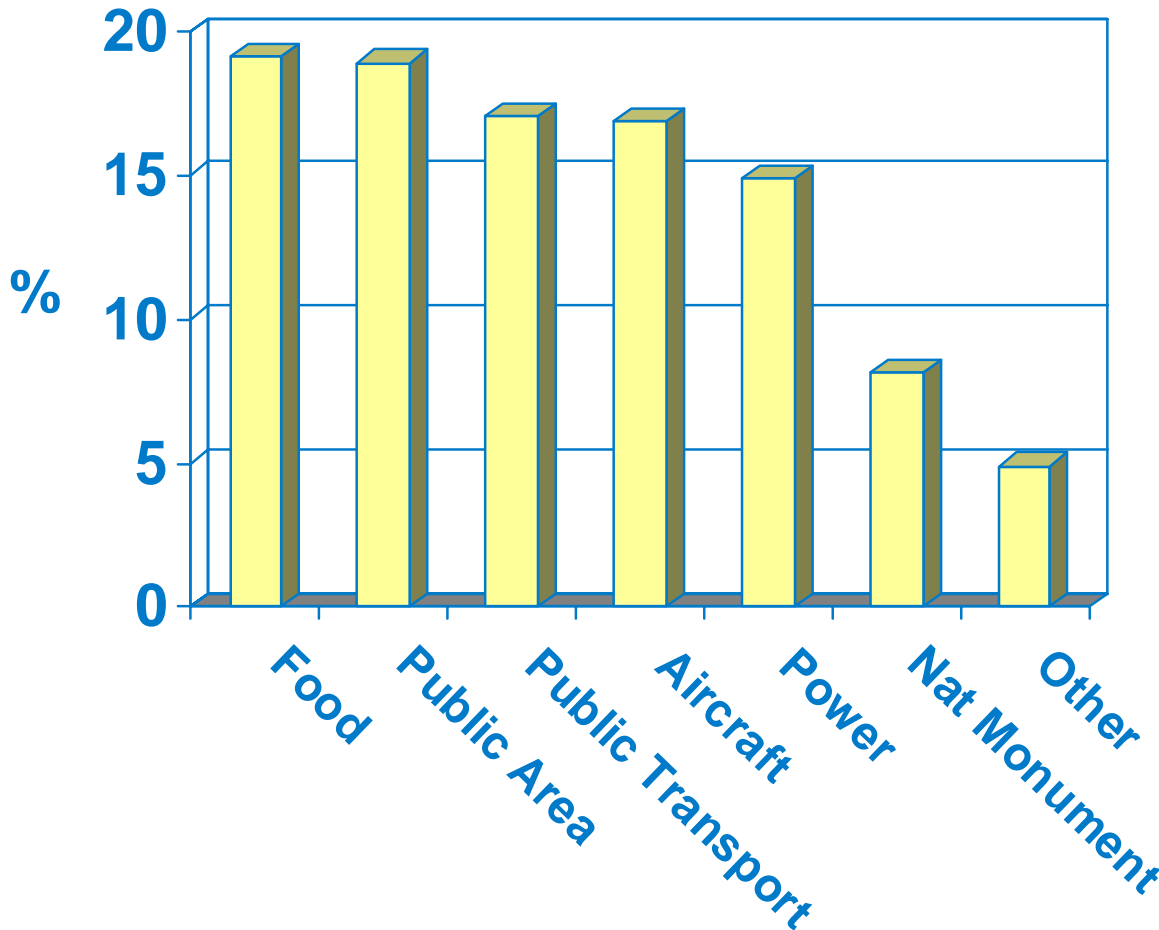
- ▲ Potential for significant economic and psychological damage
 - Food sector = \$1.24 trillion/year
- ▲ Efficient food distribution = potential for mass casualties
- ▲ Food chain complexity makes it hard to protect
 - 2,128,000 farms
 - 29,000 food manufacturing sites
 - 224,300 retail food stores
 - 565,000 food service outlets



Percent of US residents expecting a serious terrorist act in the next 4 years



Percent of anti-terrorism spending US residents believe should be allocated



Minnesota heritage linked to Food Industry



*Pillsbury A. Mill, Arch Bridge and Mississippi River,
Minneapolis, Minn.*

Heartland Food Safety & Technology Companies – Today



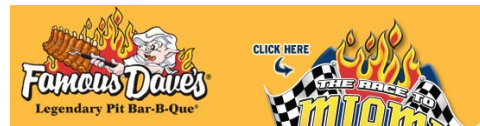
GENERAL MILLS

Land O'Lakes



SUPERVALU

3M Worldwide



Food Research In the Heartland



National Center for Food Safety and Technology

NCFST ACADEMIC PROGRAM



NORTH DAKOTA STATE UNIVERSITY
FARGO, N.D.



About Ecolab

- ▲ Leading global provider of cleaning, sanitizing, food safety and infection prevention products and service
- ▲ 23,000 associates
- ▲ Global reach – 160 countries
- ▲ \$5 billion sales in 2006



Solutions and Services that Deliver Cleaner, Safer, Healthier

Foodservice/ Hospitality



Food & Beverage Processing



Healthcare/ Infection Control



Global Customer Relationships

400,000+ Customers



What can we learn from
past incidents?

Unintentional Foodborne Outbreaks provide insight to

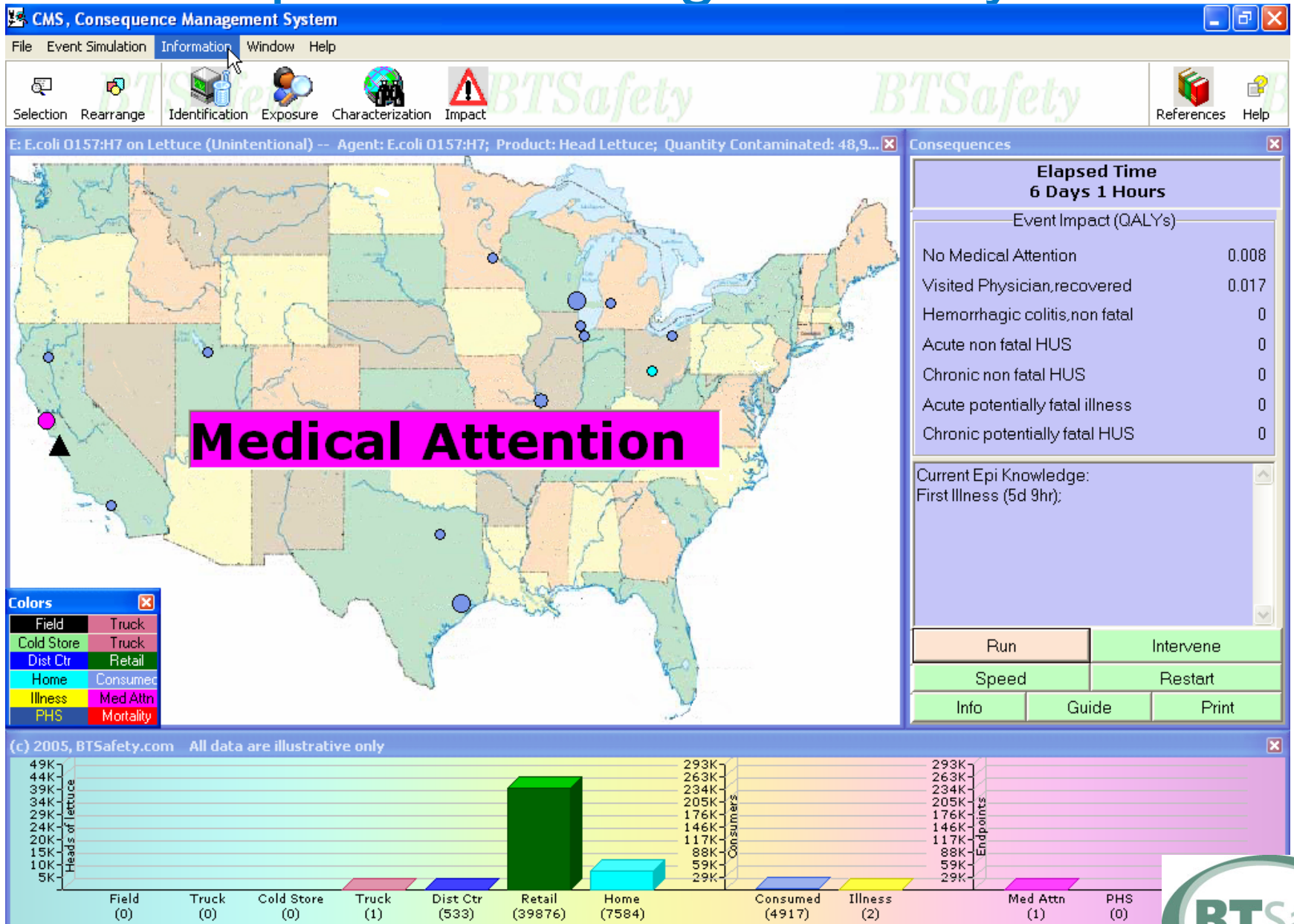
- ▲ Vulnerable foods
- ▲ Vulnerable points in their production
- ▲ Potential magnitude of public health impact



Unintentional Foodborne Outbreaks

- ▲ Norwalk like virus in bakery items with frosting, 1982
 - 3,000 people ill
- ▲ Pesticide (endrin) poisoning of contaminated flour, 1960s
 - 800 ill in the Middle East
- ▲ *Salmonella* Enteritidis in ice cream
 - Single facility, 1994
 - Estimated 224,000 affected
 - 30% required hospitalization

Consequence Management System



What can we learn from intentional attacks on our food supply?



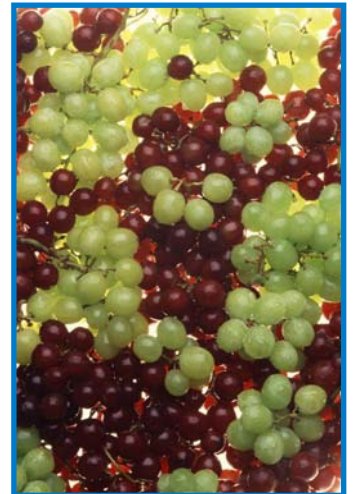
Intentional attacks



- ▲ 1984: Oregon – Rajneesh cult
 - *Salmonella* placed in multiple salads bars at restaurants, attempt to sway results of a local election
 - 751 ill, 45 hospitalized
- ▲ Oct. 1996: *Shigella dysenteriae* Type 2
 - Lab employee used microbes grown in-house to contaminate pastries served to 45 co-workers
 - 12 ill, 4 hospitalizations

Threat as a Weapon

- ▲ 1989: Chile – terrorist group
 - Phone call to the U.S. Embassy in Santiago claiming to have contaminated Chilean grapes with cyanide
 - FDA found 3 suspicious grapes in Philadelphia
 - Ruined the crop and Chilean fruit sales for an entire season, at a cost of \$200+ million
 - Consumer confidence slow to return
 - Lasting harm to image of imports



Intentional attacks – Counterfeiters and Diethylene Glycol - DEG



- ▲ 1990 – Bangladesh - 300+ children died from DEG contaminated cough syrup
- ▲ 1996 – Haiti - 85 children died from DEG contaminated cough syrup
- ▲ Oct. 2006 – Panama - over 100 deaths from DEG in sugarless liquid expectorant

Diethylene glycol sold as glycerin.....

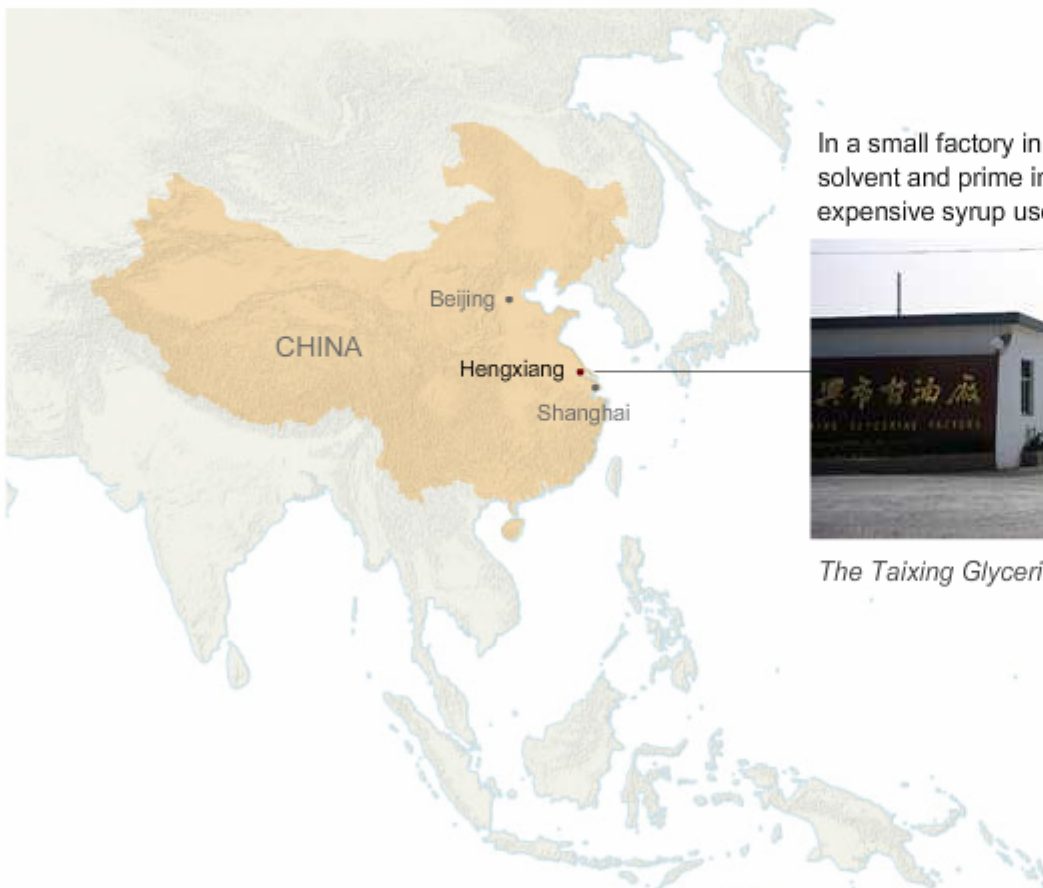
MAY 6, 2007

E-MAIL | FEEDBACK

A Poison's Path

How a toxic industrial solvent from China made its way into medication in Panama, killing at least 100 people.

1 2 3 4 5 6 NEXT ▶



In a small factory in China, a syrup containing diethylene glycol, a toxic industrial solvent and prime ingredient in some antifreeze, was sold as glycerin, a more expensive syrup used in food and drugs.



The Taixing Glycerine Factory's facility.

Du Bin for The New York Times



A dramatically different building is advertised on its website.

The New York Times

Sold to Beijing broker who shipped to Shanghai....

MAY 6, 2007

[E-MAIL](#) | [FEEDBACK](#)

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1 2 3 4 5 6 [NEXT](#) ▶



The New York Times

Counterfeit glycerin arrives in Barcelona.....

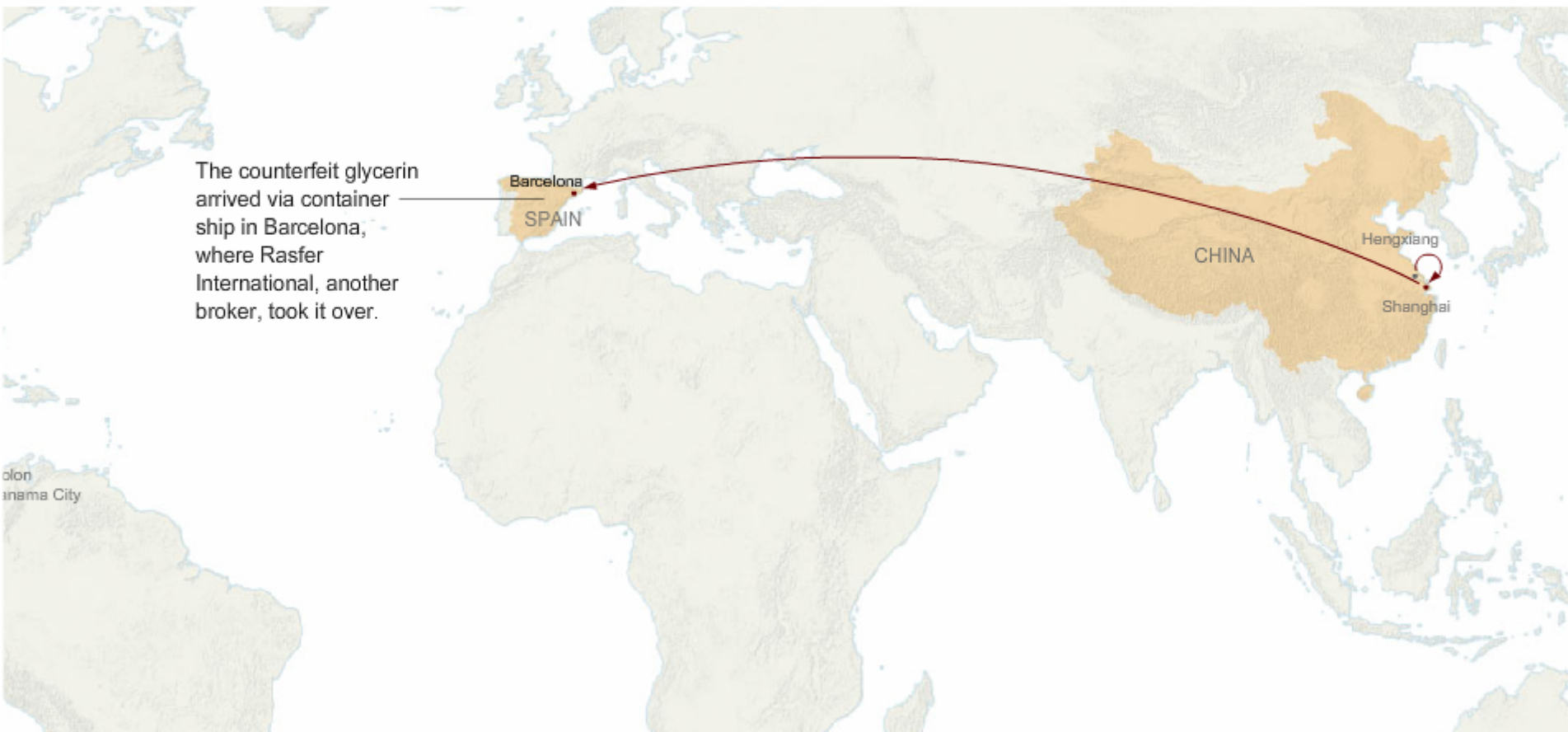
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The New York Times

Brokers certificates claim 99.5% glycerin.....

MAY 6, 2007

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The Papertrail

The certificates falsely stated that the toxic supply was 99.5 percent pure glycerin. Each new broker put its own name on the certificate, obscuring the provenance of the syrup.

Barcelona

GRASPER INTERNACIONAL S.A.
 PRODUCTOS QUÍMICOS - FARMACÉUTICOS
 Av. del Jover, 20 08020 BARCELONA (SPAIN)
 Tel: 93 254 10 60 Fax: 93 254 10 66
 E-MAIL: hsh@grasper.com WEB: http://www.grasper.com

CERTIFICADO DE ANÁLISIS
 CERTIFICATE OF ANALYSIS

PRODUCTO PRODUCT: **TD GLYCERINE 99.5 %**

BATCH# 0271601

MANUFACTURE DATE: 16/07/2003 EXPIRE DATE: 16/07/2004

Barcelona certification

CNSC FORTUNE WAY COMPANY
 4, FUXIN DUNGOU, CHAOYANG DISTRICT, BEIJING, CHINA

CERTIFICATE OF ANALYSIS
 (ANALYTICAL REPORT)

PRODUCT: TD GLYCERINE
 BATCH NO.: 03071601
 MFG. DATE: JUL 16, 2003

QUANTITY: 9000LITER
 EXP DATE: JUL 16, 2004

SPECIFICATIONS	CONTRAL RANGE	REAL
Appearance	Acromatous or pale yellow transparent adhesive liquid	Conforms
purity	>=99.5%	99.5%

Beijing certification

泰兴市甘油厂
 检验报告单

品名	TD 甘油	送检日期	03年7
生产批号	03071601	数量	12吨
序号	指标名称	控制范围	实
1	外观	无色透明或微黄色	合格
2	纯度K (比重法)	> 99.5	99.5
3	比重 (20℃/20℃)	> 1.2598	1.259
4	粘度 MPas	> 10	11.5
5	折光指数 (ND20)	1.4400-1.4700	1.455
6	PH值	6-8	6.2

Original certificate of analysis

The New York Times

46 barrels arrive in Panama.....

MAY 6, 2007

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The New York Times

Government packs it into 260,000 bottles.....

MAY 6, 2007

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A Poison's Path

How a toxic industrial solvent from China made its way into medication in Panama, killing at least 100 people.

1 2 3 4 5 **6** NEXT ▶

The syrup was trucked to Panama City, where government officials used it in 260,000 bottles of medicine. At least 100 people were killed by the medicine.



Hundreds of unopened bottles of toxic medicine still remain in boxes at a Panama hospital.



The New York Times

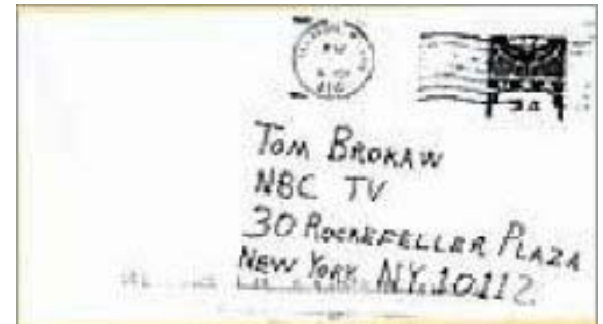
Intentional attacks – Counterfeiters and Diethylene Glycol - DEG



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 - ▲ Oct. 2006 – Panama - over 100 deaths from DEG in sugarless liquid expectorant
 - ▲ June 2007 – phony Colgate toothpaste imported from China contains DEG
- “death sentence to former pharmaceuticals control officer in China...”

Even ineffective attacks cause significant economic and psychological damage ...

- Anthrax in the mail – 2001
 - 22 cases, 5 deaths
 - 2 million people unnecessarily on Cipro
 - cost **\$1 billion**
 - Congress gave USPS **\$1 billion** for *initial* interventions
 - USPS direct costs **>\$3 billion**



How can we better prepare for the future?

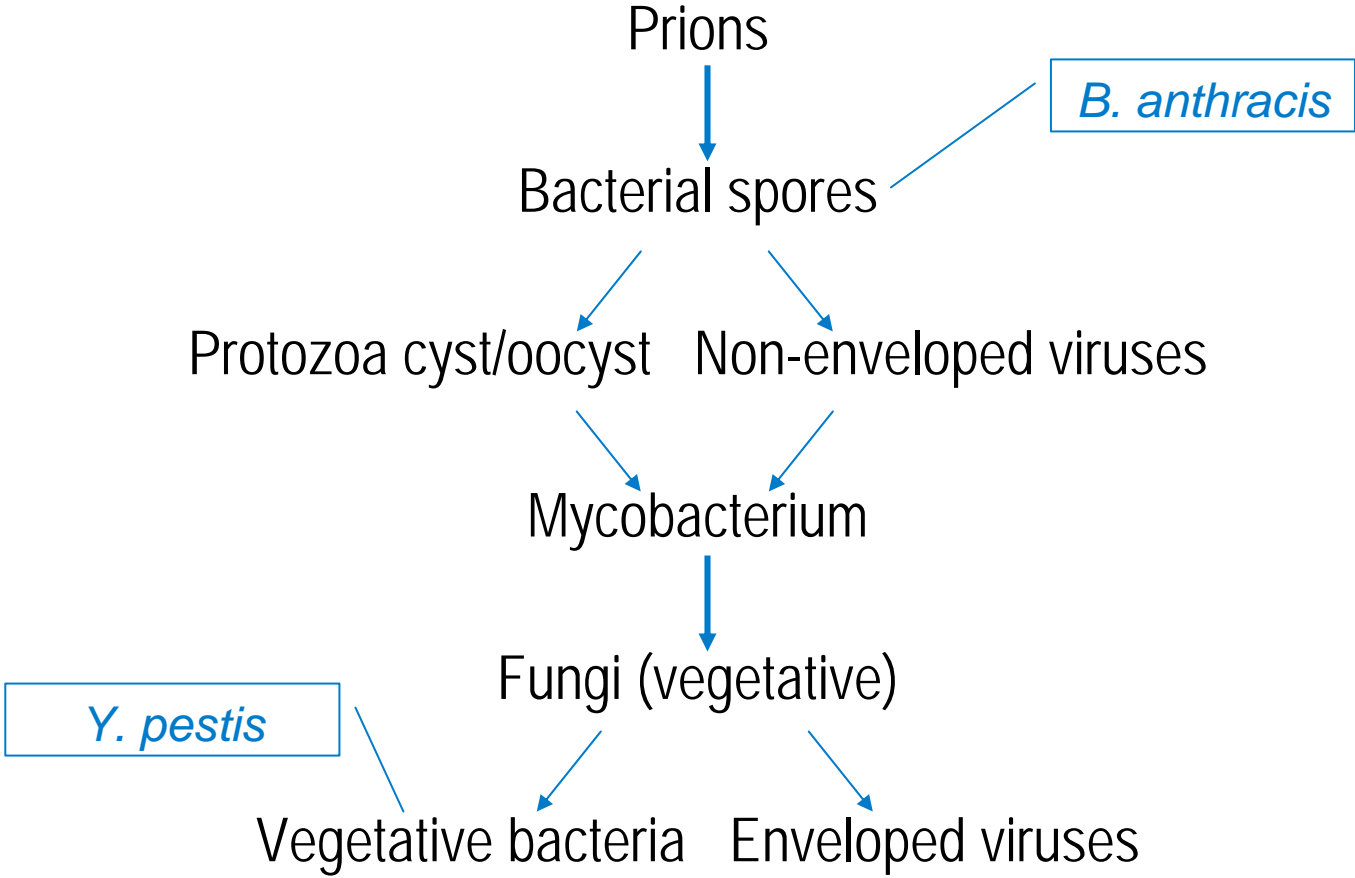


The Ecolab Research




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NATIONAL CENTER FOR
FOOD PROTECTION AND DEFENSE
A HOMELAND SECURITY CENTER OF EXCELLENCE

Resistance to Biocides



Biocide Efficacy

Organism type	Example indicator organisms	Product Classification
Bacterial spores	<i>Bacillus subtilis</i> <i>Clostridium sporogenes</i>	Sterilant  High-level disinfectant 
Vegetative bacteria	<i>Pseudomonas aeruginosa</i> <i>Staphylococcus aureus</i> <i>Salmonella choleraesuis</i>	Disinfectant  Sanitizer

Study Variables

▲ Time

- 10 and 30 minutes

▲ Temperature

- 10, 20, or 30°C

▲ Food

- None (water)
- 10% Flour paste
- Whole milk
- 50% Egg yolk emulsion

▲ Organisms

- *B. anthracis*
- *Y. pseudotuberculosis*

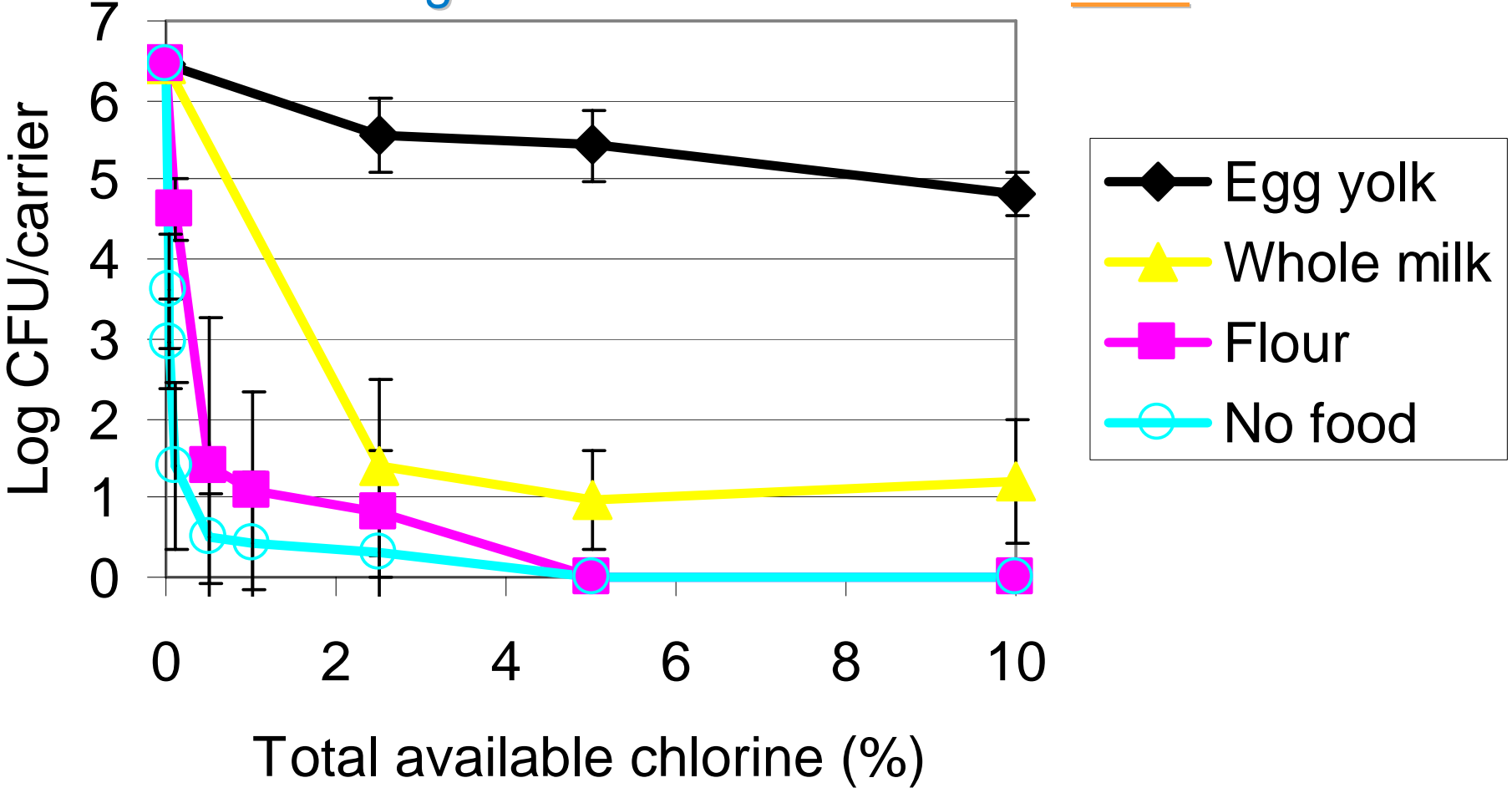
▲ Biocides*

- Sodium hypochlorite
- Quaternary ammonium compound (QAC)
- Iodophor
- Hydrogen peroxide
- Peroxyacetic acid
- Acidified sodium chlorite
- Peroxy/fatty acid sanitizers

*In 500 ppm hard water, no pH adjustment

Sodium hypochlorite – 10 minutes

Average of *B. anthracis* strains – 20°C



Needed Biocide concentration for 6-log reduction, 30 minute

B. anthracis spores

	No food			Flour paste			Whole milk			Egg-yolk		
	10°C	20°C	30°C	10°C	20°C	30°C	10°C	20°C	30°C	10°C	20°C	30°C
Sodium hypochlorite	2300	2300	900	5700	4600	1700	23000	9600	9500	48000	48000	40000
Acidified sodium chlorite	5900	1500	1100	5700	2200	1200	N	5800	2300	N	N	N
Hydrogen peroxide	25%	14%	8.9%	25%	13%	6.4%	25%	13%	6.4%	24%	13%	7.6%
Iodophor	N	N	N	N	N	N	N	N	N	N	N	N
Quaternary	N	N	N	N	N	N	N	N	N	N	N	N
Mixed peroxyacids	2100	1500	500	4200	1800	900	9200	3900	2100	26000	16000	9500
Peroxyacetic acid	14000	8000	2300	1500	7500	2300	13000	7900	3200	18000	11000	3700

“N” - undiluted biocide did not achieve a 6-log reduction

NOTE: Concentrations are all above allowable labeled use

Inactivation research summary

▲ Biocide efficacy

- QAC and iodophors not effective for *B. anthracis*
- Sodium hypochlorite, acidified sodium chlorite, hydrogen peroxide, peroxyacetic acid, and mixed peroxy acid biocides may inactivate *B. anthracis* spores on hard surfaces at concentrations well above EPA label

Inactivation research summary

▲ Biocide efficacy

■ QACs and iodophors not effective for *B. anthracis*

■ Sodium hypochlorite, acidified sodium chlorite, hydrogen peroxide, peroxyacetic acid, and mixed peroxy acid biocides may inactivate *B. anthracis* spores on hard surfaces at concentrations well above EPA label

■ Applications must be on the label

▲ For a manufacturer to make real or implied claims for efficacy against organisms which are not on the label.

IT IS A VIOLATION OF FEDERAL LAW

Inactivation research summary

- ▲ Biocide efficacy
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 - Sodium hypochlorite, acidified sodium chlorite, hydrogen peroxide, peroxyacetic acid, and mixed peroxy acid biocides may inactivate *B. anthracis* spores on hard surfaces at concentrations well above EPA label
- ▲ Inactivation dramatically reduced in colder environments and in the presence of food residues
- ▲ Work needs to continue for other potential agents

More work needs to be done.....

- ▲ Rapid detection methods
- ▲ Systems to improve traceability
- ▲ Communication
 - Technical information available for rapid response
 - Risk communication to minimize damage and panic
- ▲ Recovery tools and education



Food Protection & Defense

- ▲ There is a real threat
- ▲ Consequences would be devastating
- ▲ We need to:
 - Continue research
 - Strengthen partnerships
 - Reinforce response networks



Food Protection & Defense

Ecolab is proud to be a partner with our valued customers and the National Center for Food Protection and Defense

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