

NATIONAL CENTER FOR
FOOD PROTECTION AND DEFENSE

A HOMELAND SECURITY CENTER OF EXCELLENCE

***Defending the safety
of the food system
through research and education***

Frank Busta , Director NCFPD

DHS University Network Summit on Research and Education

15-16 March 2007

Washington D.C.

<http://www.ncfpd.umn.edu>

Award Date: June 2004 Pending extension for 2-year term, FY08-09

Mission

To defend the safety of the food system from pre-farm inputs through consumption by establishing best practices, developing new tools and attracting new researchers to prevent, manage and respond to/recover from food contamination events

Impact and Relevance

- ◆ Developed prototype food event modeling system
- ◆ Developed initial realistic decontamination protocols involving surrogate agents and food matrices
- ◆ Developed new risk communication approaches minimizing potential impact of food contamination events

Partners

Cornell Univ., Georgia Institute of Technology, Illinois Institute of Technology, *New Mexico State Univ. **, North Carolina State Univ., *North Carolina A&T State Univ. **, North Dakota State Univ., Michigan State Univ., Rutgers Univ., Purdue Univ., Saint Joseph's Univ., Texas A&M Univ., *Tuskegee Univ. **, Univ. of Arkansas, Univ. of California–Davis, Univ. of Illinois–Urbana-Champaign, Univ. of Maryland, Univ. of Missouri–Columbia, Univ. of South Carolina, Univ. of Southern Mississippi, Univ. of Tennessee–Knoxville, Univ. of Wisconsin–Madison, Univ. of Wisconsin–Milwaukee, Univ. of Wisconsin–River Falls, Wayne State Univ.

** Minority Serving Institutions*

Customers

DHS Science and Technology
DHS Preparedness Directorate/CMO
USDA, FDA, CDC and EPA
State and Local Food System Agencies
Food and Agriculture Private Sector



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Food & Agriculture = National Resource

\$1.24 Trillion

Value Toward GDP or

12.3% of GDP

Direct and Related Employment **16.7%**

or

1 in 6 Jobs

Largest in the world

- ✓ Highly concentrated – Efficient but poses new risks
- ✓ Vast transportation systems – spread disease rapidly, highly dependent upon other infrastructures: energy, water, transportation, etc.
- ✓ Increased regional, national and international travel, tourism & trade – multiplies risks



Source: Agricultural Statistics Board (National Agricultural Statistics Service)

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U.S. Global Food System: Strength and Risk

- Food sector a huge economic engine: \$1.24 trillion/year
- Food system complexity makes contamination a real risk
 - 2,128,000 farms
 - 30,000 food manufacturing sites (94,000 foreign)
 - 19,567 re-packers/packers (87,000 foreign)
 - 224,300 retail food stores
 - 565,000 food service outlets
- **Everyone eats – everyone a target**

Food Safety – A Current Concern

- Significant estimated public health & economic impact
 - 76 million illnesses/year
 - 5,000 deaths
 - Over \$30 billion in economic impact
- Significant regulatory requirements to control
- Significant private sector investment to prevent

Food Contamination History

- Historical military weapon (troops/civilians)
 - Athenian poisoning of Kirrha (590 B.C.)
 - WWII Japan in China/Manchuria with *Bacillus anthracis*, *Shigella* spp, *Vibrio cholerae*, *Salmonella paratyphi*, and *Yersinia pestis*
- Terrorist/criminal acts in the U.S. and abroad
 - Rajneeshee cult contamination of ten salad bars with *S. typhimurium* (1984, 751 ill)
 - Lab technician poisoning of 12 co-workers with *Shigella dysenteriae* laced pastries (1996)

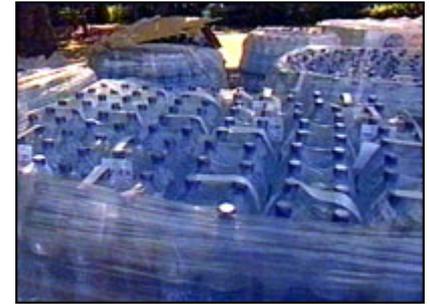


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Grocery store worker accused of poisoning beef

Thursday, February 13, 2003 Posted: 5:04 PM EST (2204 GMT)

GRAND RAPIDS, Michigan -- A former supermarket employee was indicted on charges of poisoning about 200 pounds of ground beef with insecticide and sickening more than 40 people.



Italy on alert for water poisoner

Italian police have launched a search to track down a mystery poisoner who has been injecting a soapy liquid into plastic bottles of mineral water.



61 Students felled by rat poison in central China

Monday, September 29, 2003

Dozens of elementary school students and teachers in Hunan Province were hospitalized after ingesting rat poison with their school breakfasts in an apparent deliberate mass poisoning, state media said Sunday.



350 Iraqi Policemen Suffer Food Poisoning

October 11, 2006

BAGHDAD, Iraq -- Authorities arrested the head of the mess hall where at least 350 Iraqi policemen suffered food poisoning, and a military spokesman said Monday that it was likely the poisoning was intentional.



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Government Accountability Office

Recently identified the food system as a high risk area for homeland security in its January 2007 report, "High Risk Series: An Update" (GAO-07-310).

Recent Rand Report

“In terms of modalities, one can expect to see an ongoing emphasis on coordinated bombings...possibly interspersed with the adoption of less conventional tactics such as radiological releases and the deliberate contamination of the food supply or agriculture.”

Libicki, Chalk & Sisson, 2007
“Exploring Terrorist Targeting Preferences”
RAND Corp. www.rand.org pp. 71

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Recent Rand Report

“Attacks against the agricultural sector may pose the most serious threat given their ease of execution and potential socioeconomic fallout ... food processing and packing plants are especially at risk.”

Libicki, Chalk & Sisson, 2007
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Challenges of Food Defense

- Food supply chain the most complicated supply chain known
 - Globally dispersed, privately held and highly dynamic
- Food a potentially desirable terrorist vehicle
- Unintentional contamination already highlights the challenges

Ingredients



bleached wheat flour
 malted barley flour
 thiamine
 riboflavin
 Niacin
 folic acid
 reduced iron
 Water
 corn syrup
 sesame seeds
 soybean oil
 Yeast
 Salt
 calcium sulfate
 calcium carbonate
 calcium silicate
 soy flour



Grill Seasoning
 Salt
 Pepper
 cottonseed oil
 soybean oil



mono- and diglycerides
 diacetyl tartaric acid esters
 ethanol
 sorbitol
 polysorbate 20
 potassium propionate
 sodium stearyl lactylate
 corn starch
 ammonium chloride
 ammonium sulfate
 calcium peroxide
 ascorbic acid
 azodicarbonamide
 enzymes
 calcium propionate
 wheat gluten
 baking soda

Sauce

Soybean oil pickles
 Water
 High fructose corn syrup
 onion powder
 Spice
 Salt
 mustard flour
 sodium benzoate
 mustard bran
 hydrolyzed proteins
 Paprika
 calcium disodium



Milk
 Water
 sodium citrate
 sodium phosphate
 artificial color
 acetic acid
 Enzymes

distilled vinegar
 egg yolks
 Sugar
 corn syrup
 spice extractives
 xanthan gum
 Prop. glycol alginate
 potassium sorbate
 garlic powder
 caramel color
 Turmeric
 EDTA



USDA inspected beef

milkfat
 cream
 salt
 sorbic acid
 cheese culture
 soy lecithin
 starch

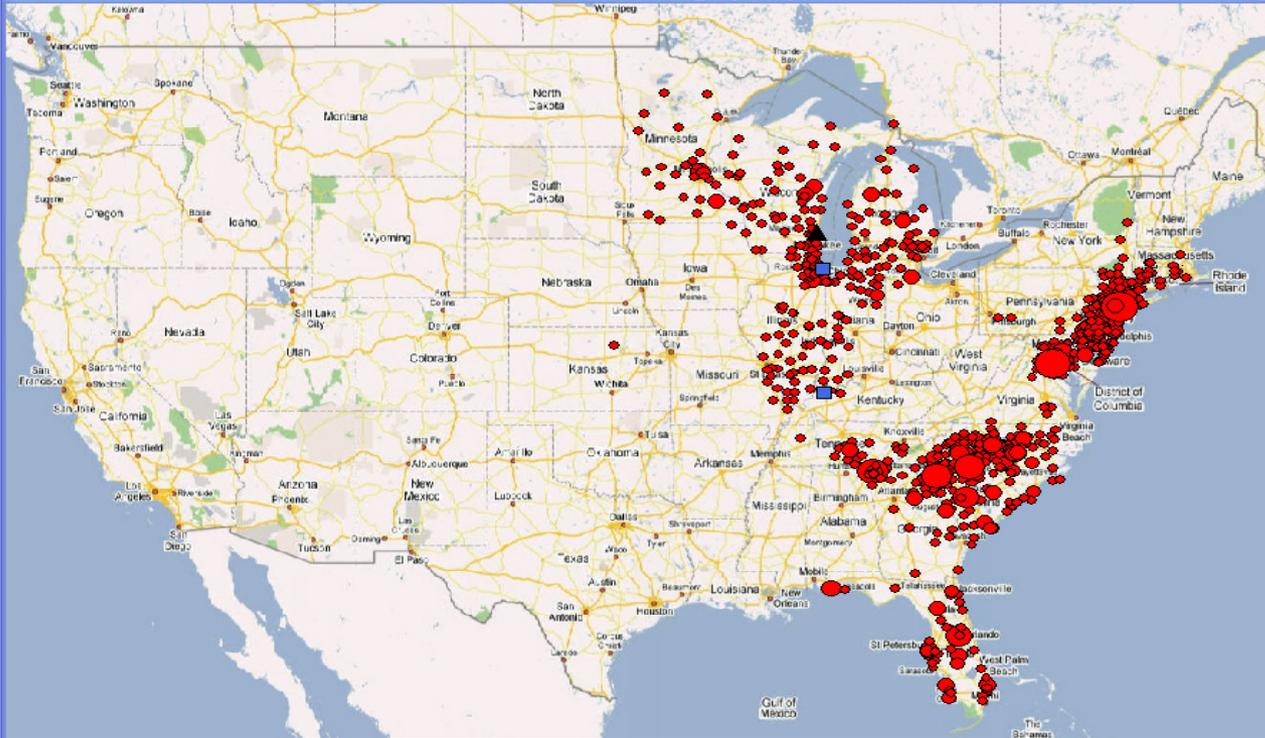


Cucumbers
 water
 Vinegar
 Salt
 calcium chloride
 Alum
 natural flavorings
 polysorbate 80
 turmeric

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E: Arsenic Trioxide in Ground Beef -- Agent: *Arsenic Trioxide; Product: *Ground Beef_2; Quantity Contaminated: 100,000 Pounds.



Consequences

10 Days 11 Hours

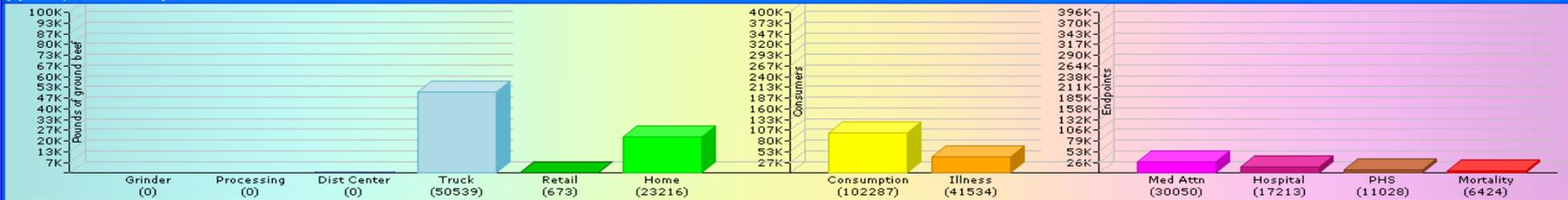
Event Impact (\$M)

Personal	0.042
Medical	0.030
Hospitals	0.017
PHS	0.011
Mortalities	0.006

Event Detected with 10 patients in New York, NY (5d 1hr);
 Agent Detected (5d 2hr);
 Product Identified (5d 8hr);
 Location Identified (5d 20hr);
 Lots Identified (6d 8hr);

Run	Intervene	
Speed	Restart	
Info	Colors	Print

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NCFPD Mission

- Reduce the likelihood of an attack
- Improve the nation's ability to respond effectively
- Reduce the consequences of an attack

NCFPD Goals:

Reduce the potential for catastrophic food system events by:

- Rendering targets unattractive
- Rapidly and accurately detecting attacks
- Responding effectively to minimize consequences
- Rapidly delivering effective recovery efforts
- Training new scientists and professionals
- Partnering and collaborating to ensure success

Broad Academic Collaboration

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The University of Southern Mississippi

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Diverse Industry and Association Collaboration



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Collaborating Across Agencies



U.S. Food and Drug Administration

CENTER FOR FOOD SAFETY AND APPLIED NUTRITION
OFFICE OF REGULATORY AFFAIRS



Department of Health and Human Services
Centers for Disease Control and Prevention



United States Department of Agriculture



Agricultural Research Service

the in-house research arm of the U.S. Department of Agriculture

aphis.usda.gov



Cooperative State
Research, Education, and Extension Service



United States Department of Agriculture
Food Safety and Inspection Service

ERS ECONOMIC RESEARCH SERVICE
United States Department of Agriculture

The Economics of Food, Farming, Natural Resources, and Rural America



Sandia
National
Laboratories



State/Local Agencies

OAK RIDGE NATIONAL LABORATORY
Managed by UT Battelle for the Department of Energy

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NCFPD Primary Themes

System Focus

- Supply Chain Resiliency
- Public Health Response
- Economic Models for Evaluating Interventions

- Rapid Detection
- Decontamination
- Inactivation
- Disposal

Agent Focus

Training Focus

- Disseminating NCFPD Products
- Training Scholars and Professionals
- Risk Communication

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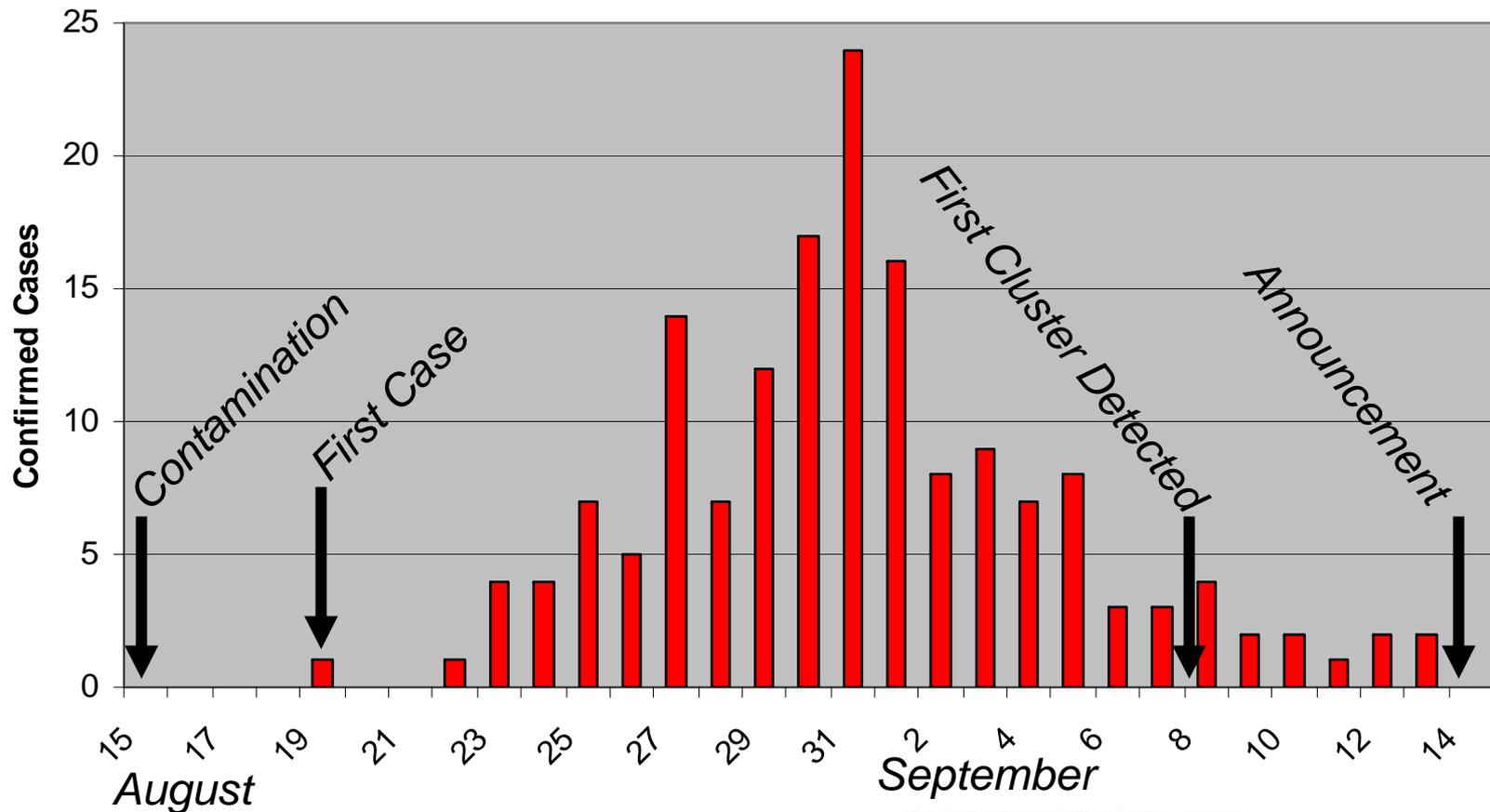
Supply Chain Goals

- Tools for the private sector to assess and improve their own capabilities to:
 - ✓ Prevent food system events
 - ✓ Respond to food system events
 - ✓ Recover from food system events
- Guidelines/standards to simplify implementation of best practices for supply chain protection

Public Health Goals

- Realistic models for food system events and public health response capability to enable:
 - ✓ Improved interventions/countermeasures
 - ✓ More rapid surveillance
 - ✓ More effective policies and training across the food and public health systems
- Performance standards for surveillance outbreak response at the state and local level

Spinach & E-coli 0157:H7 – Fast But Not Fast Enough



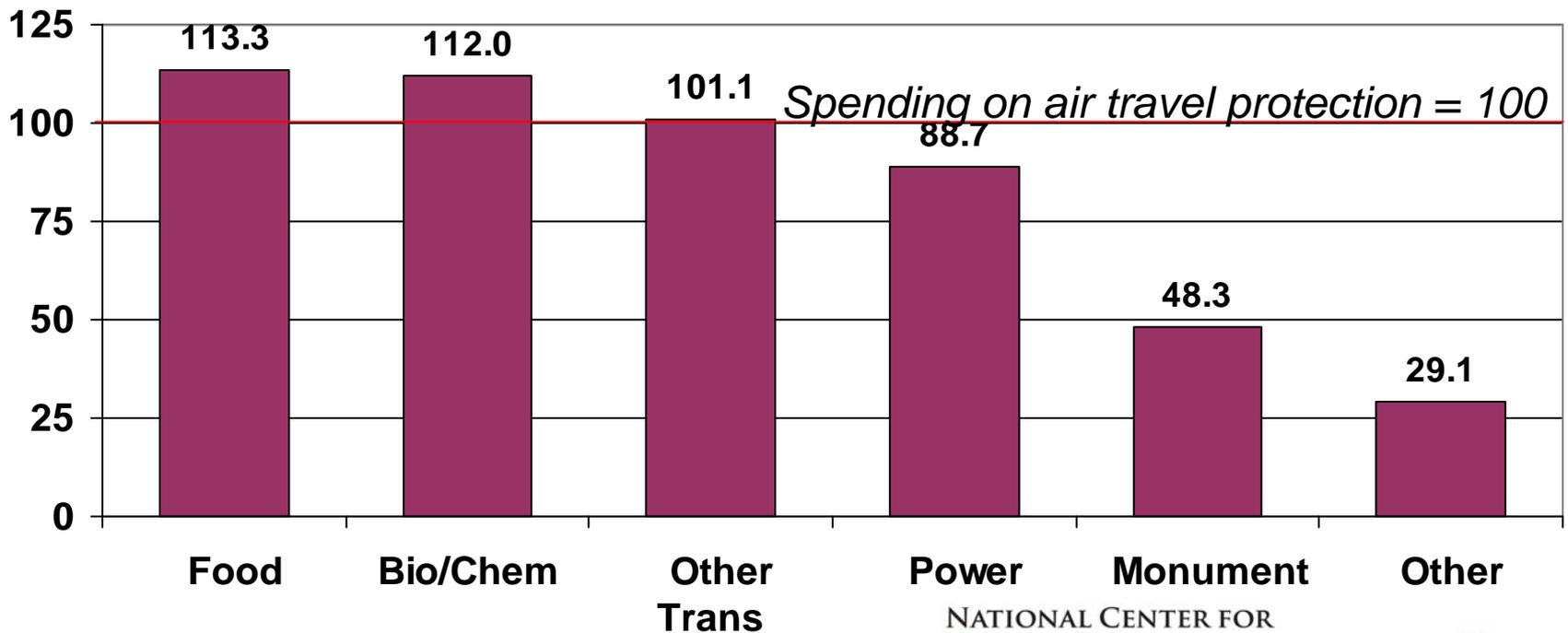
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Economics Goals

- Quantitative evaluation of the total economic consequences at the firm, community, sector, regional and national level
- Tools to optimize investments for mitigation of food system events
- Consumer and private sector validation of appropriate investments in the food system

Public Says Spend More for Food Defense and to Prevent Chemical-Biological Attacks

Percent of Spending to Protect Air Travel



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Agent Focus

Training Focus

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Detection Goals

- Detection platforms for the unique needs of the food system, including:
 - ✓ In-line processing
 - ✓ Mobile deployment
 - ✓ Private and public sector laboratories
- Detection platforms built on multiple technical strategies:
 - ✓ Integration of existing technologies into rapid systems
 - ✓ Development of new platforms for real time detection
 - ✓ Development of new platforms for rapid, high sensitivity/specificity

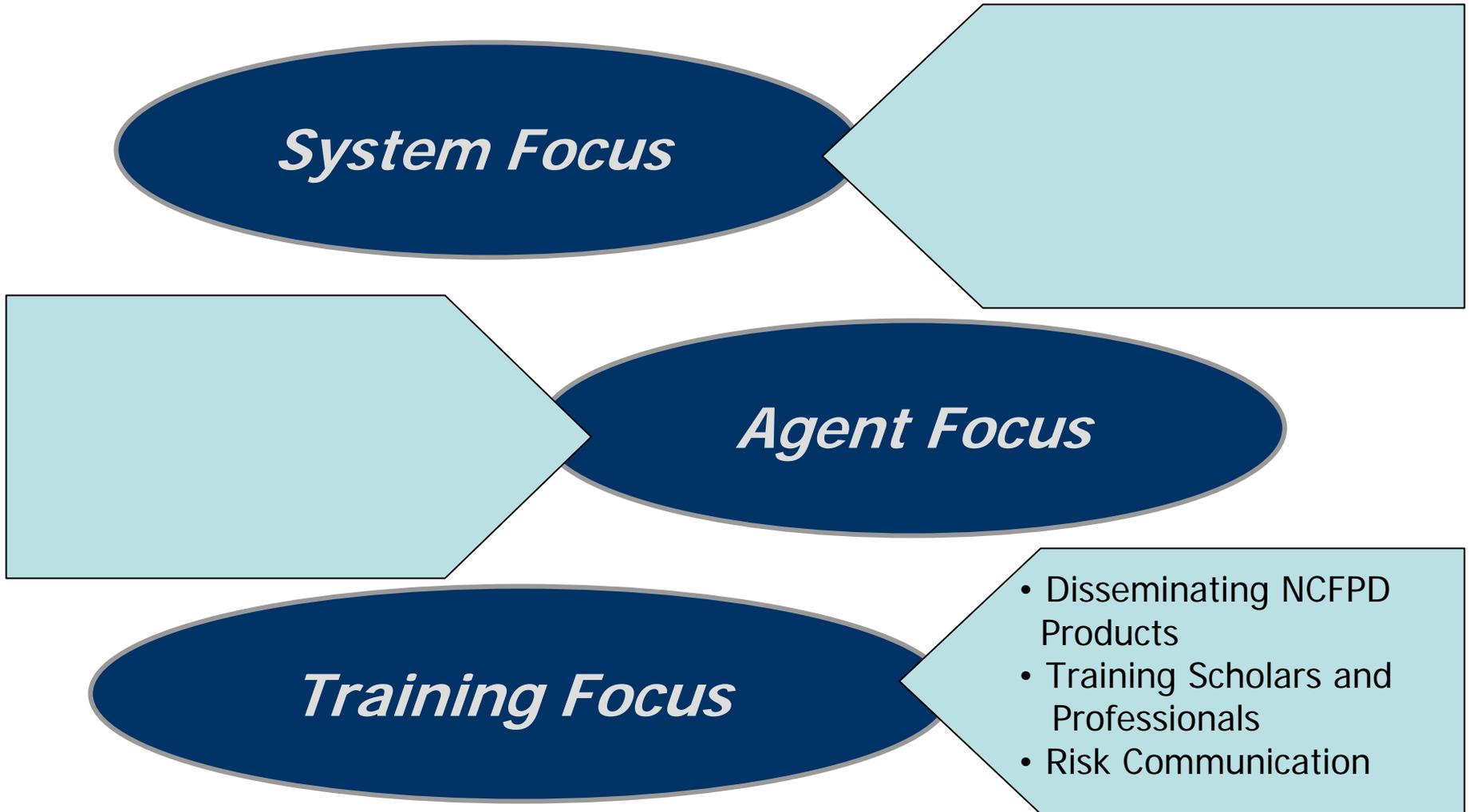
Inactivation/Decontamination Goals

- Near-term actionable decontamination procedures for food system facilities in case of an event
- Mid-term safer/more effective decontamination technical strategies for food system facilities
- Food processing protocols to mitigate the public health implications of potential contamination agents

Disposal Goals

- Near-term actionable disposal protocols for contaminated food in case of an event
 - ✓ Environmental safety
 - ✓ Regulatory/community considerations
- Mid-term safer/more community acceptable strategies for disposal of contaminated food

NCFPD Primary Themes



- Disseminating NCFPD Products
- Training Scholars and Professionals
- Risk Communication

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Education Goals

- A comprehensive educational program that addresses the educational content needs for food defense
- A learning community of experts in the fields of education, security, food supply and public health
- Educational needs assessment across the food supply chain
- Educational resources developed by others, vetted by education team and enhanced utilization
- New courses, certificates and continuing education content to close gaps in food defense education

Risk Communication Goals

- Best practices, key messages and metamessaging strategies and subject matter experts for different scenarios
- Curriculum, training materials and programs to train risk communicators for food system catastrophic events
- Capabilities for real time risk communication support in the case of an actual event

Summary

- Global leader in research and education to defend the safety of the food system
- Cross cutting systems approach to drive unique benefits in food system defense
- Fundamental research program reinforced by stakeholder relevant, applied research programs
- Diverse and strong partnerships to deliver user relevant “science to security” solutions
- Clear technology transfer plans for Center products

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