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

Food & Agriculture = National Resource

Value Toward GDP **$1.24 Trillion**

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)

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**

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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)

Associated Press

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.

BBC NEWS

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.

People's Daily

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.

AUSTRALIAN

350 Iraqi Policeman 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

Recent Rand Report

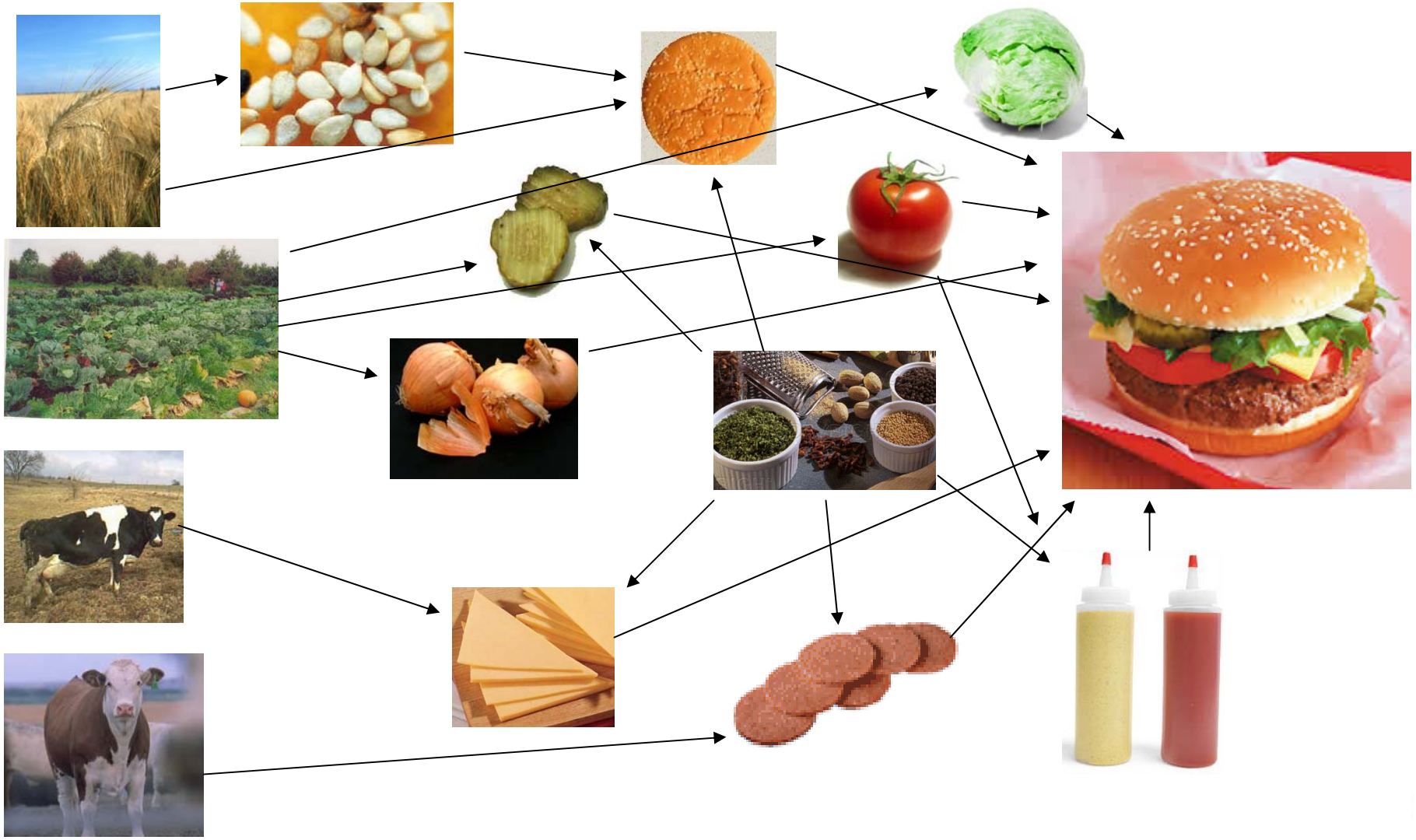
"Attacks against the agricultural sector may pose the most serious threat given their ease of execution and potential socioeconomic fallout ... food processing and packing plants are especially at risk."

Libicki, Chalk & Sisson, 2007
"Exploring Terrorist Targeting Preferences"
RAND Corp. www.rand.org pp. 84

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

Supply Chain Complexity



Ingredients

USDA inspected beef

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

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

Milk
Water
sodium citrate
sodium phosphate
artificial color
acetic acid
Enzymes

milkfat
cream
salt
sorbic acid
cheese culture
soy lecithin
starch

Grill Seasoning
Salt
Pepper
cottonseed oil
soybean oil

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

pickles

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

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

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CMS, Consequence Management System

File Event Simulation Information Help

Selection Rearrange Product Consumption Agent Public Health Interventions Impact BT Safety Scenario Help

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

(c) 2005,2006 BTSafety

Pounds of ground beef: 100K, 93K, 87K, 80K, 73K, 67K, 60K, 53K, 47K, 40K, 33K, 27K, 20K, 13K, 7K

Consumers: 400K, 373K, 347K, 320K, 293K, 267K, 240K, 213K, 187K, 160K, 133K, 107K, 80K, 53K, 27K

Endpoints: 396K, 370K, 343K, 317K, 290K, 264K, 238K, 211K, 185K, 158K, 132K, 106K, 79K, 53K, 26K

Grinder	Processing	Dist Center	Truck	Retail	Home	Consumption	Illness	Med Attn	Hospital	PHS	Mortality
(0)	(0)	(0)	(50539)	(673)	(23216)	(102287)	(41534)	(30050)	(17213)	(11028)	(6424)

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PRIMARY PRODUCTION ➤ HARVEST ➤ TRANSPORTATION ➤ STORAGE ➤ PROCESSING ➤ DISTRIBUTION ➤ RETAIL/FOOD SERVICE ➤ CONSUMER

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Defending the safety of the food system through research and education

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

University of Minnesota

University of Wisconsin Madison

NDSU North Dakota State University

Georgia Institute of Technology

UT Knoxville

Michigan State University

Cornell University

Harvard University

University of Guelph

Purdue University

Rutgers The State University of New Jersey

North Carolina State University

University of Florida

UniS University of Surrey Guildford

Texas A&M University 1876

University of Pittsburgh

University of Wisconsin UWMilwaukee

UC Davis University of California, Davis

New Mexico State University

Iowa State University

University of Arkansas

Tuskegee University

Illinois Institute of Technology

George Mason University

UMBC

K-State Kansas State University

North Carolina A&T State University Research University High Research Activity

NPS Praestantia per Scientiam

Saint Joseph's University

Wayne State University

The University of Southern Mississippi

Mizzou University of Missouri-Columbia

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A Homeland Security Center of Excellence

Primary Production ➤ Harvest ➤ Transportation ➤ Storage ➤ Processing ➤ Distribution ➤ Retail/Food Service ➤ Consumer

Diverse Industry and Association Collaboration

3M
ECOLAB
ANDX Inc.
KEYSTONE FOODS
Fresh EXPRESS
BTSafety LLC
Building Technologies for Safety
Cargill
McDonald's
Hormel
SUPERVALU
General Mills
BURGER KING
RSI Restaurant Services, Inc.
Burger King® System Independent Purchasing
Coca-Cola
JACK IN THE BOX
LAND O LAKES
H-E-B
Sodexho
COVANCE
THE DEVELOPMENT SERVICES COMPANY
DQ
Malt-O-Meal
WAL★MART
ALWAYS LOW PRICES. Always.
SYSCO
KRAFT
Schwan's
National Corn Growers Association
BIRDS EYE
GE
INTERNATIONAL FOOD INFORMATION COUNCIL FOUNDATION
PHL
mayo
IFT INSTITUTE OF FOOD TECHNOLOGISTS
AFDO
ESTABLISHED 1896
Council of State and Territorial Epidemiologists
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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

Los Alamos NATIONAL LABORATORY EST. 1943

ARGONNE NATIONAL LABORATORY

State / Local Agencies

National Center for Food Protection and Defense
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Oak Ridge National Laboratory
Managed by UT Battelle for the Department of Energy

Primary Production ➤ Harvest ➤ Transportation ➤ Storage ➤ Processing ➤ Distribution ➤ Retail/Food Service ➤ Consumer

NCFPD Primary Themes

System Focus

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

Agent Focus

- Rapid Detection
- Decontamination
- Inactivation
- Disposal

Training Focus

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

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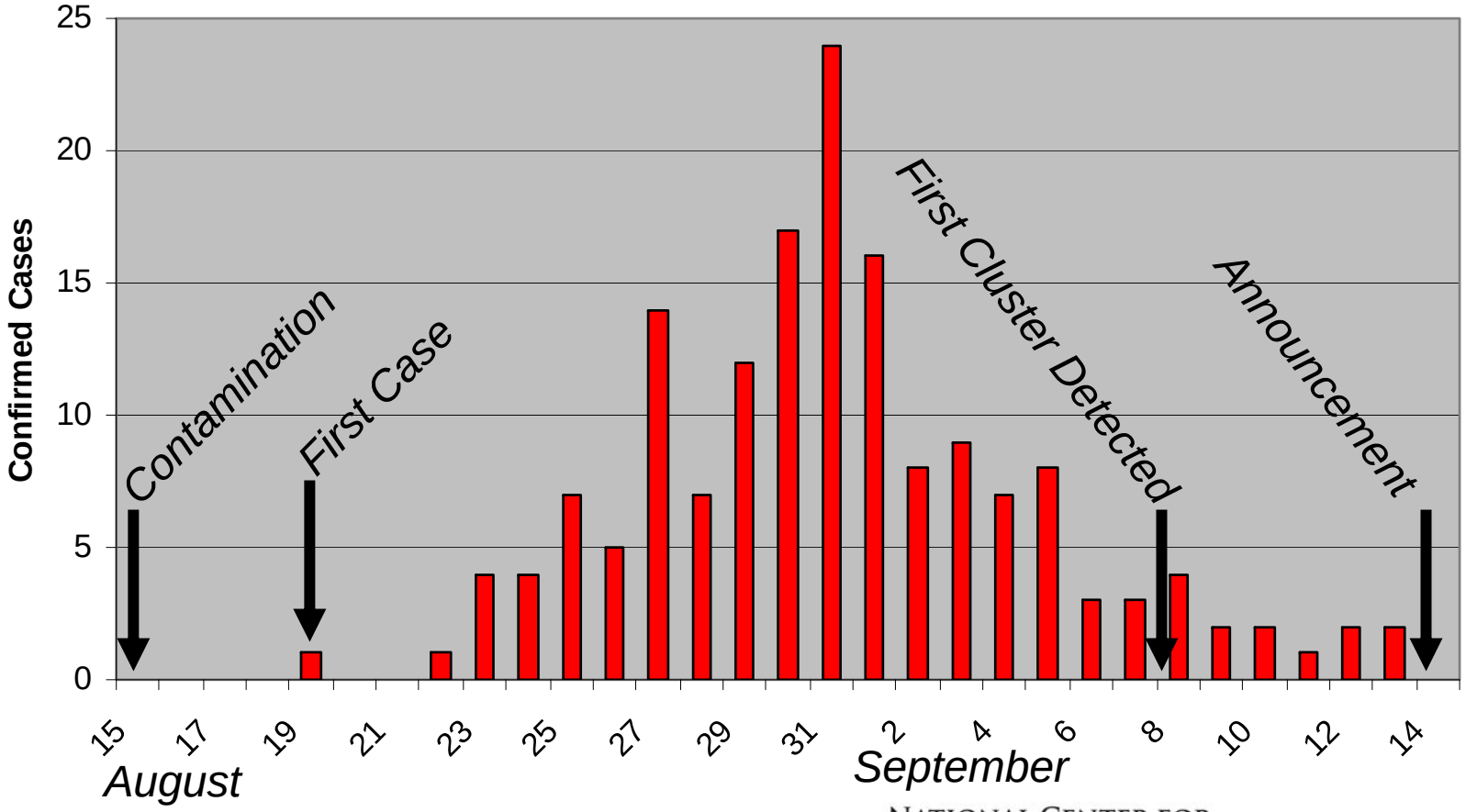
Supply Chain Goals

- 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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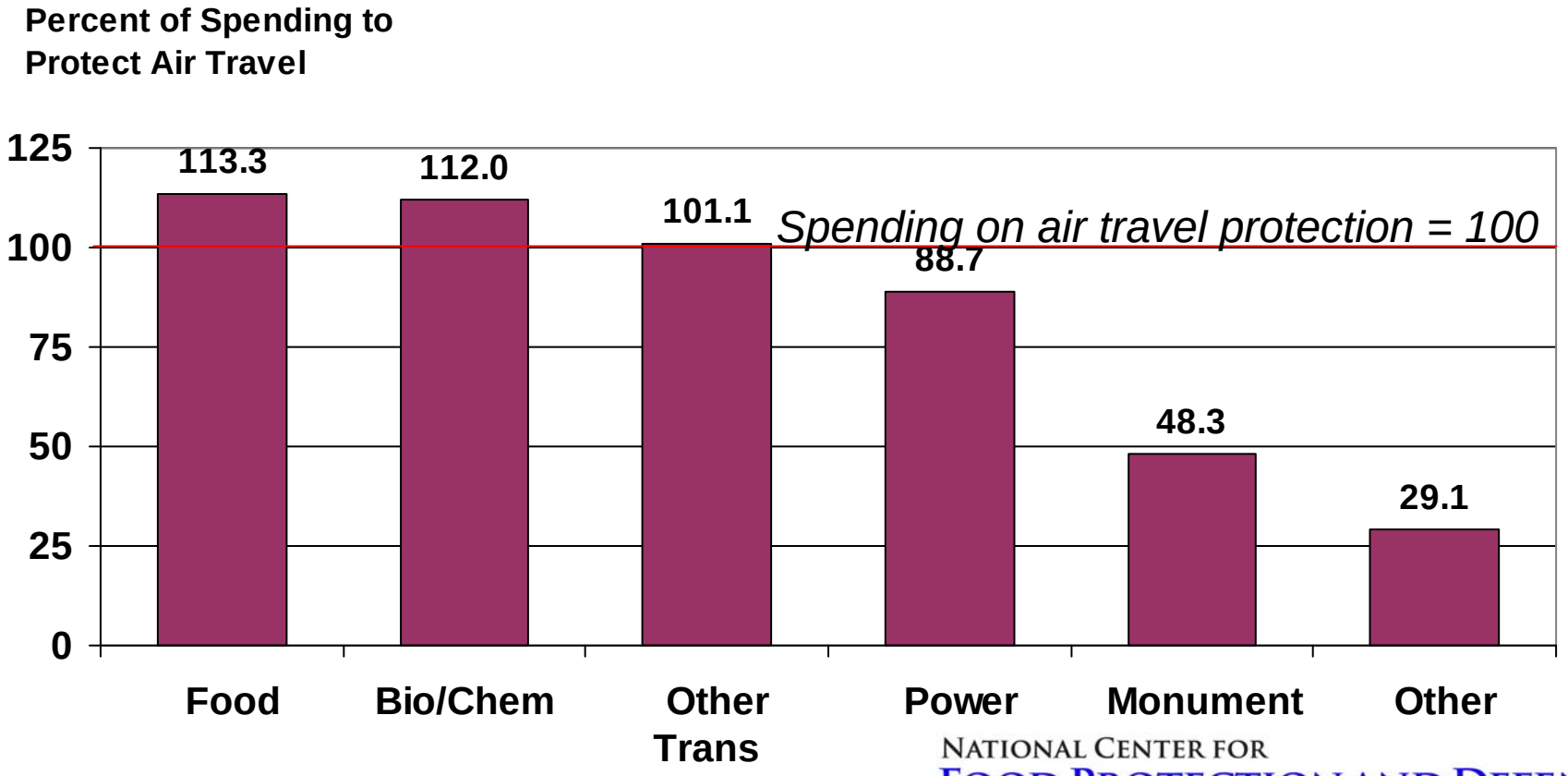
Economics Goals

- 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



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NCFPD Primary Themes

System Focus

Agent Focus

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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

System Focus

Agent Focus

Training Focus

- 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

Training Focus

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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