

Securing the U.S. Food Supply: The Quintessential Interagency Task

by Cindy A. Landgren

The general public puts little thought into the vast, interconnected infrastructure that constitutes the fabric of life in the U.S.¹ Nevertheless, large segments of that infrastructure are susceptible to failure—potentially even catastrophic failure—through both accidental and intentional means. Sometimes it is hard to tell the means by which failure has occurred, especially if the possibility of malicious intent does not receive thoughtful consideration. This is especially true of those things which, although absolutely fundamental to the sustainment of life—the air we breathe, the water we drink, and the food we eat—are mostly taken completely for granted by the average person. Moreover, the U.S. public enjoys a surplus of food availability and almost infinite variety. Nevertheless, the average citizen possesses almost no appreciation of the intricate processes required to bring food safely to the shelves. Hence, the idea that malicious persons could use food as a vehicle for intentional harm is something most people rarely if ever think about, let alone plan to prevent.

In fact, the most definitively documented case of introducing a biological agent in the food supply was one in which the possibility of “biological terrorism” was not even considered initially. In the fall of 1984, a cluster of gastrointestinal illness occurred in the eastern Oregon town of The Dalles.² A total of 751 people became ill over a two-week period. During the investigation, the investigators ruled out the possibility of intentional contamination based on the following:

- No one claimed responsibility.
- No motive was apparent.
- No pattern of unusual behavior was apparent to law enforcement.
- No one could find a disgruntled employee in the establishments to which the illness seemed to be traceable.

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- There were repeated attacks of illness.
- Indiscriminate illness involved employees and patrons.
- No event like this had been reported before.
- Hypotheses other than deliberate adulteration of the food supply were more likely.
- The source simply was not obvious either to casual observers or even to trained investigators.

It was not until much later that the motive of attempting to influence the outcome of a local election by disabling the electorate was ascertained. Although the objectives of the attack were not achieved, the perpetrators were successful in that they caused a significant number of illnesses over a short period of time in a town of 10,000 served by only one hospital.

Reflection upon this incident in The Dalles, which serves as the textbook reference case for the adulteration of the food supply chain in America, invites some interesting, pressing, and sobering questions that properly claim the attention of the interagency:

- Is the possibility of intentional contamination properly considered during outbreak investigations?
- Does the motive need to be known to ascertain the fact that adulteration has occurred?
- Does someone need to claim responsibility?
- Just because something has not happened before, does that mean it never will?
- Is “red-teaming” a part of processes that consider different types of scenarios?
- Are resources being applied to preventive measures that could reasonably be expected

to have precluded the event from occurring in the first instance?

- Is due consideration given to exclusion criteria that definitively would rule out natural contamination and enable the identification of either accidental or intentional causes?

These tactical-level questions invite a yet more sobering, but no less pertinent, reflection:

Is the U.S. prepared for an intentional attack with wide effect—perhaps even an attack of WMD-like proportion—on the food supply?

It may be compellingly argued that one of the fundamental functions of government is to ensure the safety of basic human essentials, such as the food supply, for all its citizens. However, such a burden is not one that can be borne by any single organization of government alone. Rather, it is the quintessential interagency task.

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The U.S. Food Supply as a WMD Terrorist Target

The system by which food reaches U.S. tables is complicated and provides a wide variety of choices for the American consumer. Food grown in the U.S. may be sold directly to the consumer through local farm stands or may travel long distances for processing, packaging, and marketing. The U.S. food supply includes a wide variety of foods that are imported from around the world, from fresh produce to highly processed packaged products. As the consumer walks through a supermarket of choice, the local farmer’s market, or sits down at a favorite restaurant, all of the food being consumed has been touched by a human in some significant

way, and every human encounter with that food introduces the possibility of intentional adulteration.

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The food chain is far more diverse than most routinely imagine. Well over 100,000 farms in the U.S. sell directly to consumers.³ However, the majority of the products on grocery shelves are actually an amalgam of multiple ingredients processed in some way to transform the product into something that will be further prepared in the home or restaurant, such as a cake mix. Still other products are in final form and are ready to eat, such as baked goods or yogurt cups. Similarly, foodstuffs may be imported to the U.S. as ingredient-type products or in consumer-ready form. Regardless of the form in which the consumer ultimately encounters a food product, processes have occurred to get the food into the hands of the consumer, and at each stage of each process, the possibility for adulteration exists. As the interagency works to anticipate terrorist threats to the food supply, four questions present themselves:

1. What threats do current safeguards fail to consider or even imagine?
2. How adequate are current interagency capabilities?
3. How adequate is current food safety policy?
4. How might current management protocols actually heighten risks to the safety of the food chain?

Imagining the “Unimaginable”

History provides numerous examples of small-scale attacks on the food supply, such as lacing baked goods with arsenic to kill SS soldiers in a WWII prisoner of war camp⁴, the contaminating of store-bought muffins with *Shigella dysenteriae* type 2 by a disgruntled laboratory worker in a hospital causing 12 casualties, or the lacing of a group meal with *Ascaris suum* eggs (a swine roundworm) by four university students.⁵ Nevertheless, it does not tax the imagination to consider that malicious activities like these could be expanded into much larger incidents with far more significant consequences. Technical failures in a process likewise can have large impacts on a centrally-produced ingredient. For example, in 1994, transportation of ice cream mix in a tanker that was not adequately sanitized after carrying liquid, unpasteurized eggs affected an estimated 224,000 people in 41 states.⁶ The ensuing investigation revealed that the ice cream company had recently awarded a new contract for the transportation of the ice cream mix. The written procedures for cleaning the trucks were not followed, and routine inspection of the tankers was not completed. The level of contamination in the final ice cream product had only six bacterial organisms in a half-cup serving, but that was sufficient to cause illness. While this single point of failure was essentially an accident due to carelessness, deliberate adulteration of the ice cream would have had similarly widespread affects, and a malicious but imaginative bioterrorist could identify just such an opportunity.

Conventional wisdom assumes the most effective vehicle of biological attack to be an aerosol. However substantial modeling and research have made abundantly clear the difficulty in delivering the particle size and agent that would serve as an effective weapon. Hence, the assumption that a successful biological

attack would likely be delivered by an aerosol, coupled with scientific evidence establishing the difficulties with aerosolization, have led some to conclude that a biological attack appropriating the food supply as a transmission vehicle is so unlikely as not to merit serious consideration. However, that is not sufficient reason to dismiss out of hand the possibility of attack by other means. For example, the oral route for ingesting food-borne contamination is much easier to accomplish and most likely to be disguised as unintentional food contamination. Radiological adulteration of food may also be another surprising but viable venue for terrorists.⁷

To the larger point: actual and hypothetical instances such as these combine to suggest that a different way of thinking about WMD attacks on the food supply is warranted across the interagency—one that strikes a balance between defending against threats that are known and those that are “unthinkable.”

Synergizing Interagency Capabilities

Different bureaucratic emphases within the interagency sometimes lead to non-complementary approaches to securing the food supply from terrorist attack. Consider, for example, the distinction between “food safety” and “food defense.” Food safety has been a part of the food supply system at least since the advent of the industrialization of food production. The majority of food laws resulted because of incidents that caused harm, such as chemical adulteration. Food defense, on the other hand, embodies a more recent concept that requires a somewhat different set of capabilities and skills. Since 9/11, the emphasis on food defense is lauded in public forums but is proving much harder to execute than one might suppose. The Department of Homeland Security’s (DHS) Center of Excellence, the National Center for Food Protection and Defense⁸ defines “food safety” as food system reliability, reducing the

exposure to natural hazards, errors, or failures in the food system. It defines “food defense” as “resiliency of the food system—reducing the impact of system attacks or catastrophic effects.” Other interagency members, such as the Food and Drug Administration (FDA), situate their definitional emphases somewhat differently.⁹ However, all of this portends a larger problem: While definitions like these may be meaningful and important to specialists in one agency, the distinctions they seek to capture may not be particularly resonant in the context of another agency’s work. As a practical matter, competing definitions can present conceptual gaps and seams ripe for exploitation by WMD terrorists. To counter this, the interagency needs commonly accessible conceptual tools to prevent and detect intentional adulteration of the food supply. Key food defense tools are being implemented, such as coordinated data collection and analysis, food defense plans, and the training of food defense professionals. Nevertheless, significant gaps and seams continue to exist in the system.

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Filling Policy Gaps

The food safety policies and regulations have had only minor revisions between 1906 and 2011. Other than name changes in the organizations with responsibilities for different aspects of the food supply, little has changed. Homeland Security Presidential Directive/HSPD-9¹⁰ was established in 2004 to protect agriculture and food systems from terrorist attacks by developing early warning capabilities, mitigating vulnerabilities at critical production nodes, enhancing screening procedures for

Agency	Responsibility
Food and Drug Administration (FDA)	Food (but not meat) Dietary Supplements Bottled water Seafood Wild game (exotic meat) Eggs in the shell
U.S. Department of Agriculture (USDA)	Grading of raw fruits and vegetables Meat and poultry Eggs, processing and grading Certifying organic production
National Oceanic and Atmospheric Administration	Grading fish and seafood
Environmental Protection Agency	Drinking water Pesticide residues
Customs and Border Protection	Front-line enforcement and referral
Department of Justice	Law enforcement
Federal Trade Commission	Advertising
Alcohol and Tobacco Tax and Trade Bureau	Alcohol

Table 1: Comparison of Selected Agency Responsibilities for Food Safety and Quality¹²

imported and domestic products, and enhancing response and recovery procedures. However, given the enormous scope of defense challenges immediately confronting the DHS, it is easy to imagine that food defense could be easily lost in the maelstrom. The FDA Food Supply Modernization Act (FSMA) of 2011¹¹, intended as a response to gaps in, among other things, food defense regulations, provides expanded authority for the FDA to mandate recalls and revoke food facility registrations. However, sections have not been implemented due to resource constraints and public comment. Of particular concern are the gaps remaining in the regulatory framework that could pose continued vulnerability to WMD attack on the food supply. For example, under the FSMA, direct marketing was excluded from the food safety provisions. This means that a farmer may sell directly to the consumer, restaurants, or cooperative

agreements without oversight. The direct market exclusion is not predicated on business size, and this can be a substantial vulnerability to intentional adulteration. Terrorists do not necessarily have to kill a lot of people to achieve their objectives: Contaminating a shipment of produce that will be distributed in a cooperative may be enough. This is not to suggest that everything needs to be regulated, but rather, that loopholes in the regulations remain and must be closed. Identifying those loopholes will take a concerted whole-of-government approach.

On the other side of the coin is the overlap of regulations to which the FSMA contributes. As previously described, at least 15 federal government agencies have food safety responsibilities (Table 1).

The Government Accountability Office (GAO) has conducted several audits addressing this issue.¹³ The findings include major overlaps

Product	FDA	USDA
Red Meat Products	Non-specified red meats (e.g. bison, rabbit, game animals, zoo animals, elk, wapiti, moose)	Cattle, swine, goats, horses, mules, other equine
Poultry	Non-specific birds (wild turkeys, wild ducks, wild geese, emus, ratites)	Domesticated birds (chicken, turkey, ducks, geese, guineas)
Other poultry products	Products containing <2% poultry (wet)	Products containing >2% poultry (wet)
Other meat products	Products containing <3% red meat (wet) and closed-face meat sandwiches	Products containing >3% (wet) and open-faced meat sandwiches
Eggs	Shell eggs, products containing egg products, and other egg processing not covered by USDA (e.g. restaurants, cake mix plants, bakeries) Enforcement of shell egg labels/ labeling	Pasteurized processed egg products, egg processing plants (washing, sorting, breaking, and pasteurizing)
Soup	All soup not covered by USDA	Soup containing >3% red meat or >2% poultry (e.g. chicken noodle)
Other products	Cheese, onion, mushroom, pizza, spaghetti sauces (<3% red meat), spaghetti sauce with mushrooms and 2% meat, pork and beans, sliced egg sandwiches (closed-face), frozen fish dinner, rabbit stew, shrimp-flavored instant noodles, venison jerky, buffalo burgers, alligator nuggets	Pepperoni pizza, meat lovers stuffed-crust pizza, meat sauces (>3% red meat), spaghetti sauce with meatballs, open-faced roast beef sandwich, hot dogs, beef pot pie, chicken sandwich (open-faced)
Exceptions to the above	All foods involved in an outbreak aboard an interstate vessel, plane, train, bus	

Table 2. FDA/USDA Jurisdiction Overlap for Commercial Food Products¹⁵

in domestic and importation food safety regulations. Many facilities are regulated and inspected by two or more agencies for the same or similar products. For example, jurisdiction for shell eggs is under the FDA, but egg processing is under the USDA. A facility that puts eggs in cartons for the consumer and cracks eggs for liquid use, e.g., as a bakery ingredient, has dual regulatory requirements and inspections. Table 2 highlights overlaps in the industry sector-specific Food and Agriculture Protection Plan.¹⁴ The overlap itself may, in principle, serve to

reduce vulnerability to WMD terrorist attack. However, this division of labor consumes resources that almost certainly could be applied more efficiently to the overall task of securing the food supply.

Interagency Management Challenges

The Obama Administration has acknowledged the need to protect critical infrastructure from a broad spectrum of threats. Indeed, the expanse of working groups, plans, conferences, and assessments intended to

provide recommendations for collaboration to protect critical infrastructure is large. As a result, several grand directives have assigned the responsibility for infrastructure protection under single agencies. The Presidential Policy Directive on National Preparedness (PPD-8)¹⁶ directed the development of a national preparedness goal and system. The Secretary of Homeland Security was assigned the responsibility of coordinating the domestic all-hazards preparedness efforts across federal agencies with consultation of state, local, tribal, nongovernmental, private-sector partners, and the general public. The DHS Secretary's responsibilities for critical infrastructure

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were further defined, but not reduced, with the publication of Critical Infrastructure and Resilience (PPD-21) in 2013.¹⁷ In addition to the coordination of national preparedness, the Secretary is tasked to provide strategic guidance and promote unity of effort. Critical infrastructure is divided into 16 sectors, and DHS is solely responsible for 8 of them. The Food and Agriculture sector is the coordinated responsibility of USDA and the Department of Health and Human Services (DHHS).¹⁸ The National Infrastructure Protection Plan (NIPP) of 2013 is an update to the previous plan of 2009 and acknowledges that “the Nation’s critical infrastructure is largely owned and operated by the private sector.”¹⁹ While this acknowledgement is important, it makes the job of the DHS Secretary to coordinate and implement the NIPP unimaginably difficult. Moreover, the promulgation of the NIPP does

nothing to simplify challenges caused by the fact that the food industry is regulated by 15 federal agencies. Although both the USDA and FDA each developed supporting plans, there is no indication of coordination of the individual plans.

The idea of a single food safety agency has been discussed by analysts²⁰ and the GAO.²¹ The National Academy of Sciences²² concluded that a single federal food safety agency with a clear mandate, dedicated budget, and full oversight of the entire food supply would eliminate the need for each agency to develop data-collection and risk-analysis expertise. Barring the complete reorganization of the federal food safety construct, an alternate approach is to change the traditional thinking and move to a “One Health” paradigm.²³ This paradigm uses collaboration across multiple disciplines and jurisdictions to look at health problems holistically.

By analogy, a “One Food” paradigm for food defense would include intelligence, risk analysis, regulators, and food scientists. However, the paradigm would not be without implementation challenges. These would include the ability of public health agencies to adapt to globalization, negotiating regulatory differences between federal and other regional agencies, inhibiting interdisciplinary research and collaboration due to stovepipe training and funding, and requiring training for medical, veterinary, and public health professionals in “One Food” concepts. Nevertheless, with proper resolve, all of these challenges can be overcome and should not be used as reasons to not pursue change, even if it must occur incrementally. The improvements in management of a complex system cannot be held hostage by traditional thinking and the concern about the loss of responsibility and funding. “One Food” is one way to make strategic improvements. Another way may be to start over with a whole new organization. Failure to update management models can be observed to one degree or

another in all institutions. However, failure to acknowledge the pressing realities of globalization can radically affect the security of any system in ways impossible to anticipate without conscious, consistent effort.

As pertaining to the task of securing the nation's food supply, the interagency appears to be paused on a plateau. In 2009, President Obama directed the formation of the Food Safety Working Group.²⁴ In the only progress report of the group, intentional food adulteration is discussed in only two paragraphs, which describe studies conducted or planned to improve food defense. Based on the publically available record, it is not clear whether any substantive activities have occurred since 2011. Whatever the case, it would appear that recognition of the problems that gave rise to the Food Safety Working Group in the first instance have not been accorded such a priority as would provide the impetus for ongoing action that eventually translates into executable policy.

Conclusion

As the interagency moves forward, some of the questions that require further study to develop the knowledge and structure required to mitigate current gaps include but are not limited to the following:

- Has the food supply been adequately “red-teamed” and, if so, were the vulnerabilities considered in risk-mitigation strategies?
- Will the revised food defense regulations prevent a WMD terrorist attack on the food supply?
- Can the new system be operationally and tactically tested?
- What incentives would be more effective for the private sector to maintain food defense?
- Can the loopholes in the new regulations be exploited or abused?
- Are all the stakeholders participating in adaptive deep defense?
- Is the answer to multiple regulatory agencies and overlap of jurisdiction a single food defense agency (“One Food”)?
- Will the DHS alone be able to do all that is being asked to protect the nation's food supply?

Countering weapons of mass destruction cannot be confined to the traditional thinking of delivery systems. WMD agents can be delivered in non-traditional ways that few people presently pause to consider—including via the food supply. Limited resources do not allow action calculated to prevent every possible scenario. The assessment of comparatively low risk of a previously unimagined wide-spread attack on the U.S. food supply largely fails to take account of the high consequences that just such an attack could entail. Hence, resources are directed to manage higher-risk possibilities. However, the problem with this approach, particularly for the biological contamination of the food supply, is that the current detection and investigation culture is not capable of distinguishing an intentional incident from an unintentional one. The same biological agents can be used to contaminate a food source and outbreaks are too common to alert suspicion. Terrorists are adaptive and smart. They are averse to failure and will patiently determine a method to achieve their objectives. **IAJ**

NOTES

- 1 The views expressed herein are those of the author and do not necessarily reflect the official views of the U.S. government or any of its entities.
- 2 Thomas J. Torok et al., “A Large Community Outbreak of *Salmonellosis* Caused by Intentional Contamination of Restaurant Salad Bars,” *The Journal of the American Medical Association*, Vol. 278, No. 5, 1997, pp. 389–395.
- 3 U.S. Department of Agriculture, “2012 Census of Agricultural Highlights,” August 2014, <www.agcensus.usda.gov>, accessed on January 12, 2015.
- 4 Ali S. Khan et al., “Precautions against Biological and Chemical Terrorism Directed at Food and Water Supplies,” *Public Health Reports*, Vol. 116, No. 1, January–February 2001, pp. 3–14.
- 5 Ibid.
- 6 Thomas W. Hennessy et al., “A National Outbreak of *Salmonella Enteritidis* Infections from Ice Cream,” *New England Journal of Medicine*, Vol. 334, 1996, pp. 1261–1266.
- 7 Shannon M. Allen and Peter Leitner, “Attacking Agriculture with Radiological Material—A Possibility?” *World Affairs*, Vol. 168, No. 3, Winter 2006, pp. 99–112.
- 8 National Center for Food Protection and Defense, <[https:// www.ncfpd.umn.edu/about/what-is-food-defense/](https://www.ncfpd.umn.edu/about/what-is-food-defense/)>, accessed on January 12, 2015.
- 9 Food and Drug Administration, <<http://www.fda.gov/Food/GuidanceRegulation/FSMA/ucm247559.htm#FD>>, accessed on January 12, 2015.
- 10 The White House, Office of the Press Secretary, “Homeland Security Presidential Directive(HSPD)-9, “Defense of United States Agriculture and Food,” January 30, 2004, <<http://fas.org/irp/offdocs/nspd/hspd-9.html>>, accessed on January 12, 2015.
- 11 Public Law 111-353, “FDA Food Safety Modernization Act,” January 4, 2011.
- 12 Renee Johnson, “The Federal Food Safety System: A Primer,” Congressional Research Service, January 17, 2014, <<https://www.fas.org/sgp/crs/misc/RS22600.pdf>>, accessed on January 12, 2015.
- 13 Government Accountability Office, 11-289, report to Congressional Committees, “Federal Food Safety Oversight,” March 2001; Government Accountability Office, 11-652, report to Congressional Committees, “Homeland Security,” August 2011; Government Accountability Office, 12-589, report to Congressional Committees, “Food Safety,” July 2012.
- 14 Department of Homeland Security, “Agriculture and Food: Critical Infrastructure and Key Resources Sector-Specific Plan as Input to the National Infrastructure Protection Plan,” May 2007.
- 15 Ibid.
- 16 The White House, Presidential Policy Directive (PPD)-8, “National Preparedness,” March 30, 2011, <<http://www.dhs.gov/xlibrary/assets/presidential-policy-directive-8-national-preparedness.pdf>>, accessed on January 12, 2015.
- 17 The White House, Presidential Policy Directive (PPD)-21, “Critical Infrastructure Security and Resilience,” February 12, 2013, <<http://www.whitehouse.gov/the-press-office/2013/02/12/presidential-policy-directive-critical-infrastructure-security-and-resil>>, accessed on January 12, 2015.

18 Department of Homeland Security, “National Infrastructure Protection Plan 2013: Partnering for Critical Infrastructure Security and Resilience,” <<http://www.dhs.gov/national-infrastructure-protection-plan>>, accessed on January 12, 2015.

19 Ibid.

20 Ron Knutson and Luis A. Ribera, “Provisions and Economic Implications of FDA’s Food Safety Modernization Act,” Agriculture and Food Policy Center Issue Paper 11-1, Texas A&M University, January 2011, <<https://www.afpc.tamu.edu/pubs/1/554/IP%2011-01.pdf>>, accessed on January 12, 2015.

21 Government Accountability Office, 11-289, “Federal Food Safety Oversight.”

22 National Research Council, “Enhancing Food Safety: The Role of the Food and Drug Administration,” 2010, <http://www.nap.edu/catalog.php?record_id=12892>, accessed on January 12, 2015.

23 National Research Council, “Improving Food Safety Through a One Health Approach: Workshop Summary,” 2012, <http://www.nap.edu/catalog.php?record_id=13423>, accessed on March 30, 2015.

24 The White House, “Federal Food Safety Working Group Progress Report,” December 2011, <http://www.whitehouse.gov/sites/default/files/fswg_report_final.pdf>, accessed on January 12, 2015.