

Outbreak Alert! 2008



Closing the Gaps in Our
Federal Food-Safety Net



CENTER FOR
Science IN THE
Public Interest

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Acknowledgements

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About CSPI

Center for Science in the Public Interest (CSPI) is a non-profit organization based in Washington, DC. Since 1971, CSPI has been working to improve the public's health, largely through its work on nutrition and food-safety issues. CSPI is supported primarily by the 900,000 subscribers to its Nutrition Action Healthletter and by foundation grants.

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Executive Summary

In the United States, foodborne illness has been estimated to cause 5,000 deaths and 76 million illnesses per year. Responsibility for food safety is divided among at least a dozen federal agencies involved in monitoring, surveillance, inspection, enforcement, outbreak management, research, and education. Despite recent improvements, significant gaps in the federal food-safety structure continue to put consumers at risk. To help fill one of these gaps, the Center for Science in the Public Interest (CSPI) maintains a database of foodborne illness outbreaks that have been linked to specific foods.

FINDINGS

CSPI identified a total of 5,778 outbreaks of illness linked to specific foods, involving 168,898 individual illnesses that occurred between 1990 and 2006. An outbreak involves two or more ill people. The food categories most commonly linked to outbreaks were:

- **Seafood: 1,140 outbreaks involving 11,809 cases of illness**
- **Produce: 768 outbreaks involving 35,060 cases of illness**
- **Poultry: 620 outbreaks involving 18,906 cases of illness**
- **Beef: 518 outbreaks involving 14,191 cases of illness**
- **Eggs: 351 outbreaks involving 11,143 cases of illness**

Foods regulated by the U.S. Food and Drug Administration (FDA), such as seafood, produce, eggs, and dairy, were associated with more than twice as many outbreaks as foods regulated by the U.S. Department of Agriculture (USDA), which include meats and poultry.

RECOMMENDATIONS

1. The Centers for Disease Control and Prevention (CDC) should continue to improve outbreak reporting and surveillance. The CDC has improved its reporting and surveillance system, but gaps still remain. For example, nearly half of all states do not follow national standards for tracking disease outbreaks. Those gaps are particularly troubling given the numerous recent large outbreaks. Improvements in state oversight and coordination and increased funding at state level would allow CDC to act more quickly and could reduce the sizes of foodborne illness outbreaks.

2. Congress should pass legislation to modernize food safety laws and increase funding, starting with FDA's food safety program. While creating a unified, independent food-safety agency would be the best solution in the long run, the crisis in confidence in FDA's ability to manage food safety problems creates an urgency for making improvements at that agency. Outbreaks occur, in part, because of inadequate regulatory authority, inadequate monitoring, and inadequate funding. Congress should separate food safety from drug approvals, by creating a new Food Safety Administration at the Department of Health and Human Services. A new Administrator would oversee the modernization of the food safety program, with an enhanced mission in the areas of prevention, inspection and enforcement and would help restore consumer confidence.

Introduction

In recent decades, changes in food production and consumption have impacted the safety of food. The food industry has evolved from being local to global, where production and processing are centralized in different parts of the country and world. Large-scale “factory farms,” feedlots, and processors allow pathogens to be dispersed widely through fast-paced slaughterhouses and processing plants. In fact, large-scale processing can easily spread germs into large volumes of processed food, as evidenced by the September 2006 outbreak of *E. coli* 0157:H7 in prepackaged spinach, which sickened over two hundred people across the country. Furthermore, some foodborne pathogens have become more virulent, while the U.S. population is aging and increasingly vulnerable to foodborne illness.¹

Unsafe foods cause an estimated 76 million illnesses and 5,000 deaths each year in the United States.² Although anyone can develop a foodborne illness, those who are most at risk include the elderly, young children, pregnant women and their fetuses, and the immuno-compromised. While most illnesses occur as isolated cases, outbreaks of foodborne illness are clusters of cases that result from ingestion of a common contaminated food. A single outbreak can affect as few as two or as many as thousands of people.

Outbreaks are primarily investigated by state and local health departments. These local officials sometimes call on the federal Centers for Disease Control and Prevention (CDC) to help investigate large or multi-state outbreaks. The CDC is also responsible for nationwide surveillance of outbreaks and for tracking new and emerging pathogens. But many, perhaps most, outbreaks fall through the cracks because the states are not required by law to report foodborne illness outbreaks to the CDC.

Attributing outbreaks to specific foods is difficult for many reasons. The majority of outbreak investigations at the local and state level do not identify both the food and the pathogen responsible. The outbreaks also provide researchers with very little information on the specific characteristics of foods that caused the outbreak. For example, such facts as whether the foods are imported or domestic, organic or not, are rarely reported in the line listings.

Furthermore, the foodborne illness outbreaks are organized by CDC by pathogen, rather than emphasizing the food responsible for the outbreak. Attributing illnesses to specific foods can help health officials and regulatory bodies to identify problems in the production of those foods. It also helps identify which federal agency has regulatory

oversight responsibility. The CDC's system for reporting outbreaks does not synchronize easily with the regulatory system.

In the United States, the primary agencies that inspect and regulate food are the United States Department of Agriculture (USDA), which oversees meat, poultry, and processed egg products and the Food and Drug Administration (FDA), which has regulatory responsibility for all other foods. Although FDA-regulated foods are linked to two-thirds of the outbreaks with known causes, the FDA's budget is just 35 % of the federal budget for food safety in 2008.³ The Food and Drug Administration desperately needs additional funding. And while meat-processing plants are inspected by USDA daily, companies producing many high-risk foods such as seafood, eggs, lettuce, or processed foods containing less than two percent meat are inspected by FDA on average just once every five to ten years.⁴

When foodborne illness outbreaks do occur, neither the USDA nor the FDA has the power to order recalls of contaminated food. They must ask companies to *voluntarily* remove foods from the market. The current system of voluntary recalls can delay the recall and increase the number of illnesses in an outbreak. Also, lawsuits brought by the meat industry have curbed USDA's ability to close down plants producing contaminated meat. The all-too-frequent occurrence of foodborne illness outbreaks in the United States today is evidence that the current food-safety system needs to be improved.

SPOTLIGHT: DISPARITIES IN FUNDING

Outbreaks from FDA-regulated foods account for 67% of those in CSPI's database.

- FDA-regulated foods include produce, seafood, dairy, eggs, game, bakery, and multi-ingredient foods made exclusively with FDA-regulated products.
- USDA-regulated foods include beef, poultry, pork, and luncheon and other meats.
- Foods with multiple ingredients regulated by FDA and USDA are categorized as "Both."
- While FDA-regulated foods are linked to two-thirds of outbreaks, the FDA budget accounts for under one-third of the federal food regulatory budget.

Figure 1. Outbreaks Linked to FDA- and USDA-Regulated Foods 1990-2006

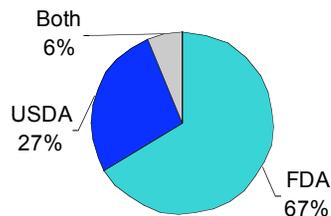
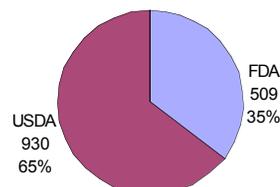


Figure 2. Food Safety Expenditures FY 2008 (\$ Millions)



A Database of Foodborne Illness Outbreaks

The Center for Science in the Public Interest (CSPI) has identified and categorized outbreaks linked to specific foods. Such data alert consumers to food-safety hazards, allow consumers to make informed risk decisions about the foods they eat, and provide better information to the government for setting priorities for food-safety resource allocation. Food attribution also enables identification of the food-pathogen combinations causing the most illnesses.

Data Collection

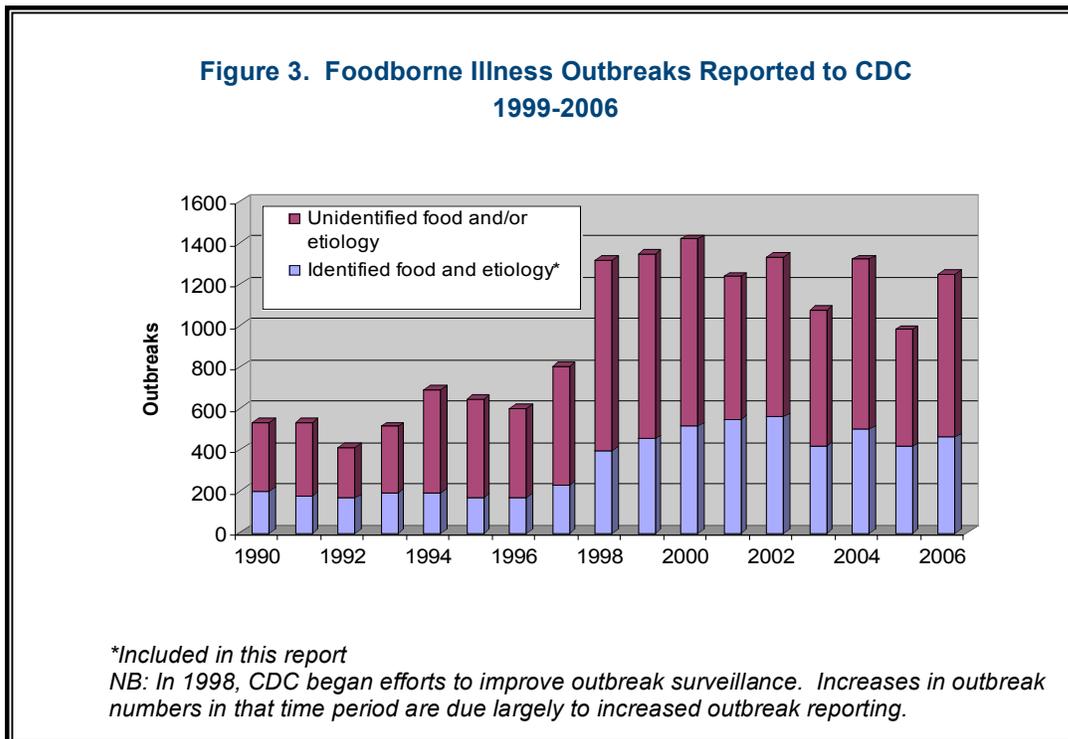
CSPI maintains a database of foodborne illness outbreaks, compiled largely from CDC and state health department annual outbreak line listings, reports by the CDC's Foodborne Outbreak Response and Surveillance Unit, and peer-reviewed journal articles. Since 2001, CDC outbreak data have been available as yearly line listings on the Internet.⁵ Prior to 2001, the CDC outbreak data was unpublished, and obtained by CSPI via Freedom of Information Act requests. Additional outbreaks are obtained from scientific articles, federal government publications, state health department postings, and newspaper reports verified by public health officials; data from these additional sources constitute about 5% of the database.

Incidents of foodborne illness are only included in the CSPI database if they meet the CDC's definition of an outbreak: when two or more people have consumed the same contaminated food and come down with the same illness.⁶ Also, each outbreak must have an identified etiology and food vehicle, must have occurred in the U.S. or its territories between 1990 and 2006, and must have been reported by a reliable source. Outbreak reports that meet CSPI's inclusion criteria are further evaluated to determine whether they were already listed in the database or whether they represented new outbreaks. Outbreak reports from different sources may contain slightly different information about the same outbreak. When such discrepancies are discovered, a public health official at the state, local, or federal level is contacted to verify the information. Excluded from the CSPI database are sporadic cases of foodborne illness (individual illnesses not linked to an outbreak), outbreaks with no identifiable etiology or food vehicle, and waterborne outbreaks.

The outbreaks included in the CSPI database represent only a small proportion of the actual foodborne illness outbreaks that occurred between 1990 and 2006. Many foodborne illness outbreaks go unidentified due to their:

- ◆ small size
- ◆ long incubation period
- ◆ geographic dispersion
- ◆ inability to identify the pathogen
- ◆ mild cases of illness which do not prompt individuals to seek medical care.⁷

Furthermore, the majority of reported foodborne illness outbreaks do not have complete outbreak information.⁸ In the years we analyzed, 56 % to 73 % of all outbreaks reported to CDC have no known etiology or food vehicle (Figure 3), and are therefore not included in CSPI's database.



Food Categorization

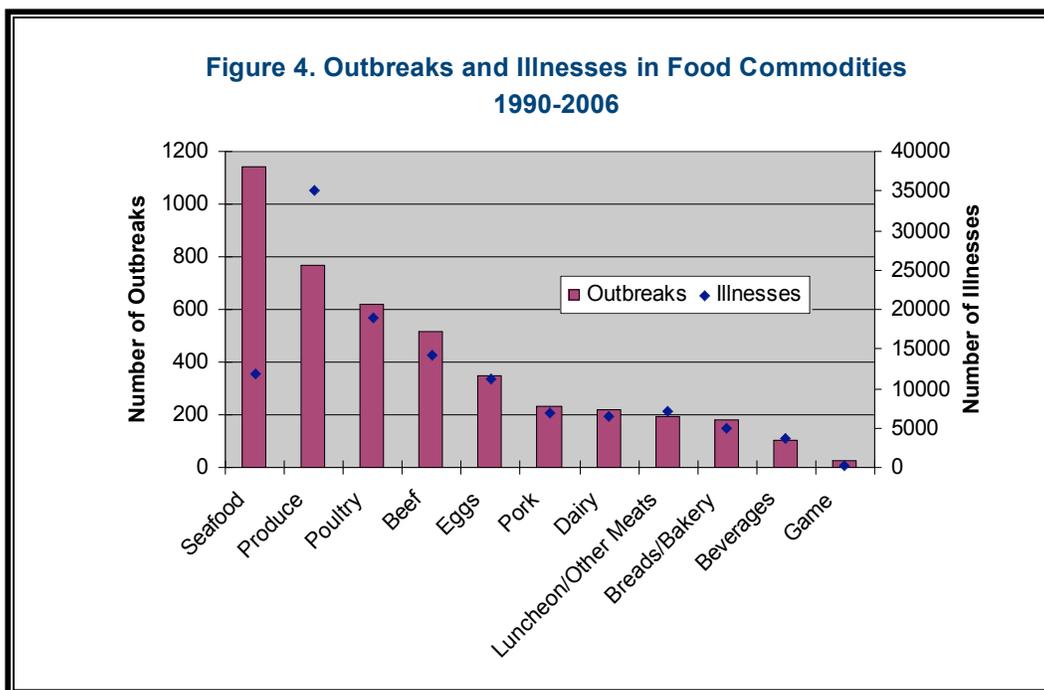
Once an outbreak is selected for inclusion in the CSPI database, it is categorized by the implicated food and the regulatory agency with primary responsibility for that particular food item. Outbreaks with meat, poultry, and processed egg products are assigned to the USDA, while outbreaks linked to other foods are assigned to the FDA.⁹ Outbreaks involving foods with meat and non-meat items are placed in a separate category entitled “Both.” Thirteen food categories make up the CSPI categorization scheme, and some of these are further divided (see Appendix A).

Results

Overall Findings

A total of 5,778 outbreaks, involving 168,898 cases of illness and occurring between 1990 and 2006, are included in the CSPI database. The five food categories, excluding multi-ingredient foods, linked to the most foodborne illness outbreaks are seafood, produce, poultry, beef, and eggs. These five food categories were responsible for 59% of all outbreaks and 54% of the illnesses. The produce category was linked to the largest number of foodborne illnesses associated with outbreaks, constituting 21% of all illnesses in CSPI's database. While outbreaks in most food categories increased between 2005 and 2006, the beef and dairy categories had a slightly lower number of outbreaks in 2006 (See Appendix B).

FDA-regulated foods were linked to 3,842 outbreaks (66% of all outbreaks) with 103,367 illnesses, while USDA-regulated foods were linked to 1,567 outbreaks (27% of all outbreaks) with 47,159 illnesses. Foods such as seafood, produce, eggs, dairy, breads, beverages, and non-meat multi-ingredient foods, together, were linked to more than twice as many outbreaks and illnesses as meats and poultry. The 369 outbreaks due to multiple-ingredient foods that include both meat or poultry (USDA-regulated) and non-meat or poultry (FDA-regulated) comprised 6% of the database.



Major Pathogens

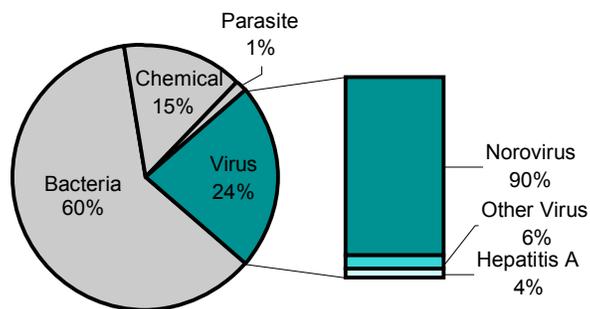
Bacterial pathogens are responsible for 60% of outbreaks, while viruses cause 24%, chemicals/toxins cause 15%, and parasites cause 1%. The most prominent bacterial pathogens in the outbreak data are *Salmonella*, which accounts for 23% of all outbreaks, *Clostridium* (11%), and *Staphylococcus* (8%). Norovirus, which typically causes non-fatal symptoms, causes 90% of all virus outbreaks, accounting for 22% of outbreaks in the entire database. Both *E. coli* and *Bacillus* caused 5%, and *Campylobacter* caused 3% of all outbreaks, respectively.

Bacterial pathogens cause more than three-fourths of outbreaks linked to beef, dairy, eggs, luncheon and other meats, pork, and poultry. Outbreaks with multi-ingredient foods are more commonly caused by bacteria (58%), but are also often caused by viruses (40%). In outbreaks linked to produce and breads, bacteria and viruses each cause about half of the outbreaks. Game is the only commodity whose outbreaks are primarily caused by parasites. Chemicals and toxins are the most common cause of seafood and beverage- related outbreaks.

SPOTLIGHT: VIRAL OUTBREAKS

About 90% of viral outbreaks are caused by Norovirus. About 4% of such outbreaks are caused by Hepatitis A. Aside from sporadic outbreaks due to Calicivirus, Rotavirus, and Sapovirus, the remaining viral outbreaks are due to unspecified viruses. Between 1990 and 1997, viral outbreaks were responsible for merely 7% of all foodborne illness outbreaks. The percentage of viral outbreaks tripled in later years, with viruses causing 31% of reported outbreaks between 1998 and 2006. This increase- mostly due to Norovirus outbreaks- likely results from improvements in Norovirus laboratory detection methods starting in 1998. The emergence of new, more virulent, Norovirus strains may result in a continued growth in reported outbreaks in the coming years.

Figure 5. Viruses in Foodborne Illness Outbreaks 1990-2006



FDA-Regulated Foods

BEVERAGES. A total of 101 outbreaks and 3,640 illnesses were linked to beverages. Juices were associated with 29 outbreaks and 1,737 illnesses, and almost a third of the outbreaks were linked to unpasteurized juices. Other beverages such as punch, tea, and soda were linked to 72 outbreaks with 1,903 illnesses. Contamination from chemicals, Norovirus, and *E. coli* O157:H7 were the most common hazards in beverages. In April 2005, unpasteurized orange juice sickened 157 restaurant patrons with *Salmonella* in a multi-state outbreak.

BREADS AND BAKERY. A total of 179 outbreaks with 4,904 illnesses were linked to breads and other bakery items. Breads, including rolls and buns, were associated with 38 outbreaks and 1,072 illnesses, while such bakery items as cake, pie, and cheesecake were linked to 141 outbreaks and 3,832 illnesses. *Salmonella* and Norovirus were the most common hazards in bread and bakery items. In the largest outbreak in 2006, 76 guests became ill with Norovirus after being served tainted cake at a nursing home in Washington State.

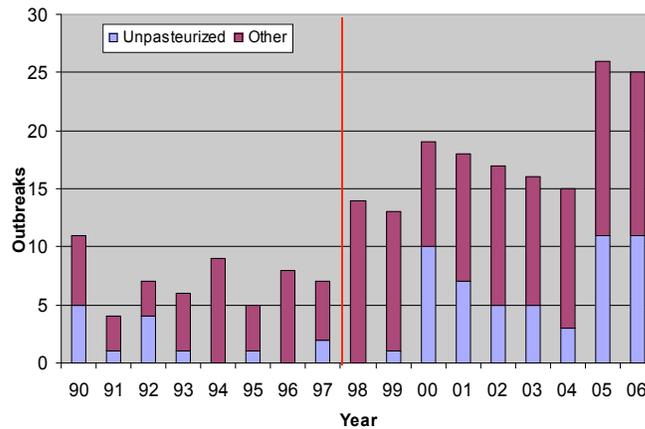
DAIRY. A total of 221 outbreaks and 6,364 illnesses were linked to such dairy products as cheese, milk, and ice cream. Milk was the vehicle in 79 outbreaks with 1,889 illnesses, cheese was identified in 67 outbreaks with 2,019 illnesses, and ice cream was identified in 50 outbreaks with 1,885 illnesses. Dairy products identified as unpasteurized were associated with 30% of the dairy outbreaks, including nearly 70% of milk outbreaks. In outbreaks associated with dairy items, *Salmonella* and *Campylobacter* were the most common hazards. The largest dairy outbreak documented in 2006 involved 96 people who became ill with *Salmonella* at a private home in Illinois. In 2005, 200 people became ill with *Campylobacter jejuni* at a jail in Virginia.

EGGS AND EGG DISHES. A total of 351 outbreaks with 11,143 illnesses were linked to eggs and egg dishes. Egg-based dishes such as French toast and egg salad were linked to 279 outbreaks with 9,396 illnesses, and eggs themselves were linked to 72 outbreaks with 1,747 illnesses. *Salmonella enteritidis* was the most common hazard among the egg outbreaks, accounting for 96 % of them. The largest outbreak caused by eggs in 2005 and 2006 was attributed to scrambled eggs served at a state mental hospital in Georgia.

SPOTLIGHT: UNPASTEURIZED DAIRY

Dairy outbreaks increased dramatically in 2005 and 2006, in large part due to a rise in outbreaks from unpasteurized dairy products. Figure 6 shows the contribution of *unpasteurized* dairy products to all dairy outbreaks. *Other* outbreaks include both dairy outbreaks caused by pasteurized milk or where pasteurization was not specified.

Figure 6. Yearly Trends in Dairy Outbreaks 1990-2006



Unpasteurized, or “raw,” dairy products have gained popularity with people who believe that flavor and nutrients are lost during pasteurization. However, forgoing pasteurization leaves consumers vulnerable to deadly pathogens, such as *Campylobacter*, *E. coli* O157:H7, and *Salmonella*, that would normally be killed off.

Eggs and egg dishes have historically caused large numbers of outbreaks every year, though the number of outbreaks has declined in recent years. In 1998, the USDA estimated that about 2.3 million eggs annually, contained *S. enteritidis*.¹⁰

To better protect consumers, FDA should finalize plans to increase oversight on the farm, including ensuring that chicken flocks are tested for S. enteritidis, providing increased immunization of flocks, and ensuring that eggs from S. enteritidis-contaminated flocks are pasteurized prior to sale. In the meantime, consumers can protect themselves by fully cooking eggs and egg dishes; by avoiding foods containing raw eggs, such as Hollandaise sauce and raw cookie dough; or by using pasteurized eggs.

GAME. A total of 28 foodborne illness outbreaks with 193 illnesses were linked to game. This category includes walrus, bear, moose, venison, and cougar meats. In game outbreaks, the parasite *Trichinella* was the most common hazard.

MULTI-INGREDIENT FOODS. A total of 1,054 outbreaks with 30,254 illnesses were linked to multi-ingredient foods. Foods including rice, beans, stuffing, and pasta dishes were linked to 216 outbreaks and 5,169 illnesses. Multi-ingredient salads such as potato salad and coleslaw were linked to 244 outbreaks with 10,896 illnesses, while multi-ingredient sandwiches were linked to 155 outbreaks and 3,786 illnesses. Sauces, dressings, and oils caused 70 outbreaks with 2,992 illnesses. Multi-ingredient ethnic foods, including pizza, spaghetti, tortellini, chili, lasagna, tacos, burrito, lo mein, and chow mein, were associated with 265 outbreaks with 4,614 illnesses, and 104 outbreaks and 2,797 illnesses were linked to other foods such as soups, puddings, and dips. *Salmonella* and Norovirus were the most common hazards associated with the multi-ingredient food category.

Multi-ingredient foods, which include such common foods as pizza, salads, and sandwiches, cause a surprisingly large number of outbreaks. Practices in home and restaurant kitchens can make multi-ingredient foods hazardous, including cross-contamination, under-cooking, inadequate cooling and storage, and worker contamination. Some states and counties have adopted grading systems to inform consumers about restaurants' compliance with health codes and to encourage restaurants to improve their practices. At home, consumers can protect themselves by cleaning all cutting boards, utensils, hands, and other surfaces that touch raw meat before using them to prepare or serve other foods; by cooking foods thoroughly; and by refrigerating leftovers promptly.

PRODUCE AND PRODUCE DISHES. A total of 768 foodborne illness outbreaks involving 35,060 illnesses were linked to produce and produce dishes. The produce category had an average of 46 illnesses per outbreak. Vegetables were linked to 279 outbreaks with 14,743 illnesses, while fruits were identified as the vehicle in 121 outbreaks with 7,802 illnesses. Produce dishes, including salads, were implicated in 368 outbreaks involving 12,515 illnesses.

More than fifty percent of produce outbreaks were attributed to food from restaurants and other food establishments, while private homes accounted for 13% of outbreaks. Norovirus was the major cause of produce outbreaks, accounting for 41% of all outbreaks. *Salmonella* was responsible for 18% of produce outbreaks, while *E. coli* caused 8%.

As a general rule, outbreaks from produce are larger than those in other categories. Here are a few examples: In September 2006, tainted pre-packaged spinach triggered an *E. coli* O157:H7 outbreak resulting in five deaths and 205 illnesses. November and December 2006 featured two additional outbreaks with leafy greens, this time involving iceberg lettuce served in Taco John and Taco Bell restaurants in the Midwest and Northeast

states, respectively. Though the restaurants chains used lettuce from different suppliers, both outbreaks were caused by *E. coli* O157:H7 and sickened a combined total of over 150 patrons.

The high-profile produce outbreaks of 2006 have prompted voluntary reforms in the produce industry. Two major recalls of bagged fresh greens in late 2007 were done prior to an outbreak occurring. This shows that while produce companies are vigilant about food safety recalls, problems in the field are still occurring.

Imports are another area where improvements are needed. Starting in April 2008, first tomatoes, and then hot peppers (Serrano) were epidemiologically linked to an outbreak of *Salmonella* Saintpaul that infected 1,438 persons. The same genetic fingerprint of that bacterium has been identified in patients in 43 states, the District of Columbia, and Canada.

SPOTLIGHT: PRODUCE OUTBREAKS

In light of the frequency and size of produce outbreaks, on-farm controls should be mandated for all growers, both domestic and foreign. By identifying food/pathogen combinations responsible for produce outbreaks, we can generate a hazard analysis, which is the first step to identifying appropriate solutions. The hazard analysis on produce (Figure 7) identifies the most common food/pathogen combinations in outbreaks and ranked their risk based on number of outbreaks. Using this type of hazard analysis, regulatory programs can set priorities for which foods and pathogens need the most rapid risk management responses (See Figure 7).

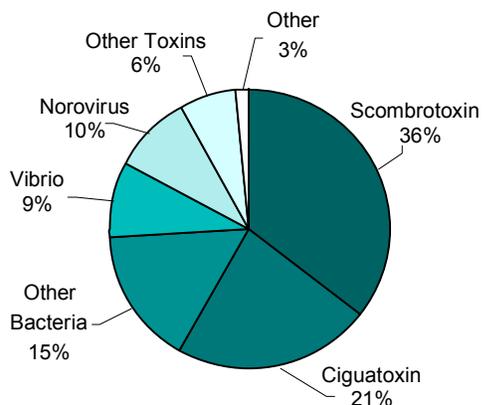
Figure 7. Produce-Pathogen Combinations in Outbreaks Caused by Produce 1990-2006

Rank	Food	Pathogen	Outbreaks	Associated Illnesses	Illnesses per Outbreaks
1	Greens-Based Salad	Norovirus	165	5,840	35.4
2	"Fruit"	Norovirus	34	2,031	59.7
3	Lettuce	Norovirus	32	1,052	32.9
4	Sprouts	<i>Salmonella</i>	25	1,879	75.2
5	Mushrooms	Chemicals/Toxins	20	98	4.9
6	Greens-Based Salad	<i>Salmonella</i>	19	1,030	54.2
7	Tomato	<i>Salmonella</i>	17	1,943	114.3
8	Lettuce	<i>E. coli</i>	17	544	32.0
9	Melon	<i>Salmonella</i>	16	1,137	71.1
10	Greens-Based Salad	<i>E. coli</i>	16	764	47.8

SPOTLIGHT: SEAFOOD PATHOGENS AND TOXINS

Seafood is a leading cause of food-borne illness outbreaks in the U.S. Outbreaks can result from naturally occurring chemical toxins, such as scombrotxin and ciguatoxin in finfish, and pathogens, such as *Vibrio* and Norovirus, in shellfish. In finfish, improper handling after harvest can cause toxins to form. Once formed, the toxins are not destroyed by cooking.¹¹ Shellfish can become contaminated with bacteria and viruses in harvesting beds. If not refrigerated shortly after harvest, levels of pathogens can increase dramatically to dangerous levels.

Figure 8. Pathogens in Seafood 1990-2006



SEAFOOD AND SEAFOOD DISHES. A total of 1,140 foodborne illness outbreaks with 11,809 illnesses were linked to seafood and seafood dishes. Of the outbreaks associated with seafood, 694 outbreaks and 3,391 illnesses were linked to finfish such as tuna and grouper, and 175 outbreaks with 3,794 illnesses were linked to molluscan shellfish including oysters, clams, and mussels. Seafood dishes like crab cakes and tuna burgers were linked to 197 outbreaks with 3,715 illnesses. Other seafood, such as shrimp and lobster, were linked to 74 outbreaks with 909 illnesses. Hazards in seafood included such chemical toxins as scombrotxin and ciguatoxin in finfish and *Vibrio* and Norovirus in shellfish. The majority of seafood outbreaks were caused by natural toxins, rather than by bacteria or viruses.

To help keep seafood safe, the FDA should increase its inspection of processors and implement testing programs to verify that firms are controlling the hazards in their products. Consumers can help protect themselves by avoiding consumption of tropical or subtropical reef fish like barracuda, by refrigerating all seafood, and by eating only cooked shellfish or raw shellfish that have been treated to eliminate hazardous bacteria.

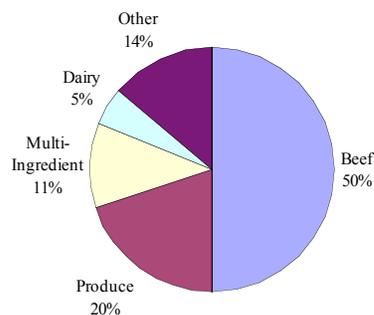
USDA-Regulated Foods

BEEF AND BEEF DISHES. A total of 518 outbreaks with 14,191 illnesses were linked to beef. Ground beef was linked to 183 outbreaks with 3,370 illnesses, while other types of beef, such as roast beef, veal, and beef jerky, were linked to 187 outbreaks with 6,543 illnesses. Beef dishes including casseroles, gravies, and stews caused 148 outbreaks with 4,278 illnesses. In beef outbreaks, the most common hazards were *E. coli* O157:H7, *Clostridium perfringens*, and *Salmonella*. *E. coli* O157:H7 and *Clostridium* live in the intestines of animals without causing illness to the animal, but can cause diarrhea, vomiting, painful abdominal cramps, and sometimes kidney failure and death if ingested by humans.

SPOTLIGHT: *E. coli* O157:H7 in Beef

- Outbreaks from *E. coli* O157:H7 are most commonly linked to beef. While the beef industry has made great strides in food safety since the 1990s, an alarming number of beef recalls due to *E. coli* O157:H7 contamination occurred in 2007 and 2008. Between June and November 2007 alone, at least 30 million pounds of beef were recalled by 20 different companies.
- In 2008, ground beef recalls continued to be both common and large. Between February and August 2008 alone, almost 1.5 billion pounds of ground beef were recalled by 8 different companies.

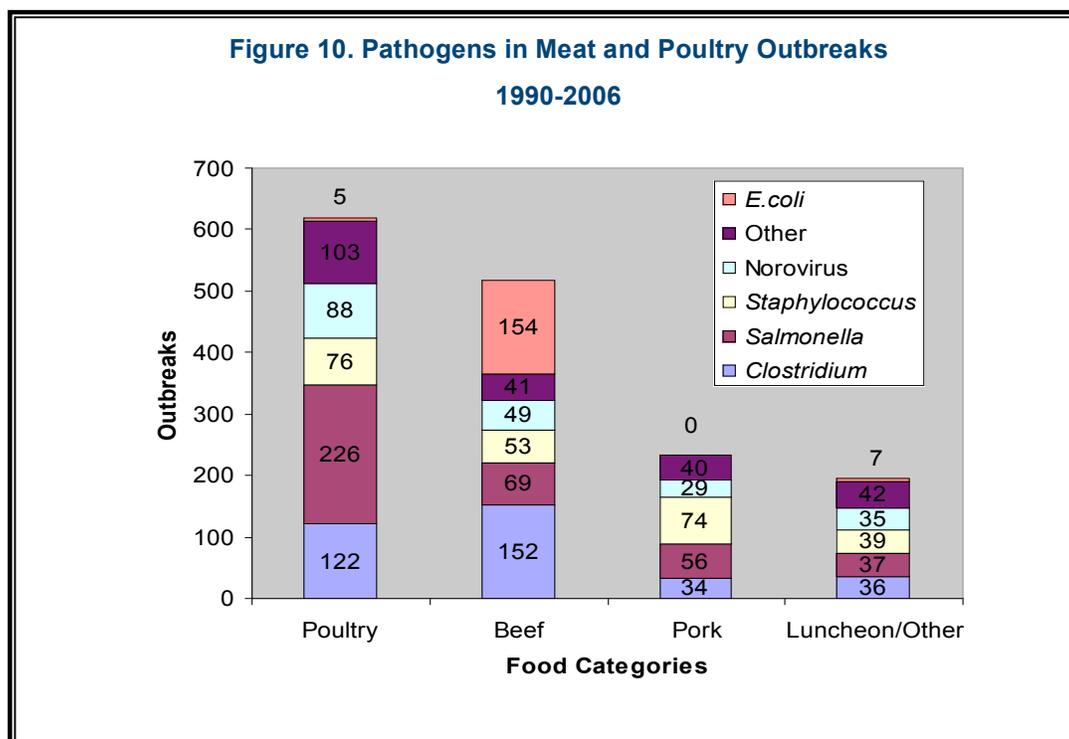
Figure 9. *E. coli* in Food
1990-2006



Many beef outbreaks might have been avoided if the government and the beef industry were more vigilant about keeping hazards out of meat, and increased their testing of beef products. Consumers can help protect themselves by cooking all beef to 160°F, using a meat thermometer to verify temperature, to ensure that all bacteria are killed.

LUNCHEON AND OTHER MEATS. A total of 196 foodborne illness outbreaks with 7,108 illnesses were linked to luncheon and other meats. Of these, 73 outbreaks with 2,289 illnesses were attributed to hot dogs and other ready-to-eat luncheon meats such as bologna and salami. Forty-eight outbreaks with 2,343 illnesses were linked to other meats such as lamb, goat, and sausage. Meat dishes, such as pizzas and gravy made with unspecified meats, were linked to 75 outbreaks with 2,476 illnesses. The largest 2006 outbreak in this category occurred when 199 people became ill from *Salmonella* Typhimurium in deli meat at an Indiana private home. *C. perfringens* was the most common hazard for outbreaks linked to other meats.

PORK AND PORK DISHES. A total of 233 foodborne illness outbreaks with 6,954 illnesses were linked to pork. Ham was the culprit in 54 outbreaks with 2,205 illnesses. Other types of pork were linked to 139 outbreaks with 3,806 illnesses. Pork dishes were linked to 40 outbreaks with 943 illnesses. The pork category had an average of 30 illnesses per outbreak. The most common hazard in pork was *S. aureus*. In the largest pork outbreaks of 2006, 81 people became ill with *Clostridium* after eating pork carnitas at a banquet facility in California.



POULTRY AND POULTRY DISHES. A total of 620 outbreaks with 18,906 illnesses were linked to poultry. The average number of illnesses per poultry-related outbreak was 30. Chicken was linked to 229 outbreaks with 5,301 illnesses, while turkey was identified as the vehicle in 103 outbreaks with 5,616 illnesses. Seven outbreaks with 114 illnesses were linked to other types of poultry, such as duck, game hen, and goose. Poultry dishes were linked to an additional 281 outbreaks with 7,875 illnesses. The most significant hazards in the poultry category were *Salmonella*, *Clostridium perfringens*, *Staphylococcus aureus*, and Norovirus. In March 2006, over 740 people were sickened from *C. perfringens* after eating baked chicken at a prison/jail in Alabama.

Hazards commonly linked to poultry outbreaks include *Salmonella*, *C. perfringens*, and *S. aureus*. *Campylobacter jejuni* is a hazard frequently associated with raw poultry, but virtually all illnesses occur as sporadic illnesses and not as part of large outbreaks. Thus, the effects of that pathogen are not captured in outbreak data.

In October 2007, ConAgra recalled nationally distributed chicken and turkey pot pies after a CDC investigation linked the product to illnesses in consumers. The CDC worked with state public health officials to examine more than one hundred similar *Salmonella* illnesses that occurred between January and October 2007 and found a strong association with Banquet brand pot pies.¹² Overall, at least 272 illnesses were reported once the company announced the recalled product. The outbreak may have been aggravated by undercooking of the finished product by consumers, but that just underscores the importance of industry diligence in keeping products pathogen-free and labeling packages with proper cooking instructions. The problems have not been completely resolved. In March and again in October 2008, raw, frozen chicken entrees were linked to *Salmonella* outbreaks.

Farm practices, such as crowding and the use of antibiotics, also can affect the safety of poultry products. Farmers and processors must recognize the critical role they play in maintaining a safe food supply. Government food-safety programs should be expanded to improve conditions on farms, as well as in the slaughter plants.

Foods Regulated by Both FDA and USDA

A total of 369 foodborne illness outbreaks with 18,372 illnesses were linked to meals containing foods regulated by both FDA and USDA. These foods included such meals as chicken served with salad, pork with coleslaw, and ground beef with potatoes. This category had an average of 50 illnesses per outbreak. In foods regulated by both the FDA and USDA, *Salmonella* and Norovirus were the most common hazards.

Recommendations

High-profile outbreaks and recalls in 2008 continued a trend begun in 2006 of heightened concern about the safety of our food supply. Surveys show public confidence in the safety of the food we eat has declined. The Harvard School of Public Health Project on the Public and Biological Security found in a 2008 poll of consumers that 64% reported being either very or somewhat worried they would get ill from food contaminated with bacteria or viruses. The poll further found that less than half of the consumers surveyed reported having confidence in the government inspection system.¹³

With the continuing occurrence of foodborne illnesses together with concerns about bioterrorism, bovine spongiform encephalopathy, and avian influenza, changes are urgently needed to increase public health protections. Implementing the following recommendations would help close holes in the federal food-safety net and, ultimately, decrease the number of illnesses and deaths caused by contaminated food.

The CDC and the States Should Continue To Improve Outbreak Reporting and Surveillance

Outbreak information serves several important functions. It can alert consumers to food safety hazards and help policymakers and public health officials to (1) identify emerging problems, (2) evaluate existing programs, and (3) set goals and priorities for food safety. Having a timely and comprehensive inventory of foodborne illness outbreaks helps food regulators to monitor trends, issue consumer alerts, and improve production practices.

States play the principal role in both identifying that outbreaks have occurred and conducting the investigation that determines the food item and the pathogen involved. If states don't have adequate public health staff or resources, outbreaks can be missed entirely. Even outbreaks that are identified may not be adequately investigated to identify the pathogens and foods, information that is essential for long-term analysis of outbreak trends and preventions of future outbreaks. States should be funded to track the outbreak sources and test for pathogens.

The CDC's foodborne illness outbreak reporting and surveillance programs have often fallen short as well, but in the past several years, CDC has made several improvements.

- ◆ The CDC has dramatically increased its use of the Internet to gather foodborne illness outbreak reports. The agency's website offers state public health officials an outbreak investigation tool kit and online reporting forms.

- ◆ The CDC has resumed publishing its line listings of foodborne illness outbreaks, a practice that was ended in the mid-1980s due to funding constraints.¹⁴ The CDC has published new outbreak information on its website, including line listings for 2005.
- ◆ Reporting by the states has also increased. This has greatly improved reporting of outbreaks since 1998, and even disclosed additional outbreaks in the earlier years.¹⁵
- ◆ The CDC has expanded systems such as FoodNet and PulseNet, which provide information needed for faster nationwide tracking of foodborne illness. FoodNet is a surveillance system for reporting foodborne illnesses, while PulseNet is a network for laboratories to report DNA fingerprinting analyses directly to CDC.

Those improvements are important, but the CDC also should mandate reporting by states, provide real-time reporting of outbreaks, and organize outbreaks by food hazard to increase the utility of its information.

While better monitoring and reporting of foodborne illness outbreaks are important, the most important goal is to develop a preventive system that reduces the toll of foodborne illnesses.

The Recipe for Safe Food: Changing to a Food-Safety System Focused on Prevention

Our food safety laws are grounded in legislation that is over 100 years old. Two laws set the framework for our principle regulatory agencies, but utilize very different approaches. Meat and poultry products are visually inspected for safety by federal inspectors housed at the U.S. Department of Agriculture so that each product can be stamped as “inspected and passed” by the government. FDA is responsible for the rest of the food supply, but lacks the resources and authority to do effective monitoring or oversight. That agency mainly responds to food crises as they occur, with few resources devoted to preventing problems before they become outbreaks. At least ten other federal agencies operating under 35 different statutes play additional roles in food research and regulation.

A better structure is urgently needed to address the problems with food-safety inspection and regulation, including gaps in consumer protections, inadequate coordination, conflicting public health standards, regulatory redundancies, and slow approvals of new technologies. A strengthened food-safety net should help decrease the numbers of foodborne illnesses and provide better protection against bioterrorism. A 1998 Institute of Medicine (IOM) report on food safety called for the consolidation of food-safety responsibilities under a single statute, with a single budget and single leader. The IOM report concluded that the “current fragmented regulatory structure is not well equipped

to meet the current challenges.”¹⁶ In October 2001, the General Accounting Office reported that:

A single food-safety agency responsible for administering a uniform set of laws is needed to resolve the long-standing problems with the current system; deal with emerging food-safety issues, such as the safety of genetically modified foods or deliberate acts of contamination; and ensure a safe food supply.¹⁷

The transition to a new and more effective federal structure offering more comprehensive protections to public health would require both organizational and statutory changes.

ORGANIZATIONAL CHANGES

The widespread food safety problems of recent years, from spinach and lettuce, to peanut butter and ground beef, have caused Congress to focus a great deal of attention on food safety in the last two years. There have been dozens of hearings on food safety in numerous committees and a number of bills have been proposed, largely addressing gaps and problems at the FDA.

Congress has identified a range of approaches, from funding improved FDA oversight of imported food with user fees, to creating a new Food Safety Administration (FSA) at HHS (with a separate FDA that just regulates drugs and medical devices), to creating a fully unified and independent agency. Each approach has merit, and also problems. But the heart of any legislative reform lies in modernizing the food safety mandates to put prevention in the forefront. CSPI is focused on addressing this gap at the FDA as an interim step to reforming the full range of problems that arise from the antiquated regulatory laws and tools available to food-safety regulators.

STATUTORY CHANGES

Most foodborne illnesses are the result of contamination that occurs during production, processing, shipping, or handling. These lapses result in outbreaks of illness, recalls, and loss of public confidence in the safety of our food supply.

While in-plant and border inspections form the core of the government’s food safety program today, the infrequent inspections conducted by the FDA’s food safety program provide little more than a spot check on performance. The reality is that the food industry, with effective government monitoring, holds the key to addressing and preventing food contamination.

The heart of a modern food safety system lies in preventing – not merely responding – to food safety problems. Mandatory process controls, coupled with government-enforced performance standards, should be the central features of a new system. These systems can be used from farm-to-table and with both domestic and imported foods. Other core elements of a new law include inspection reform, better oversight of food imports and on-farm food safety, research, education and enforcement. A full discussion of these is contained in CSPI's White Paper, entitled *Building a Modern Food Safety System for FDA-Regulated Foods*.¹⁸

The safety and security of the food supply requires an integrated, system-wide approach to preventing foodborne illness, with oversight by federal food safety agencies. Preventing food contamination can be done using programs of quality assurance and preventive process control, such as Hazard Analysis and Critical Control Points (HACCP), that are developed by individual companies. These programs are already widely used, and they can be incorporated into food production systems at all levels.

HACCP systems are mandated in some segments of the food supply, including seafood, juice, and all types of meat and poultry products – both raw and processed. A modern food safety system mandated by Congress should require the FDA to implement HACCP or HACCP-like systems for all food processors and tie agency inspections to an audit of these systems. These industry-derived programs should be coupled with performance standards, such as limits on the incidence or levels of contamination, or reductions in pathogen levels, that are established by the government. Monitoring and enforcement of these standards, including laboratory testing, are key elements of inspection in a successful food safety program.

Reforms are also needed at the USDA to modernize meat inspection, as evidenced by the spike in *E. coli* outbreaks linked to beef products in 2007. But fundamental change in these programs cannot occur overnight, and the need for reform at FDA is especially urgent.

While creating a modern law and new agency structures authorities is challenging, it should not be delayed. Gaps in current systems are leaving consumers vulnerable to outbreaks of foodborne illness from natural contaminants and even intentional contamination, like melamine in pet food or infant formula. Consumers cannot afford to wait years or even decades for the agencies to resolve their competing agendas. It is time for the government to enhance CDC programs and create a modern legal framework to improve the effectiveness of our nation's food-safety systems.

Appendix A: Summary of Foodborne Outbreaks and Illnesses by Food Categories 1990-2006

FDA-Regulated Foods		
Category	Outbreaks	Illnesses
Beverages	101	3,640
Juices	29	1,737
Other Beverages	72	1,903
Breads & Bakery	179	4,904
Bakery	141	3,832
Breads	38	1,07
Dairy	221	6,364
Cheese	67	2,019
Ice Cream	50	1,885
Milk	79	1,889
Other Dairy	25	571
Eggs	351	11,143
Eggs	72	1,747
Egg Dishes	279	9,396
Game	28	193
Multi-Ingredient	1054	30,254
Salads	244	10,896
Sandwiches	155	3,786
Sauces/Dressings/Oils	70	2,992
Rice/Beans/Stuffing/ Pasta Dishes	216	5,169
Ethnic Foods	265	4,614
Other Foods	104	2,797
Produce	768	35,060
Fruits	121	7,802
Vegetables	279	14,743
Produce Dishes	368	12,515
Seafood	1,140	11,809
Finfish	694	3,391
Molluscan Shellfish	175	3,794
Seafood Dishes	197	3,715
Other Seafood	74	909
FDA Total	3,842	103,367

USDA-Regulated Foods		
Category	Outbreaks	Illnesses
Beef	518	14,191
Ground Beef	183	3,370
Beef Dishes	148	4,278
Other Beef	187	6,543
Luncheon & Other Meats	196	7,108
Luncheon	73	2,289
Meat Dishes	75	2,476
Other Meats	48	2,343
Pork	233	6,954
Ham	54	2,205
Pork Dishes	40	943
Other Pork	139	3,806
Poultry	620	18,906
Chicken	229	5,301
Turkey	103	5,616
Poultry Dishes	281	7,875
Other Poultry	7	114
USDA Total	1,567	47,159

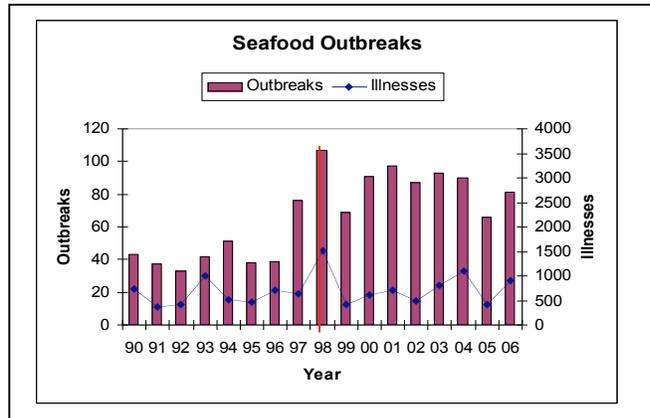
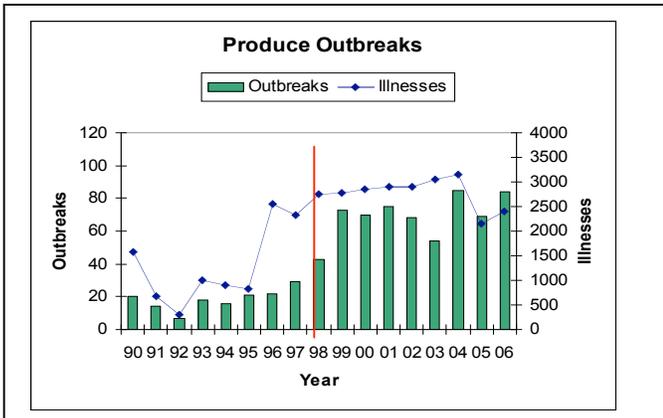
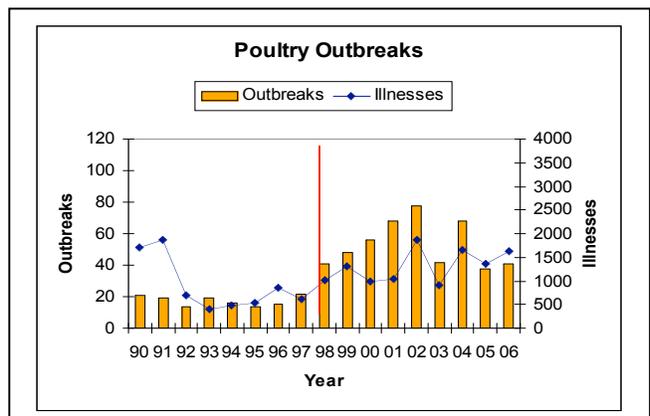
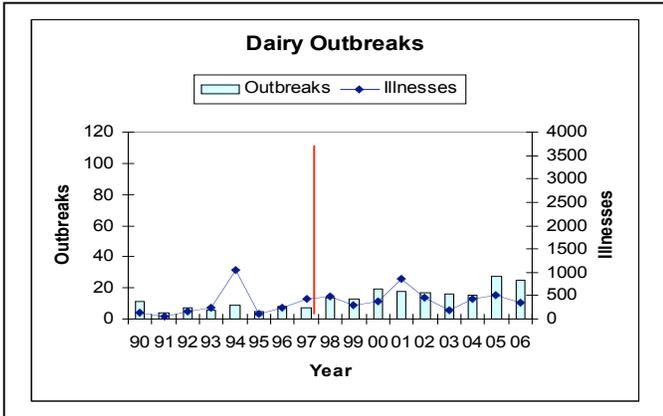
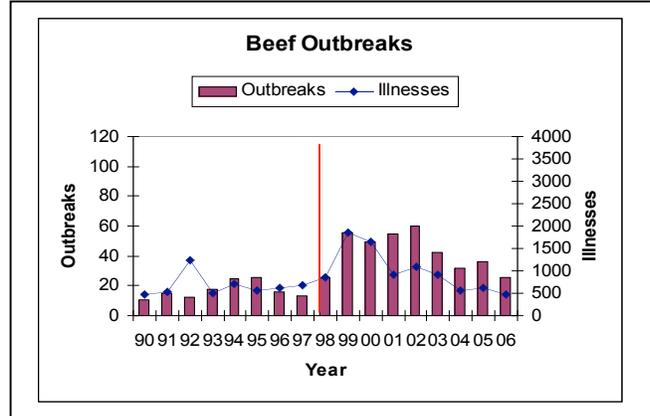
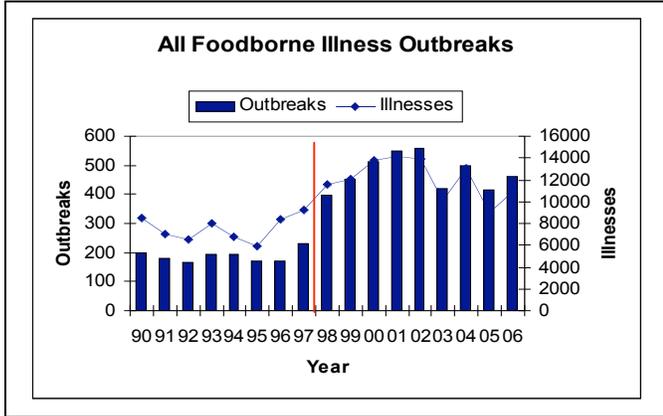
Other Foods		
Category	Outbreaks	Illnesses
Both	369	18,372

All Foods	Total Outbreaks	Total Illnesses
Grand Total	5,778	168,898

* CSPI's database excluded those outbreaks in which vehicles were listed only as "Multiple foods" or "Other food" and did not give any additional information about the foods responsible for the outbreak.

Appendix B: Trends in Foodborne Illness Outbreaks 1999-2006

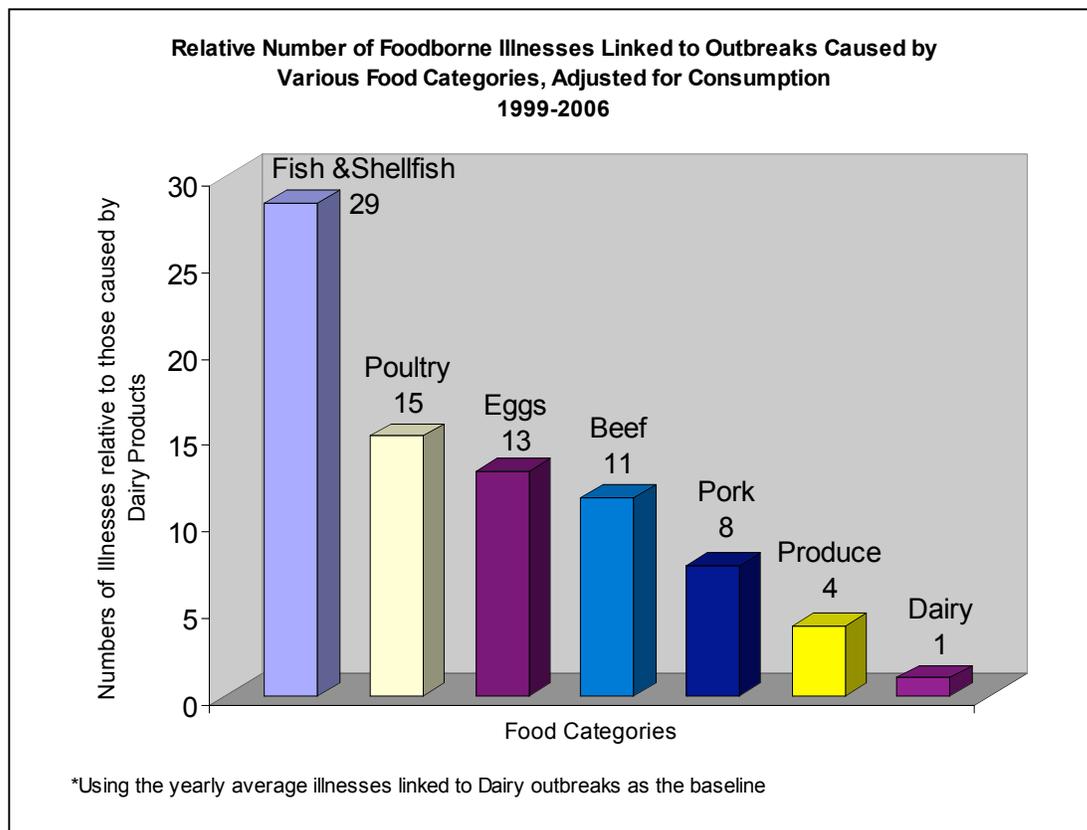
Outbreaks
 Illnesses



*Note: In 1998, the CDC enhanced outbreak surveillance through increased communication with state and local health departments. Increases in outbreak numbers in that time period are due largely to increased outbreak reporting.

Appendix C: Relative Rates of Illnesses by Food Category, Adjusted for Consumption 1999-2006

This chart shows the relative rates of illnesses linked to outbreaks among the food categories when adjusted for consumption during the period of 1999 to 2006. Since Dairy is the lowest risk food category per serving consumed, we set its rate of illness as “1” in order to facilitate a comparison between categories.



Note:

The data source of “lb/year per capita consumption adjusted for loss” was from the USDA/Economic Research Service website, which was last updated on March 15, 2008.
<http://www.ers.usda.gov/Data/FoodConsumption/FoodGuideIndex.htm>

The annual estimated population data was from the US Census Bureau website.
<http://www.census.gov/popest/states/NST-ann-est.html>

The source of outbreaks and illnesses data was from the “Outbreak Alert” database maintained by the Center of Science in the Public Interest (CSPI), which contains foodborne outbreaks and illnesses categorized by linked foods from 1990 to 2006.
<http://www.cspinet.org/foodsafety/outbreak/pathogen.php>

Endnotes

¹ The terms “food poisoning” and “foodborne disease” are often used interchangeably. However, the term “foodborne disease” reflects three kinds of causes: foodborne intoxications (from ingestion of foodborne poisons); foodborne infections (caused by foodborne pathogenic microorganisms such as *Salmonella* that, when ingested, cause infections); and foodborne toxicoinfections (from foodborne pathogens such as *E. coli* O157:H7 that, once ingested, produce harmful toxins). Satin M. *Food Alert! The Ultimate Sourcebook for Food Safety*. New York: Checkmark Books; 1999. p.16-17.

² Mead PS, Slutsker L, Dietz V, McCaig LF, Bresee JS, Shapiro C, Griffin PM, Tauxe RV. Food-related illness and death in the United States. *Emerg Infect Dis* 1999; 5(5): 607-625.

³ Consolidated Appropriations Act, 2008, Pub. L. No. 110-161 (2007)

⁴ United States General Accountability Office. *Overseeing the U.S. food supply: steps should be taken to reduce overlapping inspections and related activities*. Statement of Robert A. Robinson, Managing Director, Natural Resources and Environment. Testimony before the Subcommittee on the Federal Workforce and Agency Organization, Committee on Government Reform, House of Representatives. GAO-05-549T. Tuesday, May 17, 2005. p.4.

⁵ Centers for Disease Control and Prevention. *U.S. foodborne disease outbreaks*. <http://www.cdc.gov/foodborneoutbreaks/outbreak_data.htm>.

⁶ Centers for Disease Control and Prevention. *Foodborne illness: general information*. <http://www.cdc.gov/ncidod/dbmd/diseaseinfo/foodborneinfections_g.htm#whatoutbreak>. Before 1992, the exception to this rule was botulism where one illness was considered an outbreak. After 1992, the CDC started omitting outbreaks of botulism with only one case from its line listings. CSPI’s database reflects these changes.

⁷ Olsen SJ, MacKinnon LC, Goulding JS, Bean NH, Slutsker L. Surveillance for foodborne disease outbreaks – United States, 1993-1997. *MMWR* 2000; 49 (SS01): 1-51.

⁸ Jones TF, Imhoff B, Samuel M, Mshar P, Gibbs McCombs K, Hawkins M, Deneen V, Cambridge M, Olsen SJ, for the Emerging Infections Program FoodNet Working Group. Limitations to successful investigation and reporting of foodborne outbreaks: an analysis of foodborne disease outbreaks in FoodNet catchment areas, 1998-1999. *Clin Infect Dis* 2004; 38 (Suppl 3): S297-S302.

⁹ United States General Accountability Office. *Oversight of food safety activities: federal agencies should pursue opportunities to reduce overlap and better leverage resources*. Report to Congressional Requesters. GAO-05-213. March 2005.

¹⁰ Food Safety and Inspection Service, USDA: *Salmonella enteritidis* Risk Assessment. Shell Eggs and Egg Products. 1998. <<http://www.fsis.usda.gov/OPHS/risk/index.htm>>.

¹¹ Food and Nutrition Board Institute of Medicine. *Seafood Safety: Committee on Evaluation of the Safety of Fishery Products*. Ahmed FE, editor. Washington, DC: National Academy Press; 1991. p. 88.

¹² Centers for Disease Control and Prevention. *Investigation of Outbreak of Human Infections Caused by Salmonella I 4,[5],12:i:-*. Updated October 29, 2007. <<http://www.cdc.gov/Salmonella/4512eyeminus.html>>

¹³ Robert J. Blendon, *Food Safety Survey, May 12-June 1, 2008*, Harvard School of Public Health Project on the Public and Biological Security.

¹⁴ Telephone conversation with Dr. Patricia Griffin, Chief of Foodborne Diseases, Foodborne and Diarrheal Branch, Division of Bacterial and Mycotic Diseases, National Center for Infectious Diseases, Centers for Disease Control and Prevention, Atlanta, GA, January 14, 1999.

¹⁵ CSPI obtained the older, unpublished version of the 1990-1997 line listings by submitting a Freedom of Information (FOIA) request to the CDC.

¹⁶ Institute of Medicine National Research Council. *Ensuring Safe Food from Production to Consumption: Committee to Ensure Safe Food from Production to Consumption*. Washington, DC: National Academy Press; 1998. p. 12, 97.

¹⁷ Food Safety and Security: Fundamental Changes Needed to Ensure Safe Food: Hearings before the Subcommittee on Oversight of Government Management, Restructuring and the District of Columbia of the Senate Committee on Governmental Affairs (testimony of the General Accounting Office), October 10, 2001, p. 1.

¹⁸ CSPI White Paper: *Building a Modern Food safety System for FDA-Regulated Foods*. available online: <<http://www.cspinet.org/new/pdf/fswhitepaper.pdf>>.



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