New York State Department of Health
Bureau of Community Environmental Health and Food Protection

# Foodborne Disease Outbreaks

# In New York State

# 2006

April 2009

This publication was supported by Grant/Cooperative Agreement Number EH 000086 from the Centers for Disease Control and Prevention (CDC). Its contents are solely the responsibility of the authors and do not necessarily represent the official views of CDC.

**Executive Summary**

Data pertaining to all foodborne disease outbreaks in New York State are collected and maintained at the Bureau of Community Environmental Health and Food Protection of the New York State Department of Health (NYSDOH). Modifications were made to the current database to improve the scope of data collection pertaining to place of food preparation and risk classification of establishment. The data obtained regarding the foodborne disease outbreaks that occurred in New York State in 2006 were analyzed with the following results:

- The NYSDOH reported 84 foodborne disease outbreaks.
- 1,834 individuals contracted a foodborne illness, and 124 people required hospitalization. There were no deaths associated with foodborne disease outbreaks.
- The number of people ill due to foodborne disease outbreaks in 2006 nearly tripled in comparison to 2005. 42.3% of those ill from foodborne disease outbreaks in 2006 were associated with a single calicivirus outbreak.
- This data shows an increase in the number of people ill, an increase in the percentage of those ill requiring hospitalization, and a decrease in the number of deaths, compared to 2005.
- 33 outbreaks were attributed to bacterial illness. As was the case in 2005, bacteria were the most common cause of foodborne illness outbreaks.
  - *Salmonella* species were responsible for 15 of the 33 bacterial outbreaks. *Salmonella* species were also the most common cause of bacterial outbreaks in 2005.
- The second most common cause of foodborne illness outbreaks was viruses, which caused 11 outbreaks. This is a significant increase compared to only 6 viral outbreaks in 2005.
  - Calicivirus was the responsible agent for all 11 viral outbreaks.
- A 2.8% decrease in the number of outbreaks without a confirmed or suspect etiology, from 39.7% of outbreaks with unknown etiology in 2005 to 36.9% of outbreaks with unknown etiology.
- An increase in foodborne outbreaks associated with the agent *Vibrio parahaemolyticus* in 2006. There were 3 confirmed and 2 suspected *V. parahaemolyticus* related outbreaks in 2006, compared with only 1 confirmed outbreak and 1 suspected outbreak in the previous five years.

**Table of Contents** **Page**

## Introduction

The New York State Department of Health (NYSDOH) Foodborne Disease Surveillance System is a collaborative effort between personnel in the Bureau of Community Environmental Health and Food Protection, Regional Offices, Local Health Departments, State District Offices, Wadsworth Center, the Bureau of Communicable Disease Control, the Emerging Infections Program and the New York State Department of Agriculture and Markets. These groups work together to identify, investigate and mitigate the effects of the foodborne disease outbreaks occurring in New York State.

The Foodborne Disease Surveillance database contains information from all foodborne disease outbreaks reported in New York State. This database has been in use since 1980 and contains information regarding the etiology, method of preparation, significant ingredient and contributing factors identified in foodborne disease outbreak investigations.

This report summarizes the analyses of the foodborne disease outbreaks that occurred in 2006 and were reported to and investigated by the NYSDOH.

## Methods

The criteria used in determining the etiology of the reported foodborne disease outbreaks in New York State in 2006 followed the Centers for Disease Control and Prevention (CDC) "Guidelines for Confirmation of Foodborne-Disease Outbreaks."[1] The CDC defines a foodborne-disease outbreak (FBDO) as an incident in which two or more persons experience a similar illness resulting from the ingestion of a common food in the United States. Prior to 1992, three exceptions existed to this definition; botulism, marine-toxin intoxication and chemical intoxication only required one case to be considered a FBDO if the etiology was confirmed. The CDC changed the definition in 1992, requiring two or more cases to constitute an outbreak.[1] Due to this change in definition, single cases occurring after 1992 were excluded from the analysis.

Criteria for assessing and interpreting the method of preparation and significant ingredient are described in the "Use of Foodborne Disease Data for HACCP Risk Assessment," Weingold, et al.[2] Criteria for assessing and interpreting contributing factors are described in the "Surveillance of Foodborne Disease III. Summary and Presentation of Data on Vehicles and Contributory Factors; Their Value and Limitations," Bryan, et al.[3]

The following definitions of "confirmed," "suspected" and "unknown" are observed in the New York State Foodborne Disease Surveillance System:

- An outbreak is categorized as confirmed when epidemiologic evidence implicates an agent and confirmatory laboratory data are available.
- An outbreak is categorized as suspected when epidemiologic evidence and/or a food preparation review implicate an agent but no confirmatory laboratory data are available.
- The unknown category is used when epidemiologic evidence clearly associates food with the outbreak, but no laboratory data are available and the epidemiologic evidence does not clearly implicate a specific agent.

Basic statistical calculations were performed using the data contained in the foodborne disease surveillance system, as well as exportation of this data into a Microsoft Excel file for analyses. Microsoft Excel was also used to create charts and tables as necessary for data reporting.

**General Overview of 2006 Foodborne Disease Outbreaks**

In 2006, 84 outbreaks of foodborne disease were reported by the NYSDOH. This is the largest number of food related outbreaks per year in New York State since 1998. (Figure 1) The 2006 outbreaks consisted of 1834 cases that resulted in 124 hospitalizations and no deaths. In comparison to 2005 which saw 58 outbreaks of foodborne disease resulting in 771 cases, 38 hospitalizations and one death, the percentage of hospitalizations due to foodborne illness in 2006 increased, with a decrease in deaths. These outbreak totals do not include the single cases of intoxication with scombrotoxin that are reported and investigated. There was one single case of scombrotoxin in 2006 with no resulting hospitalization. This was an improvement over both the 2005 data, in which 5 single cases of scombrotoxin were reported, and the 2004 data, in which nine single cases of scombrotoxin were reported with one individual being hospitalized.

**Analysis of Etiology**

The etiology was confirmed in 45 (53.6%) of the 84 outbreaks that occurred in 2006 and a suspected etiology was documented for 8 (9.5%) of them. No known etiology was identified for the remaining 31 (36.9%) outbreaks. In the five previous years (2001-2005), there were 274 outbreaks. A confirmed etiology was identified for 125 (45.6%) of the outbreaks, while 54 (19.7%) had a suspected etiology, leaving 95 (34.7%) outbreaks with unknown etiology.

Of the 45 outbreaks in 2006 with a confirmed etiology, 28 (62.2%) were bacterial, 8 (17.8%) were viral, 6 (13.3%) were chemical, 2 (4.4%) were parasitic and 1 (2.2%) was fungal. Of the 125 outbreaks that occurred from 2001 through 2005 with a confirmed etiology, 81 (64.8%) were bacterial, 20 (16.0%) were chemical, 20 (16.0%) were viral and 4 (3.2%) were parasitic.

Of the 8 outbreaks in 2006 with suspected etiology, 5 (62.5%) were suspect bacterial and 3 (37.5%) were suspect viral. Of the 54 outbreaks that occurred from 2001 through 2005 with a suspected etiology, 30 (55.6%) were suspect viral, 19 (35.2%) were suspect bacterial and 5 (9.3%) were suspect chemical.

Figure 2 displays the contribution of each of these general classes of agents implicated in foodborne disease outbreaks since 2001.

In 2006, the outbreaks with a confirmed or suspected bacterial etiology were attributed to six bacterial genera: *Campylobacter*, *Clostridium perfringens*, Shiga toxin producing *Escherichia coli*, *Salmonella* species, *Staphylococcus aureus*, and *Vibrio parahaemolyticus*. Outbreaks related to chemical contamination were divided among three categories: consumption

of poisonous mushrooms, exposure to other chemicals (Susumber Berries) and scombrotoxin intoxication. All outbreaks in 2006 attributed to viruses were due to calicivirus.

Table 1 compares specific agents attributed to the outbreaks that occurred in 2006 to those attributed to outbreaks that occurred between 2001 and 2005.

**Agent-Specific Morbidity and Mortality Burden**

Of the 1466 illnesses associated with foodborne disease outbreaks that occurred in 2006 with a confirmed or suspected etiology, the highest morbidity burden was associated with calicivirus, which resulted in 961 (65.6%) illnesses. Over half of those who became ill due to foodborne diseases in 2006 were associated with a single outbreak. This single outbreak was responsible for 776 out of the 961 (80.7%) illnesses associated with calicivirus and over half (52.93%) of the 1466 total illnesses associated with foodborne disease outbreaks with a confirmed or suspected etiology in 2006. Other significant contributors to overall morbidity in 2006 were *Salmonella* species, which contributed 242 (16.5%) illnesses, and *Clostridium perfringens*, which caused 117 (8.0%) illnesses. Of the 242 illnesses associated with *Salmonella* species in 2006, over half, 85 (35.1%), were the result of a single outbreak. Similar to 2006, the leading cause of foodborne disease outbreaks from 2001 through 2005 was calicivirus, which was responsible for 975(20.7%) of the 4713 illnesses with confirmed or suspected etiology. *Shigella* species were the second largest cause of illness associated with foodborne disease outbreaks in this period, contributing 886 (18.8%) illnesses, while *Salmonella* species caused 871 (18.5%) illnesses. (Table 2)

There were no deaths associated with foodborne disease outbreaks in 2006. In 2005, one person died as a result of *Listeria monocytogenes*.

**In-Year Temporal Trends**

Foodborne disease outbreaks in 2006 peaked during the months of June, July and August with 11 (13.1%), 13 (15.5%) and 10 (11.9%) outbreaks respectively. 2006 saw a spike in outbreaks during the month of November with 9 (10.7%) outbreaks. Outbreaks during the rest of the year averaged at approximately five (5) per month. These trends were similar to the preceding five years, 2001 through 2005, in which the summer months saw the largest number of foodborne disease outbreaks along with a spike in November and December. In contrast to 2006 when the number of foodborne disease began to rise in June, foodborne disease outbreaks from 2001 through 2005 began to increase in May. (Figure 3)

Similar to 2005, *Salmonella* species were the implicated agents in the majority of foodborne disease outbreaks between the summer months of May through August. In 2006, *Salmonella* species caused 13 (32.5%) of the 40 foodborne disease outbreaks that occurred May through August, compared to 2005, during which *Salmonella* species caused six (21.4%) of the 28 foodborne disease outbreaks during these months. From 2001 through 2005, *Salmonella* species were associated with 26 (24.1%) of the 108 outbreaks that occurred in the summer months. There was a decrease in the number of outbreaks with unknown etiology in the summer of 2006 (11 of 40 outbreaks; 27.5%) when compared to the previous five summers (31 of 108 outbreaks; 28.7%). The summer months of 2006 saw the number of outbreaks attributed to

calicivirus reduced by more than half, from 11 out of 108 (10.2%) outbreaks from 2001 through 2005, to 2 out of 40 (5.0%) outbreaks in 2006.

**Method of Preparation**

The most frequently reported method of preparation in 2006 was cook/serve foods. This was reported in 19 (22.6%) of the 84 foodborne disease outbreaks in 2006, followed by solid masses with potentially hazardous foods, which was reported in 12 (14.3%) of the 84 outbreaks.

Cook/serve foods was identified more than twice as frequently in 2006 (22.6% of 2006 outbreaks) as it was from 2001 through 2005 (9.1% of the outbreaks). The percentage of foodborne disease outbreaks associated with solid masses of potentially hazardous foods tripled in 2006 (14.3% of 2006 outbreaks) compared to the percentage from 2001 through 2005 (4.7% of the outbreaks). In 2006, the number of foodborne disease outbreaks associated with beverages decreased to 1.2% compared to the 2.6% of outbreaks associated with beverages between 2001 and 2005. The number of outbreaks with an unknown method of preparation in 2006 was consistent with the previous five years. (Table 3)

The method of preparation in 2006 was not identified in 33 (39.3%) of the outbreaks. Nineteen (61.3%) of the 31 outbreaks with an unknown etiology had an unknown method of preparation, while 13 (24.5%) of the 53 outbreaks with a confirmed or suspected etiology had an unknown method of preparation.

**Significant Ingredient**

In a foodborne disease outbreak, the phrase 'significant ingredient,' refers to the ingredient determined to have introduced the agent and/or that characterizes the vehicle. The most frequently reported significant ingredient was other seafood (8 of 84 outbreaks; 9.5%), followed closely by starchy foods (7 of 84 outbreaks; 8.3%). The number of outbreaks in which other seafood was identified as the significant ingredient was the highest since data collection began in 1980.

In 2006, 44% of reported foodborne disease outbreaks had an unknown significant ingredient. This is an increase from the last five years when only 35% of foodborne disease outbreaks had an unknown significant ingredient. Other seafood was identified as the significant ingredient nearly three times more often in 2006 than from 2001 through 2005. The percentage of foodborne disease outbreaks in which infected food workers were deemed responsible for contamination of food dropped from 10.6% from 2001 through 2005, to 4.8% in 2006. (Table 4)

In 2006, 37 (44%) of the 84 reported foodborne disease outbreaks had no known significant ingredient. Twenty (64.5%) of the 31 outbreaks with an unknown etiology had an unknown significant ingredient and 16 (30.2%) of the 53 outbreaks with a confirmed or suspected etiology had an unknown significant ingredient.

## Associations between Etiologic Agent, Method of Preparation and Significant Ingredient

In the 2006 foodborne disease outbreaks, the most commonly identified significant ingredient was other seafood, which was also associated with the most commonly identified method of preparation, cook/serve foods. Six (75%) of the 8 outbreaks in which other seafood was identified as the significant ingredient also had cook/serve foods as the implicated method of preparation. Agents implicated in foodborne disease outbreaks in which other seafood was the significant ingredient include two *Salmonella* species as well as *Vibrio parahaemolyticus*. Agents implicated in foodborne disease outbreaks in which cook/serve foods was the reported method of preparation include *Clostridium perfringens, Escherichia coli, Salmonella* species, *Staphylococcus aureus and Vibrio parahaemolyticus.*

*Salmonella* species was the agent most likely to be implicated in foodborne disease outbreaks in 2006, as it was the identified agent in 15 (28.3%) of the 53 outbreaks with a confirmed or suspected etiology. Of these 15 outbreaks, the significant ingredients identified were dairy (1 outbreak), fruits (4 outbreaks), no specific ingredient identified (2 outbreaks), other seafood (2 outbreaks), other vehicle (1 outbreak), poultry (1 outbreak) and unknown significant ingredient (7 outbreaks). Note: More than one significant ingredient can be implicated in a single outbreak. The phrase "no significant ingredient" is used when specific ingredients were identified as possible vehicles of the illness, but none were statistically significant. The term "unknown" is used when it is unknown what food item may have caused the illness. Figures 4 through 7 illustrate the significant ingredients associated with etiologic agents in outbreaks during 2006.

Of the 32 outbreaks without a known method of preparation, 31 (96.9%) outbreaks had an unknown significant ingredient. One outbreak had food contaminated by an infected worker as the significant ingredient.

## Contributing Factors

No contributing factors were identified during the outbreak investigations in over 60% of the foodborne disease outbreaks in 2006. This percentage is up from the 52.6% of outbreaks without an identified contributing factor reported from 2001 through 2005. Of the contributing factors that were identified, the most frequently cited were contaminated ingredients (11.9% of outbreaks with an identified contributing factor) and infected person (9.5% of the outbreaks with an identified contributing factor). Both of these are consistent with what was reported from 2001 through 2005. In 2006, the number of outbreaks for which inadequate hot holding, inadequate re-heating, and inadequate refrigeration were identified as contributing factors showed a decrease when compared to 2001 through 2005. (Table 5)

## Discussion

The 84 foodborne disease outbreaks reported by NYSDOH in 2006 represents an increase in foodborne disease outbreaks in comparison to the last five years. In 2006, the average number of individuals ill in each outbreak, 24 per outbreak, was consistent with the last five years. There

were no reported deaths during 2006 due to foodborne disease outbreaks. During 2001 through 2005, only two other years reported zero deaths. Only in 16 of the 26 years in which data was collected were one or no deaths reported as a result of food related outbreaks. One of the 26 years reported more than four deaths due to a foodborne illness outbreak.

**Conclusions/Recommendations**

Based on the analysis of foodborne disease outbreaks in New York State in 2006 and analysis of trends from recent years, recommendations for improving both public health and the quality of the foodborne disease surveillance system are listed below.

1. Prevention of *Vibrio* related illness

As stated previously, 2006 showed an increase in both sporadic cases and foodborne disease outbreaks related to *Vibrio parahaemolyticus.* There were three confirmed and two suspected outbreaks of the disease during this time period, compared to only one suspected *Vibrio parahaemolyticus* outbreak in 2005. A similar trend was seen nationwide, and the majority of outbreaks were linked to the consumption of shellfish. *Vibrio parahaemolyticus* is a naturally occurring bacteria found in ocean waters and is not related to contamination issues. Testing of shellfish areas as well as monitoring water temperature are used to prevent harvesting during high levels of *Vibrio Parahaemolyticus*. Cooking shellfish prior to consumption is effective in preventing illness. The New York State Sanitary Code requires food service establishments to retain shellfish tags for 90 days after use for trace-back purposes. It is important for food service establishments to adhere to this Code so as to provide the means for tracing back the implicated product to the source water and therefore preventing additional outbreaks from occurring. Additionally, the importance of properly cooking shellfish cannot be overstated. Many *V. parahaemolyticus* outbreaks have been associated with not only the consumption of raw shellfish, but also the consumption of other cooked foods that have been contaminated by raw shellfish. *V. parahaemolyticus* organisms rapidly multiply, and if not properly refrigerated between harvest and consumption even low organism count can manifest into high infectious doses.[4] As a result, it is imperative that shellfish handlers and cooks properly deal with this product.

2. Improved technology and new CDC reporting guidelines

Advances in laboratory techniques such as real time Polymerase Chain Reaction (Real Time-PCR) and Pulse Field Gel Electrophoresis (PFGE) allow public health practitioners to link individual foodborne illness cases to each other based on the "genetic fingerprint" of pathogens recovered from patient samples. In the past, these cases of illness may have been attributed to sporadic illness and not linked to a common outbreak. This improved ability to identify outbreaks contributes to the increase in reported foodborne outbreaks in recent years. Eleven outbreaks in 2006 were identified by PFGE patterns matching cases in other states. In 2007, CDC instituted new guidelines for reporting multi-state outbreaks. A common food exposure occurring in more than one state must be identified for an outbreak to be classified as multi-state. These guidelines

were not implemented until 2007, and therefore their impact will likely not be felt until 2007 or later. It is anticipated that the selective nature of the guidelines will result in a decrease in the number of reported multi-state outbreaks in the future, thus showing a decrease in the annual number of outbreaks.

3. Increased identification of Norovirus cases

There was an increase in the number of confirmed foodborne outbreaks of Norovirus, a genus of the calicivirus family, from one in 2005 to seven in 2006. Factors attributed to this improvement include strong campaigning by health department officials to promote the collection and testing of stool samples from individuals suffering gastrointestinal illness, and the recommendation that stool samples be collected for viral analysis from up to 5 days after date of illness onset to up to 14 days after illness onset. It is important to encourage cases to submit stool samples to provide essential investigation tools, ensure proper identification of responsible pathogens and reduce the number of food related outbreaks with unknown etiology.

4. Lack of data supporting the identification of Place of Contamination

The majority (75%) of the foodborne disease outbreaks occurring in New York State in 2006 had an unknown place of contamination. (Figure 8) As a result, information that could potentially identify the risk factors for contamination in various food preparation procedures is unavailable. Although it is often difficult to determine, it is important for food safety inspectors to focus on food preparation reviews in order to identify at which stage ingredients are most likely to be contaminated in order to then develop regulations and guidance to prevent a similar outbreak.

**Case Studies of Selected 2006 Outbreaks**

The foodborne disease outbreaks that occurred in New York State in 2006 were varied. Several narratives are presented below to illustrate the challenges faced and successes achieved by foodborne disease surveillance staff during the investigations.

1. *Clostridium perfringens* outbreak at a teacher appreciation luncheon – Sullivan County

In November, 38 school staff became ill after a PTA sponsored Teacher Appreciation luncheon served at the school. No students were affected by the outbreak. An individual volunteer was acting as an unlicensed caterer and prepared food at his home to be served at school. All ill staff consumed meatballs in sauce as well as sausage and peppers. Laboratory samples of both the meatballs in sauce and sausage and peppers were taken in the caterer's home where the food was prepared and at the school and were found to contain high levels of *Clostridium perfringens*. Contributing factors in this case were identified as: allowing foods to remain at room or warm outdoor temperature for several hours, slow cooling, preparing foods a half day or more before serving, insufficient time and/or temperature during hot-holding, insufficient time and/or temperature during reheating, and operating without a valid permit.

2. *Campylobacter* associated with raw milk consumption – Tompkins County

In February, two people became ill after consuming raw, or unpasteurized, milk. Although it is illegal in New York State to sell raw milk to food service and retail establishments that are regulated by the Department of Health, it is legal for farmers to sell raw milk to individual consumers as these transactions are regulated by the Department of Agriculture and Markets. Two consumers at a farm in Tompkins County consumed raw milk and shortly thereafter experienced symptoms of abdominal cramping and diarrhea. The New York State Department of Agriculture and Markets took samples of raw milk from the farm, which tested positive for *Campylobacter*. The illness lasted an average of seven days, and no hospitalizations were reported. Contributing factors in this outbreak were identified as: ingestion of contaminated raw products and allowing foods to remain at room or warm outdoor temperature for several hours.

3. Chemical (chaconine) poisoning due to Susumber Berries – Queens County

In August, three individuals became ill after consuming Susumber berries at a private home. Susumber berries, members of the Nightshade family, were federally listed on the U.S. noxious weed list in 1995. The berries are commonly found in the tropics, and have been found to be toxic, although it is not clear what stage of growth is the most toxic. The berries were picked, cooked and frozen in Jamaica before being taken to the United States where they were served in a cod and rice dish. Two of the three cases experienced symptoms similar to botulism: slurred speech, drooping facial features, blurred vision, weakness and numbness. The third case consumed a smaller amount of Susumber berries compared to the other two and experienced diarrhea without neurological affects. Although the toxicity of Susumber berries is not well known, chaconine poisoning was suspected based on clinical symptoms. The contributing factor in this investigation was found to be a toxic substance naturally occurring in the Susumber berries.

4. Enterohemorrhagic *E. coli* O157:H7 – Chemung County

In August, 11 people became ill after consuming fresh, pre-bagged spinach grown in California. The individuals experienced vomiting, diarrhea, abdominal cramps and fever. Stool specimens were positive for *E. coli* O157:H7, and six of the eleven cases were hospitalized. Through discussion with the CDC, it became apparent that this cluster was part of a larger multi-state outbreak associated with fresh spinach. The California Food Emergency Response Team (CalFERT), a collaboration between the FDA's Pacific Region and the California Department of Health Services, collected environmental samples at four implicated ranches where the spinach was grown, and all four tested positive for *E. coli* O157:H7. One of the ranches had isolates that matched the outbreak strain. This was a large beef cattle ranch that leased a small amount of land for spinach growth. Additionally, a large population of feral pigs roamed the area, eating the spinach and defecating in the fields. It was hypothesized that the pig feces and run off from the cattle lands around the crops contaminated the spinach with *E. coli* O157:H7.

Epidemiologic investigation and laboratory findings allowed for swift regulatory action and the recall of bagged fresh spinach to prevent the spread of infection. The outbreak led to over 200 confirmed cases of *E.coli* O157:H7 in 26 states. The contributing factor in this outbreak investigation was identified as contaminated ingredients. It is important for farmers to prevent contamination of food in general, but especially foods that will be consumed without cooking.

5. Enterohemorrhagic *E. coli* O157:H7 – Clinton, Nassau, New York, Oneida, Otsego, St. Lawrence, and Suffolk Counties.

In December, 20 people in seven New York State counties became ill after eating at a national fast food chain. Individuals who became ill experienced vomiting, abdominal cramps, fever and diarrhea. Fourteen of the 20 cases were hospitalized, and stool specimens identified *E. coli* O157:H7 as the responsible agent. Pulse field gel electrophoresis (PFGE) analysis matched the *E. coli* strains in New York State with those in other states investigating similar cases of *E. coli* O157:H7. The food chain implicated green onions as the responsible ingredient, but laboratory testing on the onions was negative for *E. coli*. Fifteen fast food chain stores in 6 New York State counties were closed for cleaning and sanitation, and employees were educated in proper hygiene practices. A case control study was conducted to identify the likely source of contamination. The study showed cases had higher levels of exposure to lettuce and cheddar cheese in comparison to controls. Epidemiologic investigation of the food production lines within this fast food chain suggested cross-contamination of cheddar cheese by lettuce. This additional epidemiologic evidence led to the implication of lettuce as the most likely food to have caused illness. Laboratory confirmation of lettuce as the source of *E. coli* O157:H7 in these cases could not be conducted as the lettuce had already been discarded or consumed at the time of investigation. It is critical to take precautions at the farm to prevent contamination from occurring.

6. Salmonellosis due to peanut butter – Broome, Erie, Niagara, Onondaga, Cortland, Monroe, Suffolk, Schoharie, St. Lawrence, Oneida, Tompkins, Genesee, Chautauqua, Oswego, Chemung, Delaware, Dutchess, Yates, Cayuga, Fulton, Otsego, Fulton, Wyoming, Steuben, Saratoga, Ontario and Rensselaer Counties.

In November, 85 individuals became ill after consuming peanut butter contaminated with *Salmonella tennessee*. Ill individuals experienced a sudden onset of nausea, abdominal cramping, watery diarrhea, fever and vomiting. Communication with health department officials in other states revealed that 3 rare patterns of *Salmonella tennessee* were identified by laboratory investigation. A case control study revealed that cases were likely to have consumed peanut butter. Jars of peanut butter were sampled and were positive for *Salmonella tennessee.* Environmental samples were also taken at the peanut butter manufacturing plant, and also came back positive for *Salmonella tennessee.* Over 600 cases in 47 states were confirmed to have illness associated with consuming the peanut butter. This outbreak led to an FDA consumer advisory and voluntary recall of the product. This recall was later expanded to include peanut butter topping manufactured at the same plant. Investigations revealed that the likely source of

contamination was a leaky roof and a sprinkler system that allowed moisture into the plant thereby forming conditions ideal for Salmonella growth. The manufacturing plant closed for repairs and was re-opened in October 2007. Food manufacturers must take the necessary steps to guarantee that their facilities meet federal standards designed to ensure the safe production of food for consumption. Food safety inspectors must reinforce the importance of such standards designed to prevent contamination of food in production.

## References


1. Centers for Disease Control and Prevention. (2000). Guidelines for Confirmation of Foodborne-Disease Outbreaks. *Morbidity and Mortality Weekly Report*, 49(SS01): 54-62.

2. Weingold SE, Guzewich JJ, Fudula JK. (1994). Use of Foodborne Disease Data for HACCP risk Assessment. *Journal of Food Protection*,57(9):820-30.

3. Bryan FL, Guzewich JJ, Todd ECD. (1997). Surveillance of Foodborne Disease III. Summary and Presentation of Data on Vehicles and Contributory Factors; Their Value and Limitations. *Journal of Food Protection*,60(6):701-14.

4. Centers for Disease Control and Prevention. (2006). Vibrio Parehaemolyticus Infections Associated with the Consumption of Raw Shellfish-Three States, 2006. *Morbidity and Mortality Weekly Report*, 55:1-2.

## Tables and Figures

Figure 1. Chart of reported foodborne disease outbreaks in New York State, 1980-2006. Outbreaks reported before 1992 include investigation of single case outbreaks (e.g., single cases of scombrotoxin intoxication), which accounted for 60 outbreaks in this period.

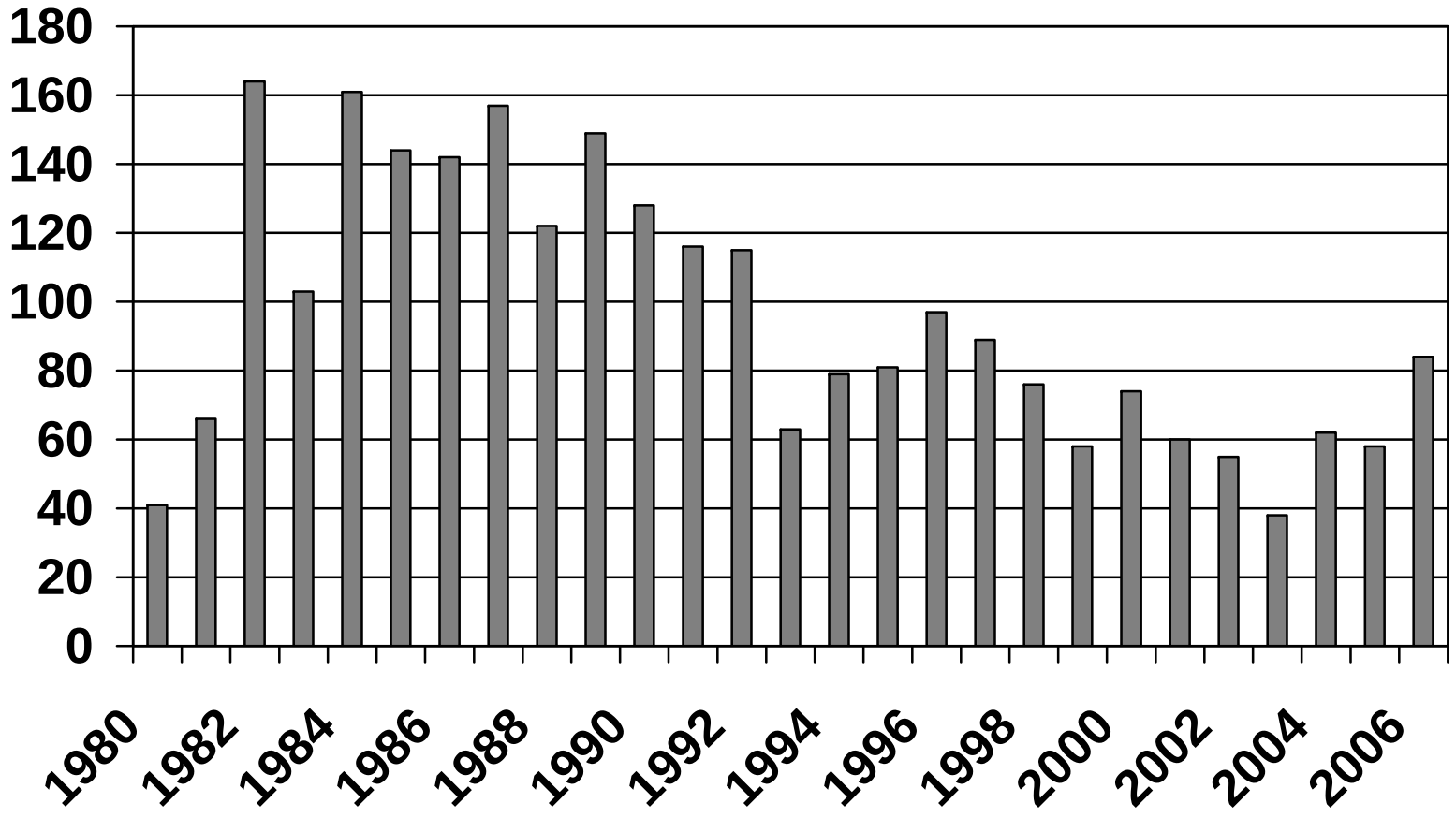

**Figure 2. Chart of General Etiologic Agent Classes Implicated for Reported Foodborne Disease Outbreaks in New York State, 2001-2006.**

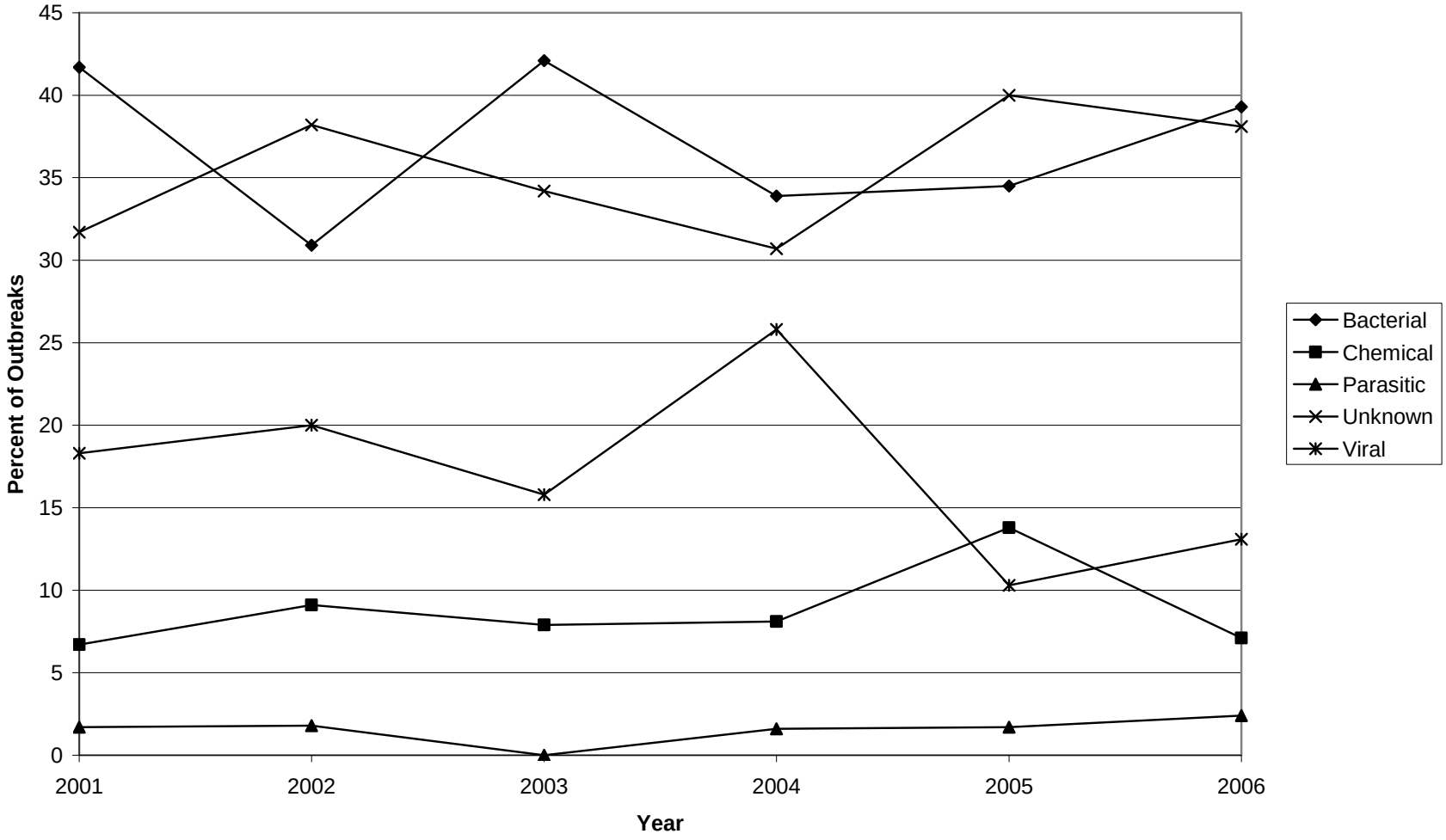

**Figure 3. Month-by-Month Trend of Outbreaks in 2006, Compared to Outbreaks Occurring between 2001 and 2005, New York State.**

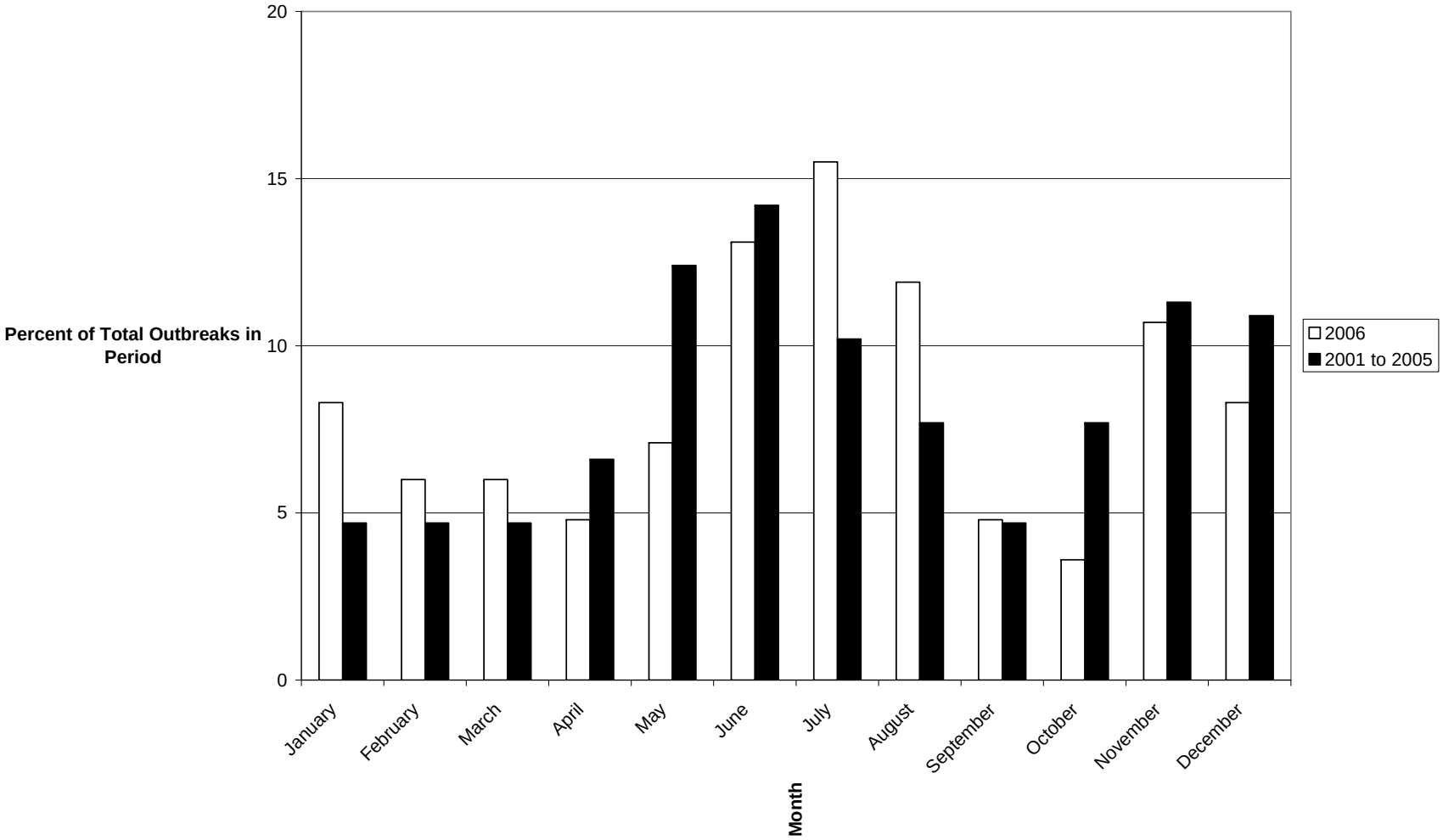

**Figure 4.Significant Ingredients Associated with Bacterial Agents Implicated in Foodborne Disease Outbreaks, New York State, 2006**

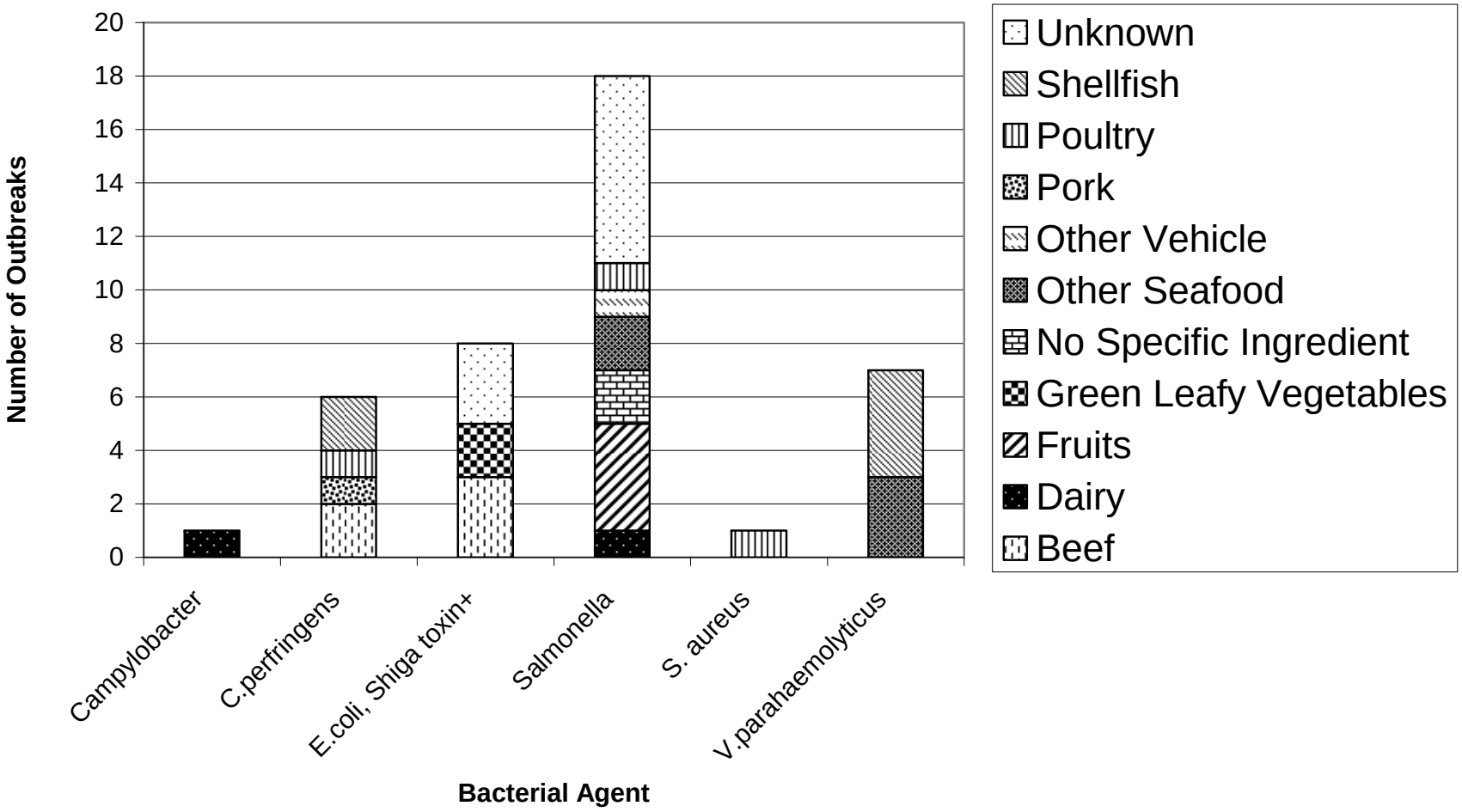

**Figure 5. Significant Ingredients Associated with Chemical Agents Implicated in Foodborne Disease Outbreaks, New York State, 2006**

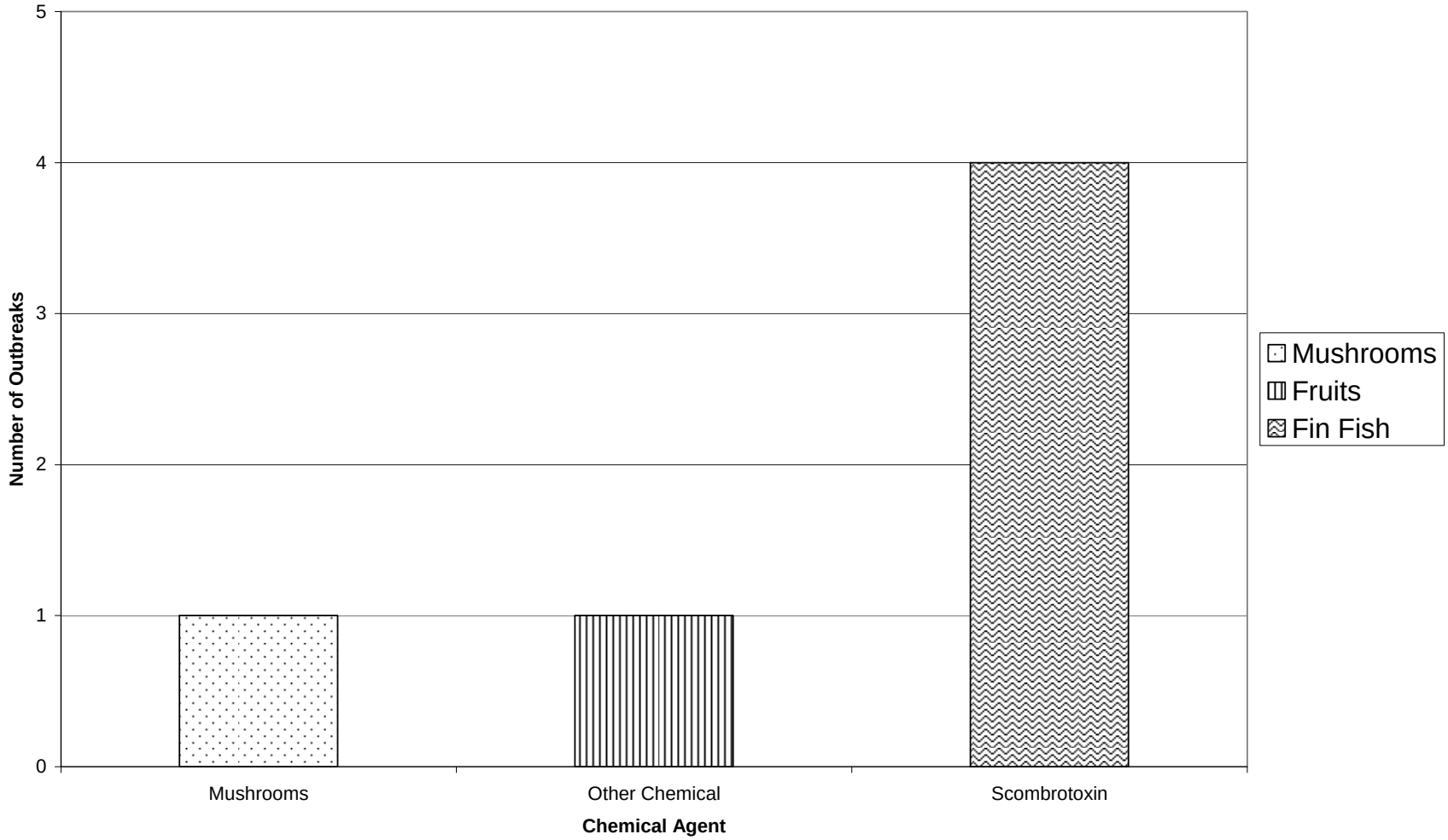

**Figure 6. Significant Ingredients Associated with Viral and Parasitic Agents Implicated in Foodborne Disease Outbreaks, New York State, 2006.**

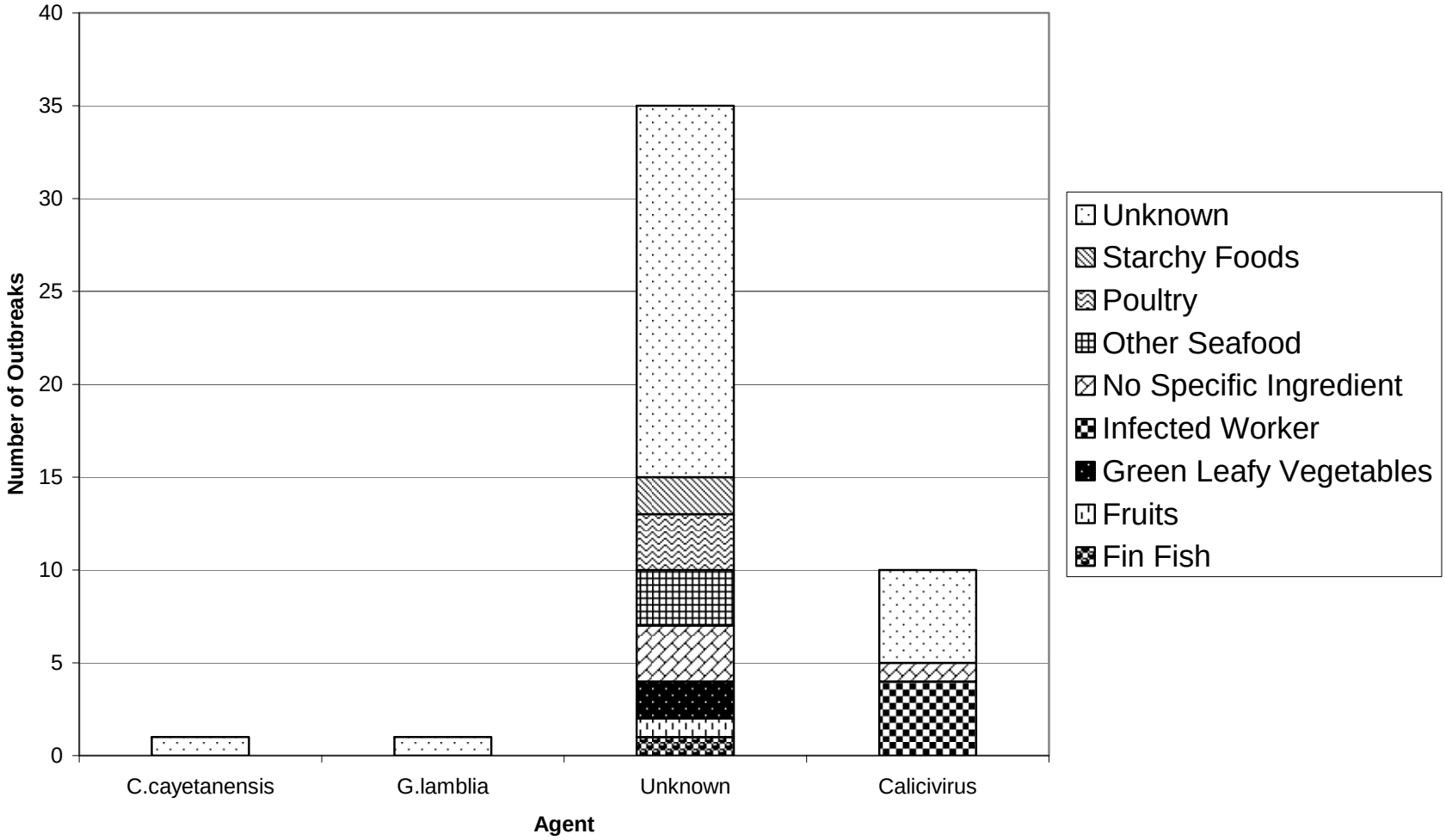

**Figure 7. Significant Ingredients Associated with Unknown Agents Implicated in Foodborne Disease Outbreaks, New York State, 2006.**

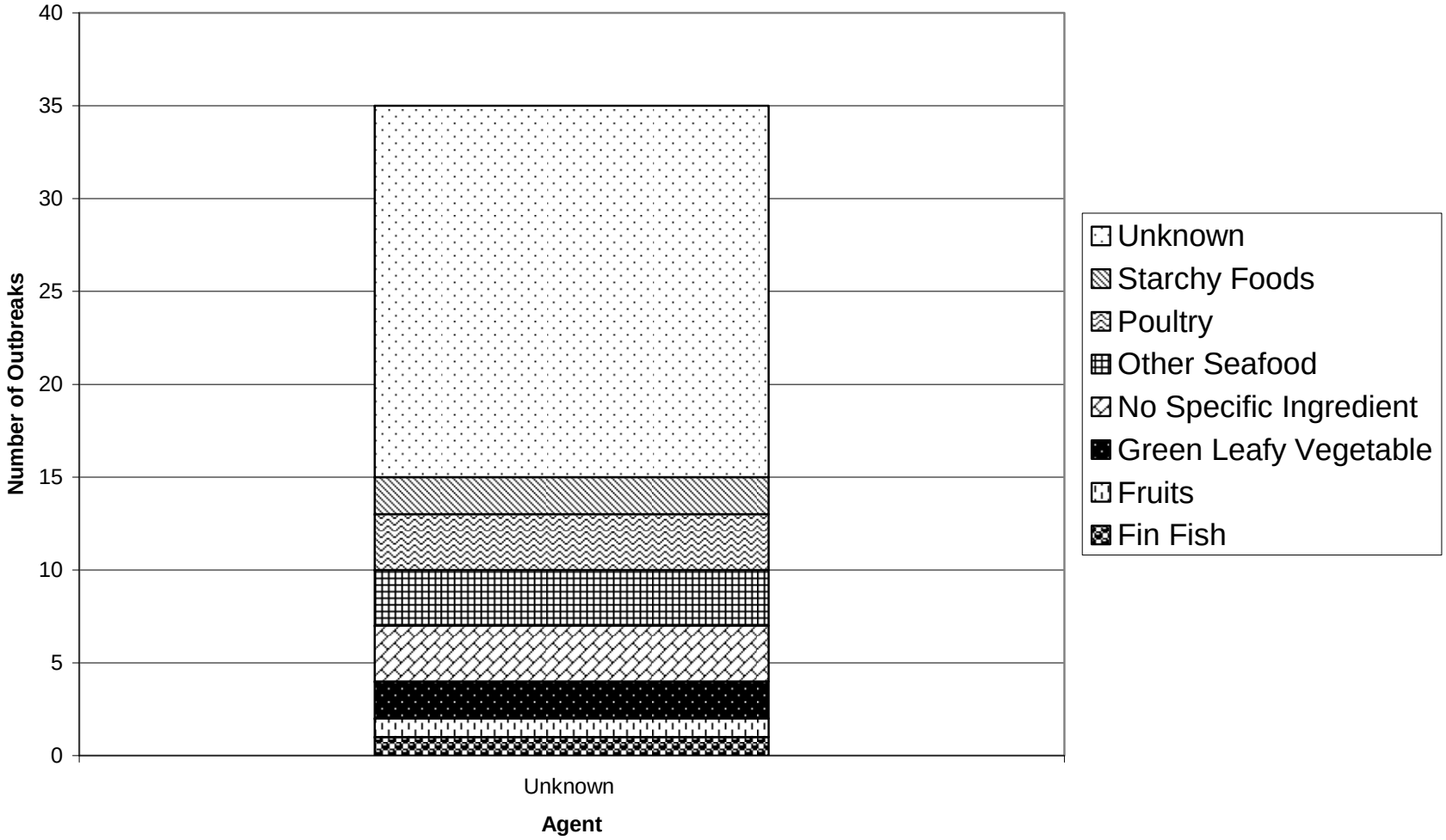

**Figure 8. Implicated Place of Contamination, Foodborne Disease Outbreaks, New York State, 2006**

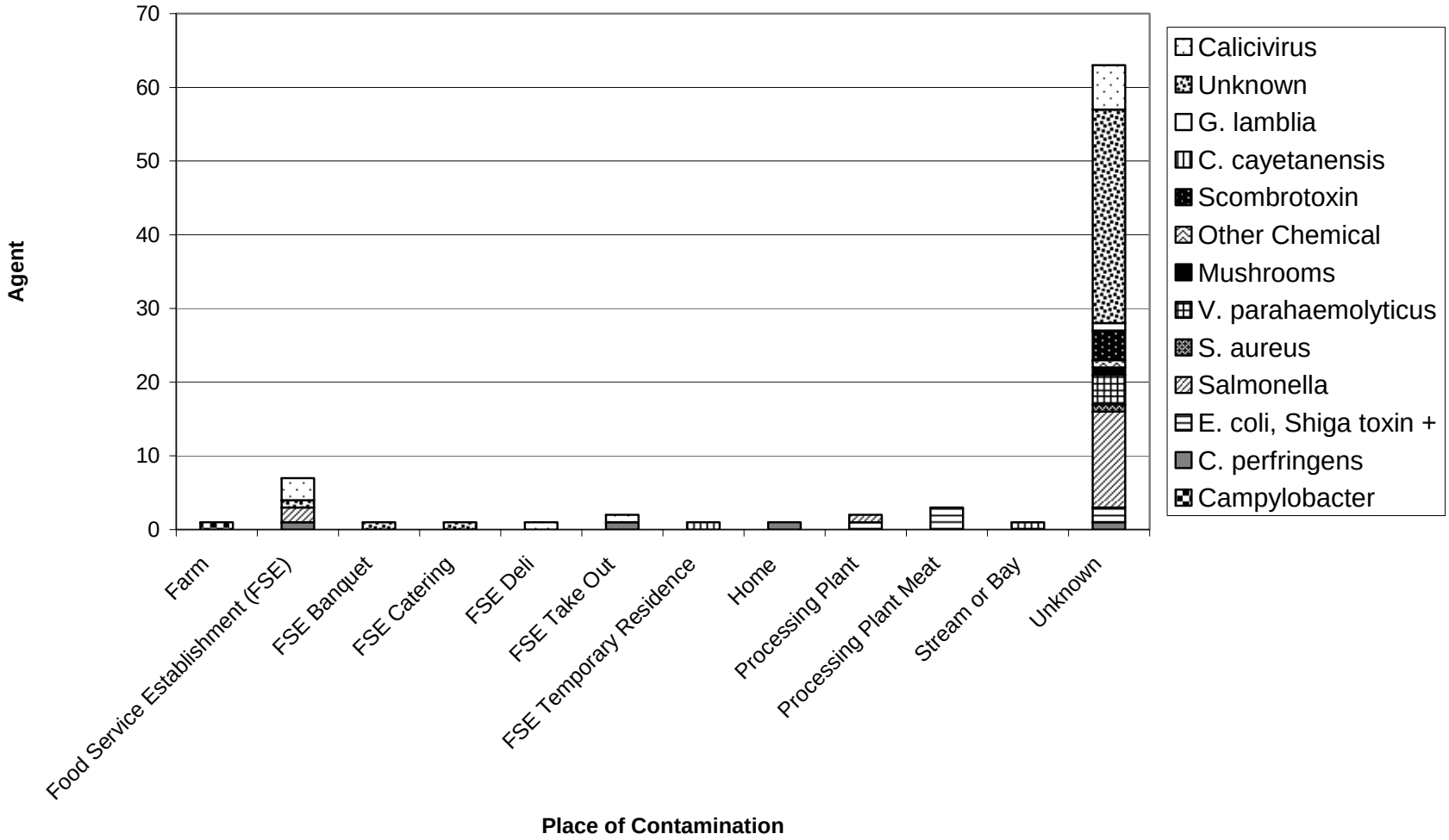

Table 1. Etiology of Foodborne Disease Outbreaks, New York State, 2006, Compared to Outbreaks between 2001 and 2005.

| | Agent | 2006 | | | 2001 to 2005 | | |
|---|---|---|---|---|---|---|---|
| | | N | %* | %** | N | %* | %** |
| Outbreaks with Confirmed Etiology | Bacterial - *Campylobacter* species | 1 | 3.6 | 1.2 | 4 | 4.9 | 1.5 |
| 2006: N = 45 | Bacterial - *C. perfringens* | 4 | 14.3 | 4.8 | 10 | 12.3 | 3.6 |
| 2001 to 2005: N = 125 | Bacterial - *C. parvum* | *** | *** | *** | 1 | 1.2 | 0.4 |
| | Bacterial – *E. coli:* Shiga toxin Positive | 6 | 21.4 | 7.1 | 12 | 14.8 | 4.4 |
| | Bacterial – *L. monocytogenes* | *** | *** | *** | 5 | 6.2 | 1.8 |
| | Bacterial – *Salmonella* species | 14 | 50.0 | 16.7 | 41 | 50.6 | 15.0 |
| | Bacterial – *Shigella* species | *** | *** | *** | 1 | 1.2 | 0.4 |
| | Bacterial – *S. aureus* | *** | *** | *** | 4 | 4.9 | 1.5 |
| | Bacterial – *V. cholera* | *** | *** | *** | 1 | 1.2 | 0.4 |
| | Bacterial – *V. parahaemolyticus* | 3 | 10.7 | 3.6 | 1 | 1.2 | 0.4 |
| | Bacterial – *Y. enterocolitica* | *** | *** | *** | 1 | 1.2 | 0.4 |
| | Chemical – Allergen | *** | *** | *** | 1 | 5.0 | 0.4 |
| | Chemical – Ciguatera Toxin | *** | *** | *** | 1 | 5.0 | 0.4 |
| | Chemical – Heavy Metal | *** | *** | *** | 1 | 5.0 | 0.4 |
| | Chemical – Mushroom | 1 | 16.7 | 1.2 | 1 | 5.0 | 0.4 |
| | Chemical – Other Chemical | 1 | 16.7 | 1.2 | 4 | 20.0 | 1.5 |
| | Chemical – Scombrotoxin | 4 | 66.7 | 4.8 | 12 | 60.0 | 4.0 |
| | Parasitic – *C. cayetanensis* | 1 | 50.0 | 1.2 | 2 | 50.0 | 0.7 |
| | Parasitic – *G. lamblia* | 1 | 50.0 | 1.2 | 2 | 50.0 | 0.7 |
| | Viral - Calicivirus | 8 | 100.0 | 9.5 | 18 | 90.0 | 6.6 |
| | Viral – Hepatitis A | *** | *** | *** | 2 | 10.0 | 0.7 |
| Outbreaks with Suspected Etiology | Bacterial – *B. cereus* | *** | *** | *** | 7 | 36.9 | 2.6 |
| 2006: N = 8 | Bacterial – *C. perfringens* | 1 | 20.0 | 1.2 | 9 | 47.4 | 3.3 |
| 2001 to 2005: N = 54 | Bacterial – *Salmonella* species | 1 | 20.0 | 1.2 | *** | *** | *** |
| | Bacterial – *S. aureus* | 1 | 20.0 | 1.2 | 2 | 10.5 | 0.7 |
| | Bacterial – *V. parahaemolyticus* | 2 | 40.0 | 2.4 | 1 | 5.3 | 0.4 |
| | Chemical – Other Chemical | *** | *** | *** | 1 | 20.0 | 0.4 |
| | Chemical – Scombrotoxin | *** | *** | *** | 4 | 80.0 | 1.5 |
| | Viral – Calicivirus | 3 | 100.0 | 3.6 | 10 | 33.3 | 3.6 |
| | Viral – Gastrointestinal Virus | *** | *** | *** | 19 | 63.3 | 6.9 |
| | Viral- Rotavirus | *** | *** | *** | 1 | 3.3 | 0.4 |
| Outbreaks with Unknown Etiology | Unknown | 31 | 100.0 | 36.9 | 95 | 100.0 | 34.7 |

*-% of outbreaks in confirmation and general agent category (e.g., Confirmed/Bacterial, Confirmed/Chemical, Suspected/Bacterial)
**-% of total outbreaks
***- No outbreak reported for that agent in the time period

Table 2. Morbidity Burden of Agents Implicated in Foodborne Disease Outbreaks, New York State, 2006, Compared to 2001 through 2005.

| | | 2006 | | | 2001 to 2005 | | |
|---|---|---|---|---|---|---|---|
| | | # ill | %* | %** | # ill | %* | %** |
| Bacterial | *B. cereus* | *** | *** | *** | 50 | 0.08 | 1.06 |
| | *Campylobacter* species | 2 | 0.11 | 0.14 | 48 | 0.70 | 1.02 |
| | *C. perfringens* | 117 | 6.40 | 7.98 | 325 | 5.06 | 6.90 |
| | *C. parvum* | *** | *** | *** | 212 | 3.30 | 4.50 |
| | *E. coli:* Shiga Toxin + | 44 | 2.40 | 3.00 | 325 | 5.06 | 6.90 |
| | *L. monocytogenes* | *** | *** | *** | 39 | 0.61 | 0.83 |
| | *Salmonella* species | 242 | 13.20 | 16.51 | 871 | 13.56 | 18.48 |
| | *Shigella* species | *** | *** | *** | 886 | 13.80 | 18.80 |
| | *S. aureus* | 2 | 0.11 | 0.14 | 209 | 3.25 | 4.43 |
| | *V. cholera* | *** | *** | *** | 2 | 0.03 | 0.04 |
| | *V. parahaemolyticus* | 52 | 2.84 | 3.55 | 4 | 0.06 | 0.08 |
| | *Y. enterocolitica* | *** | *** | *** | 4 | 0.06 | 0.06 |
| Chemical | Allergen | *** | *** | *** | 15 | 0.23 | 0.32 |
| | Ciguatera Toxin | *** | *** | *** | 4 | 0.06 | 0.08 |
| | Heavy Metal | *** | *** | *** | 6 | 0.09 | 0.13 |
| | Mushrooms | 2 | 0.11 | 0.14 | 4 | 0.06 | 0.08 |
| | Other Chemical | 2 | 0.11 | 0.14 | 36 | 0.56 | 0.76 |
| | Scombrotoxin | 8 | 0.44 | 0.55 | 77 | 1.20 | 1.63 |
| Parasitic | *C. cayetanensis* | 20 | 1.09 | 1.36 | 17 | 0.26 | 0.36 |
| | *G. lamblia* | 8 | 0.44 | 0.55 | 70 | 1.09 | 1.49 |
| **VIRAL** | **CALICIVIRUS** | 961 | 52.40 | 65.55 | 975 | 15.18 | 20.69 |
| | Gastrointestinal Virus | *** | *** | *** | 484 | 7.54 | 10.27 |
| | Hepatitis A | *** | *** | *** | 20 | 0.31 | 0.42 |
| | Rotavirus | *** | *** | *** | 30 | 0.47 | 0.64 |
| Unknown | Unknown | 374 | 20.40 | | 1708 | 26.60 | |

*-% of all ill (including those from outbreaks with unknown etiology)
**-% of ill from outbreaks with confirmed or suspected etiology
***-No outbreak reported for that agent in the time period

Table 3. Method of Preparation Implicated in Foodborne Disease Outbreaks, New York State, 2006, Compared to Outbreaks between 2001 and 2005.

| Method of Preparation | 2006 | | | 2001 to 2005 | | |
|---|---|---|---|---|---|---|
| | N | %* | %** | N | %* | %** |
| Unknown | 33 | 39.3 | N/A | 97 | 35.4 | N/A |
| Cook/Serve Foods | 19 | 22.6 | 37.3 | 25 | 9.1 | 14.1 |
| Solid Masses with Potentially Hazardous Foods | 12 | 14.3 | 23.5 | 13 | 4.7 | 7.3 |
| Foods Eaten Raw or Lightly Cooked | 7 | 8.3 | 13.7 | 9 | 3.3 | 5.1 |
| Salads with Raw Ingredients | 7 | 8.3 | 13.7 | 7 | 2.6 | 4.0 |
| Natural Toxicant | 6 | 7.1 | 11.8 | 18 | 6.6 | 10.2 |
| Commercially Processed Foods | 4 | 4.8 | 7.8 | 7 | 2.6 | 4.0 |
| Sandwiches | 4 | 4.8 | 7.8 | 15 | 5.5 | 8.5 |
| Baked Goods | 3 | 3.6 | 5.6 | 5 | 1.8 | 2.8 |
| Liquid/Semi-Solid Mixtures of Potentially Hazardous Foods | 3 | 3.6 | 5.9 | 10 | 3.6 | 5.6 |
| Other | 2 | 2.4 | 3.9 | 9 | 3.3 | 5.1 |
| Beverages | 1 | 1.2 | 2.0 | 7 | 2.6 | 4.0 |
| Chemical Contamination | *** | *** | *** | 2 | 0.7 | 1.1 |
| Multiple Foods | *** | *** | *** | 44 | 16.1 | 24.9 |
| Roasted Meat/Poultry | *** | *** | *** | 16 | 5.8 | 9.0 |
| Salads Prepared with One or More Cooked Ingredients | *** | *** | *** | 12 | 4.4 | 6.8 |

*-% of total outbreaks (2006: N=84; 2001 to 2005: N=274)
**-% of outbreaks where method of preparation was identified (2006: N=52; 2001 to 2005: N=177)
***-No outbreak reported for that method of preparation in the time period

Table 4. Significant Ingredient Implicated in Foodborne Disease Outbreaks, New York State, 2006, Compared to Outbreaks between 2001 and 2005.

| Significant Ingredient | 2006 | | | 2001 to 2005 | | |
|---|---|---|---|---|---|---|
| | N | %* | %** | N | %* | %** |
| Unknown | 37 | 44.0 | N/A | 96 | 35.0 | N/A |
| Other Seafood | 8 | 9.5 | 17.0 | 3 | 1.1 | 1.7 |
| Starchy Foods | 7 | 8.3 | 14.9 | 16 | 5.8 | 9.0 |
| Fruits | 6 | 7.1 | 12.8 | 4 | 1.5 | 2.2 |
| No Specific Ingredient | 6 | 7.1 | 12.8 | 42 | 15.3 | 23.6 |
| Poultry | 6 | 7.1 | 12.8 | 27 | 9.9 | 15.2 |
| Shellfish | 6 | 7.1 | 12.8 | 6 | 2.2 | 3.4 |
| Beef | 5 | 6.0 | 10.6 | 23 | 8.4 | 12.9 |
| Fin Fish | 5 | 6.0 | 10.6 | 18 | 6.6 | 10.1 |
| Green Leafy Vegetables | 4 | 4.8 | 8.5 | 9 | 3.3 | 5.1 |
| Infected Worker | 4 | 4.8 | 8.5 | 29 | 10.6 | 16.3 |
| Dairy | 2 | 2.4 | 4.3 | 4 | 1.5 | 2.2 |
| Mushrooms | 1 | 1.2 | 2.1 | 1 | 0.4 | 0.6 |
| Pork | 1 | 1.2 | 2.1 | 2 | 0.7 | 1.1 |
| Other Vehicles | 1 | 1.2 | 2.1 | 3 | 1.1 | 1.7 |
| Beverage | *** | *** | *** | 4 | 1.5 | 2.2 |
| Eggs | *** | *** | *** | 2 | 0.7 | 1.1 |
| Other Vegetables | *** | *** | *** | 7 | 2.6 | 3.9 |

*-% of total outbreaks (2006: N=84; 2001 to 2005: N=274)
**-% of outbreaks where significant ingredient was identified (2006: N=47; 2001 to 2005: N=178)
***-No outbreak reported for that Significant Ingredient in the time period

Table 5. Contributing Factors Identified in Foodborne Disease Outbreaks, New York State, 2006, Compared to Outbreaks between 2001 and 2005.

| Contributing Factor | 2006 | | | 2001 to 2005 | | |
|---|---|---|---|---|---|---|
| | N | %* | %** | N | %* | %** |
| Unknown | 51 | 60.7 | N/A | 144 | 52.6 | N/A |
| Contaminated Ingredients | 10 | 11.9 | 29.4 | 32 | 11.7 | 24.6 |
| Infected Person | 8 | 9.5 | 23.5 | 30 | 10.9 | 23.1 |
| Hand Contact w/Implicated Food | 6 | 7.1 | 17.6 | 17 | 6.2 | 13.1 |
| Natural Toxicant | 6 | 7.1 | 17.6 | 19 | 6.9 | 14.6 |
| Improper Cooling | 5 | 6.0 | 14.7 | 16 | 5.8 | 12.3 |
| Consumption of raw/lightly heated foods of animal origin | 4 | 4.8 | 11.8 | 9 | 3.3 | 6.9 |
| Inadequate Cooking | 4 | 4.8 | 11.8 | 12 | 4.4 | 9.2 |
| Inadequate Hot-Holding | 4 | 4.8 | 11.8 | 20 | 7.3 | 15.4 |
| Inadequate Refrigeration | 4 | 4.8 | 11.8 | 22 | 8.0 | 16.9 |
| Inadequate Reheating | 3 | 3.6 | 8.8 | 12 | 4.4 | 9.2 |
| Other | 2 | 2.4 | 5.9 | 3 | 1.1 | 2.3 |
| Food Preparation Several Hours before Serving | 1 | 1.2 | 2.9 | 13 | 4.7 | 10.0 |
| Added Poisonous Chemicals | *** | *** | *** | 2 | 0.7 | 1.5 |
| Cross-Contamination | *** | *** | *** | 7 | 2.6 | 5.4 |
| Toxic Container | *** | *** | *** | 2 | 0.7 | 1.5 |
| Unapproved Source | *** | *** | *** | 1 | 0.4 | 0.8 |
| Unclean Equipment | *** | *** | *** | 7 | 2.6 | 5.4 |

*-% of total outbreaks (2006: N=84; 2001 to 2005: N=274)
**-% of outbreaks where contributing factor was identified (2006: N=34; 2001 to 2005: N=130)
***-No outbreak reported for that contributing factor in the time period

## Acknowledgements

Thanks are due to county, city, Regional and District Office Foodborne Disease Surveillance Officers, lab staff employed at Local Health Departments and private labs, the New York State Department of Health Wadsworth Center, New York State Department of Health Bureau of Communicable Disease Control, New York State Department of Agriculture and Markets, New York State Department of Environmental Conservation, United States Food and Drug Administration, the Centers for Disease Control and Prevention, and health and agriculture agencies in surrounding states.

County Health Department

Albany
Allegany
Broome
Cattaraugus
Cayuga
Chautauqua
Chemung
Chenango
Clinton
Columbia
Cortland
Dutchess
Erie
Genesee
Livingston
Madison
Monroe
Nassau
Niagara
Oneida
Onondaga
Orange
Orleans
Oswego
Putnam
Rensselaer
Rockland
Schenectady
Schoharie
Seneca
Suffolk
Tioga
Tompkins
Ulster
Westchester
Wyoming

City Health Department

New York City

District and Regional Offices

Western Region
Canton
Capital Region
Geneva
Glens Falls
Herkimer
Hornell
Metropolitan Region
Monticello
Oneonta
Saranac Lake
Central Region
Watertown

Bureau of Community Environmental Health and Food Protection

Director: Michael Cambridge
Assistant Director: Doug Sackett

Section Chief, Food Protection: Barbara Gerzonich

Foodborne Outbreak Coordinators :

David Nicholas
Darby Greco
Ed Carloni
Amy Mears
Kendell Dunham
Jessica Egan