

Evaluation of Food Recalls and Withdrawals Trends Between 2014 and 2018 and Risk
Management Tools to Reduce the Financial Impact of a Recall

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Abstract

Food products are regulated by both the USDA and the FDA. Food recalls are voluntary and can be classified as class I, class II, or class III, depending on the risk to the public. In this project, food recall and withdrawal trends were evaluated between 2014 and 2018. During this timeframe, approximately 1,700 food recalls occurred in the United States. The majority of food recalls were caused by undeclared allergens and pathogen contamination. Risk management and loss control tools are used to prevent recalls or minimize the effects of recalls. Recall insurance is a risk management tool that minimizes a company's financial burden due to a recall event. Recall insurance is widely available but does not cover all of the costs associated with a recall. Risk management tools on-farm or in processing facilities and recall insurance should be used in conjunction with each other to provide the best protection.

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Introduction

The Food Safety and Inspection Service, an agency of the United States Department of Agriculture (USDA), is responsible for overseeing meat and poultry recalls, and the United States Food and Drug Administration (FDA) is responsible for overseeing recalls on most other food products (Kramer et al., 2005). In 1971, the FDA issued the definition of a recall in the Federal Register, Volume 36 (Clevenger, 1972). Clevenger summarized the definition of a recall as “the removal from the market of products which present a threat or potential threat to consumer safety and well-being, or involve product adulteration, or cause gross fraud or deception of consumers, or are materially misleading, causing consumer injury or damage, and which are subject to legal action under other aspects of the FDA’s existing compliance policy.” (1972). Companies typically initiate a recall due to the presence of microbial agents, undeclared allergens, chemicals, or foreign material, as well as incorrect labeling or improper cooking (Kramer et al., 2005).

There are three classes of recalls. Products involved in class I recalls cause serious adverse health effects or death (Lister & Baker, 2010). Recalls caused by contamination from *Listeria monocytogenes*, *Salmonella*, *Escherichia coli* O157:H7, undeclared allergens, and foreign material are classified as class I (Kramer et al., 2005). Products involved in class II recalls cause temporary or reversible adverse health effects (Lister & Baker, 2010). Recalls caused by minor allergens and incorrect labeling are classified as class II (Kramer et al., 2005). Products involved in class III recalls are not likely to cause adverse health effects (Lister & Baker, 2010). In 2006, a New York Senator, Charles Schumer, criticized the FDA’s ability to respond to a potential recall of fruits and vegetables or processed foods due to jurisdictional tangles, and lack of staff and funding (Onyango et al., 2007). Schumer noted that the USDA is better prepared to respond to a potential recall than the FDA (Onyango et al., 2007). The USDA Food Safety and Inspection Service enforces the Federal Meat Inspection Act and the Poultry Products Inspection Act, which allows the Food Safety and Inspection Service to detain meat and poultry that are unsafe for human consumption, adulterated, or misbranded (Thomson & McKenzie, 2001). For food processing facilities

that the FDA regulates, the average length of time between inspections is approximately ten years (Onyango et al., 2007). In 2010, only half of the registered food facilities had been inspected by the FDA within five years (Lister & Baker, 2010). Unlike the FDA, the USDA is required to have an inspector in each of the meat or poultry processing plants (Onyango et al., 2007). The United States Food Safety and Inspection Service can remove inspectors from meat and poultry facilities if a company does not issue a recall (Teratanavat et al., 2005). The FDA releases a regularly updated list of recalls, and this list primarily contains class I recalls (Lister & Baker, 2010).

The FDA requires all domestic and international food handling facilities to register, but these facilities are not required to renew the registration (Lister & Baker, 2010). Imported food contributes to approximately fifteen percent of the food consumed in the United States, and the FDA only inspects approximately one percent of imported food lines (Lister & Baker, 2010).

Some groups have argued for self-regulation of food safety protocols because mandatory government agency regulation would be too expensive and could negatively impact the small farms economically (Onyango et al., 2007). These groups have argued that processors and packers should implement procedures to protect consumers against foodborne illnesses before the government requires certain procedures (Onyango et al., 2007). Food recalls create public doubt in the food industry, which negatively affect interstate, intrastate, and international trade leading to economic impacts (Onyango et al., 2007).

Trends in Food Recalls and Withdrawals - Historical Data

Since 1987, there has been a steady increase in the amount of produce consumed per capita (Onyango et al., 2007). In the studies cited by Onyango et al., half of the outbreaks were caused by cross-contamination in the kitchen, and the other half were caused by produce already contaminated with *Escherichia coli* O157 at the time of purchase (Onyango et al., 2007). Once the consumer has purchased contaminated produce that will be consumed raw, foodborne illness

will likely occur (Onyango et al., 2007). In 1999, it was estimated that 76 million people became sick, 325 thousand people were hospitalized, and 5,000 people died from foodborne illness (Lister & Baker, 2010).

Kramer's study documented an overall increase in the number of recalls between 1993 and 2003, and this is due to more sensitive pathogen tests, increased surveillance through sampling by the USDA, and Pulse Net (2005). The Centers for Disease Control and Prevention manages two programs used to detect and track foodborne illness outbreaks: FoodNet and PulseNet (Hallman & Cuite, 2009). FoodNet monitors foodborne illnesses at public health laboratories in California, Colorado, Connecticut, Georgia, Maryland, Minnesota, New Mexico, New York, Oregon, and Tennessee (Hallman & Cuite, 2009). PulseNet monitors foodborne illness using pulsed-field gel electrophoresis to identify specific strains of pathogens (Hallman & Cuite, 2009). PulseNet tracks outbreak data involving *Escherichia coli O157:H7*, *Non-Typhoidal Salmonella*, *Shigella*, *Campylobacter*, and *Listeria monocytogenes* (Kramer et al., 2005). The USDA Food Safety Inspection Service can use data published on Pulse Net to recommend that a company initiate a recall (Kramer et al., 2005). The recall system discussed in 2005 had several weaknesses – lack of authority by the FDA or the USDA to mandate initiation of recalls, miscommunication between regulatory agencies, and use of incomplete or premature data to suggest a recall (Kramer et al., 2005). The FDA typically has more recalls than the USDA because the FDA regulates more food products than the USDA does (Weaver et al., 2017). In 2010, *Campylobacter jejuni*, *Escherichia coli O157:H7*, *Listeria monocytogenes*, and *Cyclospora cayetenensis* were the foodborne pathogens of greatest concern, and these were not recognized as foodborne pathogens twenty years earlier (Lister & Baker, 2010). The Swiss Re Group, a global insurance and risk management company, studied food recall trends between 2002 and 2004 and

again between 2012 and 2014 (Knusli et al., 2015). The two most common recall reasons were microbiological contamination and incorrect labeling (Knusli et al., 2015). The majority of the recalls were in FDA regulated foods as opposed to the USDA Food Safety and Inspection Service regulated products (Knusli et al., 2015). During the period that Swiss Re studied, ready to eat meals contributed to 21 percent of the total recalls (Knusli et al., 2015). According to Knusli, Friedli, and Busenhardt, ready to eat meals are implicated in the most recalls due to the large number of ingredients and the many steps in the chain between farms and consumers (2015). Processed foods may contribute to more food recalls due to the many ingredients present in these products with both domestic and international origins (Lister & Baker, 2010). Additionally, a single ingredient may be used for multiple products, which can make it difficult to identify the originating cause of a recall (Lister & Baker, 2010).

Smith DeWaal et al. studied foodborne illness outbreaks between 2003 and 2012 (2015). The study determined that produce, seafood, poultry, beef, and dairy caused the most solved outbreaks (Smith DeWaal et al., 2015). An outbreak is considered solved if both the pathogen and food items are identified (Smith DeWaal et al., 2015). It is significantly easier to determine the type of pathogen that caused the foodborne illness than it is to determine the food product that contained the pathogen (Lister & Baker, 2010). Even if the food product is identified, it can be difficult to determine the food handling practice or manufacturing process that contributed to the contamination (Lister & Baker, 2010). During the period studied, bacteria caused 54 percent of solved outbreaks, viruses caused 35 percent of solved outbreaks, chemicals and toxins caused 11 percent of solved outbreaks, and parasites caused less than one percent of solved outbreaks (Smith DeWaal et al., 2015). The researchers also studied the total outbreaks reported and solved outbreaks by state (Smith DeWaal et al., 2015). Table 1 summarizes the percentage of outbreaks

solved by state. Alaska, Hawaii, Louisiana, Minnesota, and South Carolina solved more than half of their state outbreaks. Alabama, Arizona, Delaware, Indiana, Kentucky, Maine, Montana, and Texas solved less than fifteen percent of their state outbreaks (Smith DeWaal et al., 2015). A state's ability to solve an outbreak is determined by the resources of the state's public health institutions (Smith DeWaal et al., 2015).

Trends in Food Recalls and Withdrawals - 2014 to 2018

Food recall and withdrawal data was collected from Recalls, Market Withdrawals, & Safety Alerts from the FDA. The dataset includes date recall was initiated, brand name, product description, recall reason, and company name. For the study reported here, recall data was evaluated between January 1, 2014, and December 31, 2018. A total of 1,751 recalls were reported during the timeframe. Table 2 summarizes the number of recalls per year, during the five-year period, with the highest and lowest number of recalls in 2016 and 2014, respectively.

Figure 1 illustrates the number of recalls per recall reason during the five-year period. The presence of undeclared allergens and pathogens contributed to 91% of the total recalls, with the remaining 9% of the recalls attributed to undeclared chemicals and foreign material, improper processing, and other (Figure 1). Chemicals found in the recalled food products were lead, sulfites, alkaline phosphatase, cadmium, lasalocid, and food coloring. Foreign material found in the recalled food products were plastic, metal, glass, animal matter, rubber, and wood. Some of the techniques that were included in the improper processing category included improper evisceration, pasteurization, and sealing. Most recalled food products fitting the other category (ca. 0.5%) were recalled due to choking hazards, mislabeling, and adulteration. Figure 2 illustrates the type of allergens that contribute to recalled cases. The most common allergen implicated in food recalls is milk, with nearly 30% of the cases, followed by multiple allergens,

with approximately 20% of the cases. Figure 3 illustrates the type of pathogens that contribute to recalled cases due to pathogenic contamination. Two pathogens, *Listeria monocytogenes* and *Salmonella* species contribute to more than 85% of pathogen-recall cases. In 2018, approximately 350 illness cases of Salmonellosis were linked to raw turkey products in 42 states (*Outbreak of Multi-Drug Resistant Salmonella Infections Linked to Raw Turkey Products*, 2019). The outbreak resulted in 133 hospitalizations and one death (*Outbreak of Multi-Drug Resistant Salmonella Infections Linked to Raw Turkey Products*, 2019). During the recall, Jennie-O recalled approximately 300,000 pounds of raw turkey (*Outbreak of Multi-Drug Resistant Salmonella Infections Linked to Raw Turkey Products*, 2019). In 2015, 35 cases of Listeriosis were linked to processed caramel apples using Bidart Bros. Granny Smith and Gala apples (*Multistate Outbreak of Listeriosis Linked to Commercially Produced, Prepackaged Caramel Apples Made from Bidart Bros. Apples (Final Update)*, 2015). The outbreak resulted in a voluntary recall by Happy Apples, California Snack Foods, and Merb's Candies (*Multistate Outbreak of Listeriosis Linked to Commercially Produced, Prepackaged Caramel Apples Made from Bidart Bros. Apples (Final Update)*, 2015).

During the five-year study period, 37 companies reported five or more recalls. The companies with multiple recalls are summarized in Table 3. Fourteen companies reported five recalls - A.S.K. Foods, Aurora Products, Country Fresh, Del Monte Fresh Produce, Dole Fresh Vegetables, Dutch Valley Foods, Greencore USA, Harris Teeter, JFC International, Kanan Enterprises, Nestle, Pinnacle Foods, Trader Joe's, and United Natural Trading. Five companies reported six recalls - Frito-Lay, Giant Food, Lipari Foods, McCain Foods, and Schnucks Market. Four companies reported seven recalls - Blue Bell Ice Cream, Mars, Taylor Farms, and Pictsweet Company. Two companies reported eight recalls - ConAgra Foods and Kraft. Two companies

reported nine recalls - First Source and Vitamin Cottage Natural Food Markets. Three companies reported ten recalls - Fresh Express, General Mills, and Meijer. Five companies reported between eleven and twenty recalls - Hyvee (12), Publix Supermarkets (12), Wegmans (13), H-E-B (18), and Kroger (18). Two companies reported more than twenty recalls - Giant Eagle (25) and Whole Foods Market (52).

Risk Management and Loss Control Suggestions

There are several risk management and loss control techniques that can be utilized to reduce the financial impact of a recall or withdrawal. These techniques are summarized in table 4. Businesses should set up a recall committee to implement a recall plan (Berman, 1999). The recall team is responsible for both preventing and responding to recalls (Kramer et al., 2005). The recall committee should include senior management from various departments and the chief executive officer (Berman, 1999). Departments that should be included in the committee are sales, manufacturing, legal, finance, logistics, and communications (Berman, 1999). The components of a recall plan include contact information for recall team members, the corporate structure, companies throughout the distribution chain, regulatory agencies, decision tree to make quick but thought out decisions, detailed records of important documents, a predetermined system to determine the quantity of product involved, and a unified message for the media (Kramer et al., 2005). A recall plan must be submitted to either the FDA or the USDA describing the consumer notification method and the method or methods to recover the recalled product (Weaver et al., 2017).

When a recall team is set up, the team should review company protocols surrounding production, HACCP, recordkeeping, and traceability of the product within the facility and throughout the distribution chain (Kramer et al., 2005). A Hazard Analysis Critical Control

Points plan is used to reduce food safety risks by identifying potential points in a process or protocol that are entry points for hazards and preventive measures at each of the points (Berman, 1999). Facilities are required to report food safety problems to the FDA within 24 hours of determining there is a food safety problem (Lister & Baker, 2010). A digital hazard analysis critical control point plan can allow faster identification of potential recall exposures (Weaver et al., 2017).

One of the goals of the recall team should be to issue a recall quickly to remove the product from the market before it reaches consumers (Weaver et al., 2017). It is critical for a recall team to work efficiently and utilize resources correctly to avoid a product being pulled from retail distribution for an extended time period (Weaver et al., 2017). The benefit of initiating a recall early includes minimized overhead, communication costs, and product costs (Teratanavat et al., 2005). The amount of product liability claims and lawsuits also decrease when recalls are initiated quickly (Teratanavat et al., 2005). Part of the recall plan should be a database of products and customers as well as lot tracing, so that the recall team can coordinate the customer notification during a recall event (Berman, 1999).

Successful communication with the public is an essential role of the recall team during a recall event (Hallman & Cuite, 2009). Communication should be aimed at all populations that could be affected by the recall and specifically identifies which products have been recalled (Hallman & Cuite, 2009). Companies should consider using multiple platforms to communicate a recall including television and social media websites (Hallman & Cuite, 2009). Hallman and Cuite determined that consumers with lower levels of education, younger consumers, and single consumers were the least likely to be aware of a recall, so communications should be altered to reach these populations (2009). Communications should also be targeted to reach populations at

the greatest risk for adverse health effects including immunocompromised consumers, pregnant women, elderly consumers, and young children (Hallman & Cuite, 2009). More than 175 languages are spoken in the United States, so recall communication may need to be translated into multiple languages to reach non-English speakers that could be affected by the recall (Hallman & Cuite, 2009).

The Food Safety Modernization Act requires that companies keep records of the sources of material one step in the supply chain prior and one step after (Weaver et al., 2017). The goal of a traceability system is to identify the source of a food defect using a backward trace and identify the products that contain the defective food using a forward trace (Resende-Filho & Buhr, 2012). Traceability systems allow for food recall liability identification in a supply chain and quicker withdrawal of recalled food products (Resende-Filho & Buhr, 2012). The recall committee should determine the recall budget by using the number of recalled products sold, the product unit value, costs for labor and material, distribution of the product, and the recall completion rate (Berman, 1999). Additional costs that should be considered when estimating the financial burden of a recall include additional costs such as transportation, destruction, cleaning, refunding, and media, as well as reduced returns, and reduced manufacturer costs (Huirne et al., 2006). After a recall event has been concluded, the recall committee should work to restore the reputation and determine the effectiveness of the recall (Berman, 1999). Two ways that business can restore their reputation are preventing future recalls caused by the same hazard and distinguishing new products from the products that were recalled (Berman, 1999). The effectiveness of a recall can be evaluated by the completion rate and performing a recall audit (Berman, 1999). Companies should conduct mock recalls to determine if the recall plan is adequate or needs adjustments (Kramer et al., 2005).

Swiss Re put together a list of risk management techniques for manufacturers including quality control, temperature tracking, shelf-life labeling, and packaging disposal instructions (Knusli et al., 2015). There are three ways to detect improper product labeling (Teratanavat et al., 2005). The manufacturer or distributor can detect the improper labeling (Teratanavat et al., 2005). The United States Food Safety and Inspection Service conducts regular testing on products and can detect improper labeling through these tests (Teratanavat et al., 2005). Local, state, and federal agencies can collect consumer complaints that reveal improper labeling (Teratanavat et al., 2005).

The practices that can reduce the probability of on-farm contamination include farm worker sanitation, housing animals and their waste products away from produce fields, and using clean water to irrigate fields (Lister & Baker, 2010). Large and small meat and poultry facilities approach food safety in different ways (Teratanavat et al., 2005). Large facilities typically focus on improved technology and smaller facilities focus on protocol adjustments and manual sanitation (Teratanavat et al., 2005). Due to public recognition and concerns over the company's image, companies that produce branded products must invest more company resources in food safety than companies that produce unbranded products (Teratanavat et al., 2005).

Some of the direct costs that businesses incur include customer communication, product recovery, product replacement, product disposal, and profit loss (Berman, 1999). Indirect costs of a recall include product liability litigation, decrease in value of the company's stock, decrease in the availability of export markets (Onyango et al., 2007). In 1996, Odwalla recalled apple juice and suffered a decrease in stock prices equaling thirty percent of shareholder wealth (Weaver et al., 2017). Many studies have examined the financial impacts of recalls on non-food related products but researchers concluded that these findings would be similar to financial

impacts of food recalls including decreased stock prices (Weaver et al., 2017). An example of an economic impact of a large-scale recall in the United States occurred during 1998 (Onyango et al., 2007). 30 million pounds of frankfurters and lunch meats were recalled due to a possible *Listeria* contamination, which cost the company between fifty and seventy million dollars and shut down the processing facility (Onyango et al., 2007). Studies have shown that when a recall is initiated on a meat product, the demand for meat products decreases and shifts toward non-meat products (Kramer et al., 2005). In 2011, the Grocery Manufacturers Association studied the cost of recalls of 36 international companies (Knusli et al., 2015). 52 percent of the recalls totaled more than ten million dollars in recall costs (Knusli et al., 2015). In 2012, XL Foods recalled *Escherichia coli* contaminated beef which resulted in the largest meat recall in Canadian history (Harrison, 2013). After the recall JBS purchased XL Foods and the recall resulted in a decreased value of c\$75,000,000 (Harrison, 2013). Another example of a recall leading to diminished market value occurred in the United Kingdom (Harrison, 2013). Britvic released a product into the market that presented a choking hazard. The recall resulted in a decreased value of GBP100,000,000 (Harrison, 2013).

When a business discovers a safety hazard, adulterated product, or misbranded product, the business has to decide whether to recall or not to recall (Packman, 1998). The Food, Drug, and Cosmetic Act requires companies to protect the health and safety of consumers, which obligates companies to issue a recall on a potentially hazardous product (Packman, 1998). Additionally, issuing a recall raises credibility with the state and federal governing agencies, and provides the company an opportunity to control the publicity around the hazardous product (Packman, 1998). If a company fails to issue a recall, the company can face increased liability due to class action lawsuits and claims of punitive damages (Packman, 1998). If the case goes to

trial, juries can award punitive damage amounts higher than compensatory damages (Packman, 1998). In 1985, The Jewel Companies produced milk contaminated with *Salmonella*, which led to approximately 200,000 cases of Salmonellosis (Packman, 1998). The Jewel Companies believed that the Salmonellosis cases were tied to milk produced only on March 20, so they recalled all milk produced on that day (Packman, 1998). On April 8, Salmonellosis cases were linked to milk produced after March 20, so The Jewel Companies recalled all milk produced at the plant in the Chicago area (Packman, 1998). The class action attorneys sought punitive damages between 30 million and 100 million, but the jury found that The Jewel Companies did not act in gross negligence and did not award punitive damages (Packman, 1998). The Jewel Companies paid approximately 53 million in compensatory damages (Packman, 1998).

The Grocery Manufacturers Association reported that the top three costs associated with a food recall are product disposal, business interruption, and customer reimbursement (Weaver et al., 2017). There has been an increased demand for recall insurance due to the increased number of food recalls (Kramer et al., 2005). Recall insurance can be a large expense for the company depending on the exposure, but the company can reduce the cost of the insurance by implementing food safety plans (Kramer et al., 2005). Product liability insurance covers defense costs and claims related to bodily injury and property damage caused by contaminated food (Knusli et al., 2015). Product recall insurance covers a business's recall related expenses including consumer notification, product testing, disposal cost, product replacement costs, and consumer reimbursement (Knusli et al., 2015). Product recall insurance covers most of the direct costs of a recall, but does not cover the expenses of reimbursing customers for the product's value (Berman, 1999). Contaminated products insurance covers recall expenses and pre-incident consulting related to food contamination (Knusli et al., 2015). Insurance carriers had difficulty in

determining adequate premium levels for the risk of food recall (Meuwissen, Valeeva, Velthuis, & Huirne, 2006). The carriers increased the number of exclusions in the policy and increased risk loadings to combat the uncertainty in premium levels (Meuwissen et al., 2006).

At the time of the study by Meuwissen et al., the majority of the existing food recall insurance policies covered recalls due to contamination but did not cover recalls other than contamination (2006). Other perils that can cause a food recall include quality issues, mislabeled products, and legal issues (Meuwissen et al., 2006). Losses that can result from the other perils include business interruption, customer notification, and relocation expenses (Meuwissen et al., 2006). Insurance policies pay for accidental and unintentional losses (Meuwissen et al., 2006). Therefore, it is imperative that companies follow protocols and ensure third party verifiability (Meuwissen et al., 2006). At the farm level, most processes are not third party verifiable, but at the processing plant level, most of the processes are third party verifiable (Meuwissen et al., 2006). Insurance carriers may require that a company have quality control protocols in place that can be verified by a third party (Meuwissen et al., 2006). Reputational damage is a major concern to companies during a recall event (Harrison, 2013). One insurance carrier developed a recall insurance product to cover third party liability costs and manufacturers errors and omissions (Harrison, 2013). Insurance carriers and brokers require a completed product recall insurance application to provide a quote. The information in the application is used to determine the appropriate rate for the exposure. Applications typically ask for revenue, list of products, quality control procedures, traceability information, and supplier information (*Product Recall Insurance Consumer Goods*, 2017). Product recall insurance is available for businesses of all size, but individual insurance carriers can determine the minimum premium for their individual product. Minimum premiums range from no minimum to \$50,000. Most of the available policies

have a self-insured retention. A self-insured retention is the amount the insured will pay before an insurance carrier will start paying for the loss (*Self Insured Retention*, 2020). Minimum self-insured retentions also vary among insurance carriers, but they range from \$2,500 to \$50,000. (Harrison, 2013). The insurance market is seeing an increased trend in claims related to inaccurate or incomplete labeling of products (Harrison, 2013).

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Figures and Tables

Table 1 – Foodborne Illness: Outbreaks Reported and Solved Outbreaks by State from 2003 to 2012

State	Outbreaks Reported	Outbreaks Solved	Percentage of Outbreaks Solved
Alabama	83	12	14.46%
Alaska	43	24	55.81%
Arizona	240	31	12.92%
Arkansas	29	10	34.48%
California	1303	543	41.67%
Colorado	325	129	39.69%
Connecticut	138	76	55.07%
Delaware	11	1	9.09%
District of Columbia	19	6	31.58%
Florida	929	415	44.67%
Georgia	198	79	39.90%
Hawaii	160	106	66.25%
Idaho	50	24	48.00%
Illinois	637	109	17.11%
Indiana	57	7	12.28%
Iowa	82	37	45.12%
Kansas	255	42	16.47%
Kentucky	27	3	11.11%
Louisiana	40	20	50.00%
Maine	140	7	5.00%
Maryland	246	70	28.46%
Massachusetts	114	29	25.44%
Michigan	371	75	20.22%
Minnesota	487	267	54.83%

Mississippi	20	8	40.00%
Missouri	78	18	23.08%
Montana	12	0	0%
Nebraska	13	4	30.77%
Nevada	43	12	27.90%
New Hampshire	46	18	39.13%
New Jersey	110	34	30.90%
New Mexico	36	6	16.67%
New York	488	221	45.29%
North Carolina	121	35	28.93%
North Dakota	51	12	23.53%
Ohio	720	168	23.33%
Oklahoma	38	14	36.84%
Oregon	210	104	49.52%
Pennsylvania	278	117	42.09%
Rhode Island	39	11	28.21%
South Carolina	91	49	53.85%
South Dakota	15	6	40.00%
Tennessee	180	71	39.44%
Texas	157	18	11.46%
Utah	44	14	31.82%
Vermont	22	8	36.36%
Virginia	130	61	46.92%
Washington	387	192	49.61%
West Virginia	19	5	26.32%
Wisconsin	238	104	43.70%
Wyoming	38	12	31.58%

Table 2 – Number of Food Recalls per Year

Year	Number of Recalls
2018	405
2017	310
2016	447
2015	329
2014	260

Figure 1 - Number of Food Recalls by Recall Reason (2014-2018)

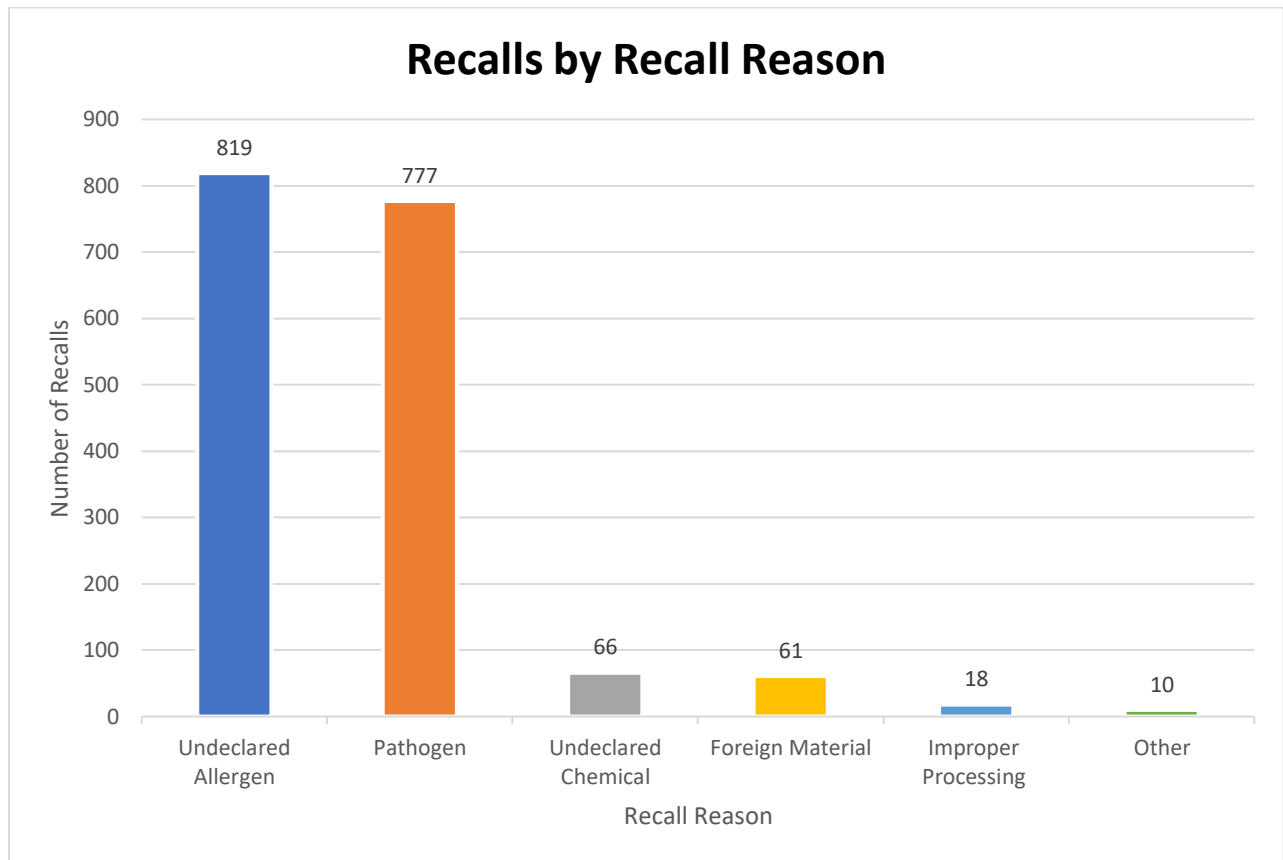


Figure 2 - Number of Allergen Recalls by Allergen Type (2014-2018)

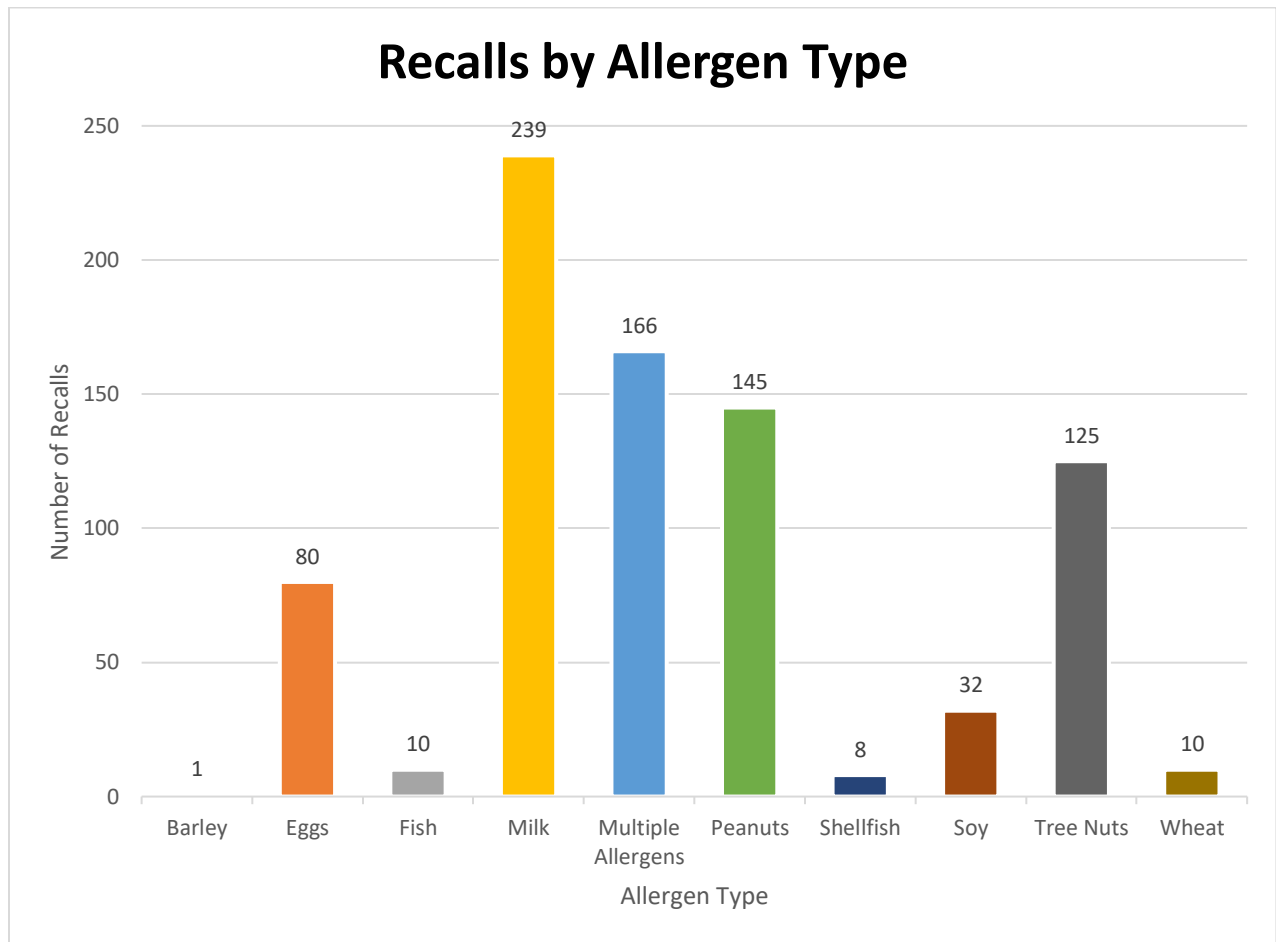


Figure 3 - Recalls by Pathogen Type (2014-2018)

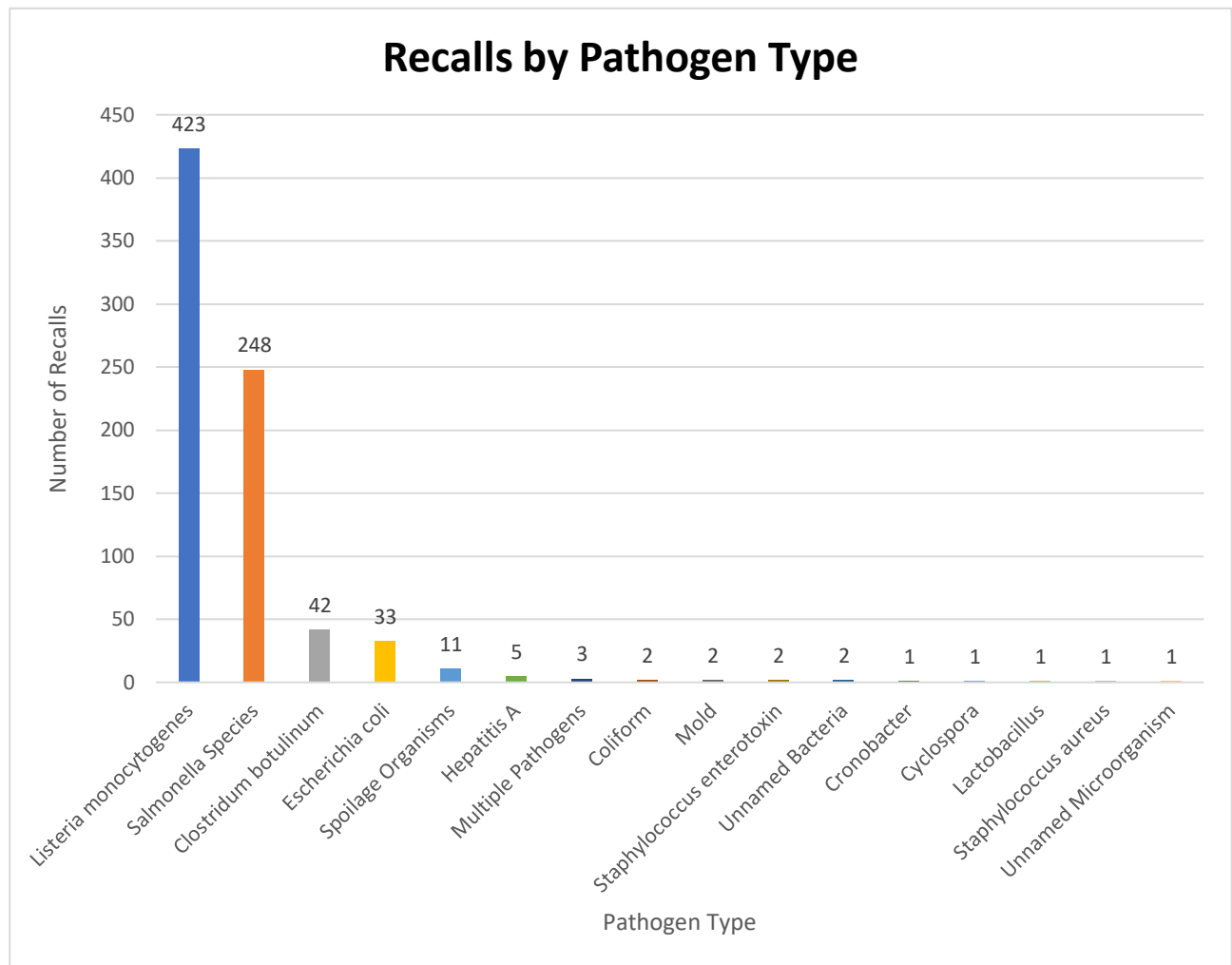


Table 3 – Companies with Multiple Recalls in the Five-Year Timeframe

Number of Recalls	Company Names
5	A.S.K. Foods, Aurora Products, Country Fresh, Del Monte Fresh Produce, Dole Fresh Vegetables, Dutch Valley Foods, Greencore USA, Harris Teeter, JFC International, Kanan Enterprises, Nestle, Pinnacle Foods, Trader Joe's, and United Natural Trading
6	Frito-Lay, Giant Food, Lipari Foods, McCain Foods, and Schnucks Market
7	Blue Bell Ice Cream, Mars, Taylor Farms, and Pictsweet Company
8	ConAgra Foods and Kraft
9	First Source and Vitamin Cottage Natural Food Markets
10	Fresh Express, General Mills, and Meijer
12	Hyvee and Publix Supermarkets
13	Wegmans
18	H-E-B and Kroger
25	Giant Eagle
52	Whole Foods Market

Table 4 – Summary of Risk Management Strategies

Strategy	Description
Establish a Recall Committee	<ul style="list-style-type: none"> • Should include senior management from various departments (sales, manufacturing, legal, finance, logistics, etc.) and the Chief Executive Officer • The team should review company protocols surrounding production, HAACP, recordkeeping, and traceability of the product within the facility and throughout the distribution chain • Successful communication with the public is an essential role of the recall team during a recall event • The team should determine the recall budget by using the number of recalled products sold, the product unit value, costs for labor and material, distribution of the product, and the recall completion rate
Establish a Recall Plan	<ul style="list-style-type: none"> • Should include Contact information for recall team members, the corporate structure, companies throughout the distribution chain, regulatory agencies, decision tree to make quick but thought out decisions, detailed records of important documents, a predetermined system to determine the quantity of product involved, and a unified message for the media • Part of the recall plan should be a database of products and customers as well as lot tracing, so that the recall team can coordinate the customer notification during a recall event • The effectiveness of a recall can be evaluated by the completion rate and performing a recall audit
Utilize Hazard Analysis Critical Control Points (HAACP)	<ul style="list-style-type: none"> • HAACP reduces safety risks by identifying potential points in a process or protocol that are entry points for hazards and preventive measures at each of the points • A digital HAACP plan can allow faster identification of potential recall exposures
Issue a Recall Early	<ul style="list-style-type: none"> • The benefit of initiating a recall early includes minimized overhead, communication costs, and product costs • The amount of product liability claims and lawsuits also decrease when recalls are initiated quickly
Establish a Traceability System	<ul style="list-style-type: none"> • The goal of a traceability system is to identify the source of a food defect using a backward trace and identify the products that contain the defective food using a forward trace • Traceability systems allow for food recall liability identification in a supply chain and quicker withdrawal of recalled food products
Conduct Mock Recalls	<ul style="list-style-type: none"> • A mock recall should be conducted to determine if the recall plan is adequate or needs adjustments

Purchase Insurance	<ul style="list-style-type: none"> • Product liability insurance covers defense costs and claims related to bodily injury and property damage caused by contaminated food • Product recall insurance covers a business's recall related expenses including consumer notification, product testing, disposal cost, product replacement costs, and consumer reimbursement • Contaminated products insurance covers recall expenses and pre-incident consulting related to food contamination • Insurance is available to businesses of all sizes • Minimum premiums range from no minimum to \$50,000 • Minimum self-insured retentions range from \$2,500 to \$50,000
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