



Managing *Salmonella* Contamination Risk in Retail Food Facilities

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Salmonellosis

Salmonellosis is an infection caused by eating food that has been contaminated by a bacterium called *Salmonella*. It is estimated that *Salmonella* causes approximately 1.35 million infections, 26,500 hospitalizations, and 420 deaths in the United States each year (CDC, 2022). Salmonellosis results in symptoms of diarrhea, fever, and abdominal cramps. While illness generally resolves itself without any treatment, it can cause life threatening sickness even in healthy people.

Salmonella is widely distributed in nature and can survive well and even grow in a variety of foods. *Salmonella* is often found in the gastrointestinal tracts of mammals, birds, reptiles, and humans. Most commonly, *Salmonella* is spread by the fecal-oral route, with the host ingesting the *Salmonella* bacteria. The fecal-oral route of transmission can be the result of the consumption of contaminated food or water, by direct contact with an infected animal, or by direct or indirect person-to-person contact. However, the majority of salmonellosis is transmitted by contaminated food.

Salmonella can survive and grow in a variety of foods. Foods contaminated with *Salmonella* are often of animal origin, such as poultry, beef, milk, or eggs; however, any food can become contaminated through environmental contamination, cross-contamination, or by poor food worker hygiene. In recent years, outbreaks of salmonellosis have been traced back to a variety of foods including fresh produce, peanut butter, cereal, and other dried food products (CDC, 2022). *Salmonella* can survive at a wide range of pH values and temperature ranges.

Even if conditions in a food or environment are not suitable for its growth, *Salmonella* can survive for long periods of time on surfaces and foods; so, it is important to prevent *Salmonella* from getting into your facility and contaminating your food and food processing area.



Figure 1: Examples of food that have been associated with previous *Salmonella* outbreaks. Photo source: California Department of Public Health

Salmonella can be easily introduced into and spread throughout food production facilities via raw ingredients, packaging, equipment, and workers' hands and clothing. By taking steps to prevent *Salmonella* from entering your facility, and through an effective sanitation plan and environmental monitoring, you can reduce the risk of *Salmonella* contamination in finished products. This document outlines some things you can do to control *Salmonella* in your facility.

Search for *Salmonella* in the Environment

Develop a program for routinely sampling your facility's production environments for *Salmonella*

via an environmental monitoring program (EMP). EMPs are used to assess cleaning and sanitization procedures and to determine where *Salmonella* is entering into the facility to potentially pose a risk to the food processing environment and food itself. This strategy is favored over testing food ingredients or finished product; as testing the environment may serve as an early warning system for contamination.



Figure 2: Environmental sampling swabs being collected in a food processing facility. Photo source: U.S Food and Drug Administration.

Screen Raw Materials

The quality and safety of your incoming materials could make the difference in the safety of your finished product. Therefore, it is important to have an adequate system in place to monitor all incoming raw materials, especially if these raw products are susceptible to *Salmonella* contamination. A facility can test incoming raw materials, request certificates of independent analysis from suppliers for high-risk ingredients (e.g., nuts, raw egg products, untreated spices), and isolate ingredients that pose a risk for *Salmonella* contamination.

Additionally, it is recommended that ingredients are purchased from reputable sources. Reputable sources could include facilities that undergo third party audits or inspections. It is also important to have a standard operating procedure (SOP) in place to review and approve suppliers.

Use Proper Pest Control Measures

Pests (e.g., rodents, insects, birds) are a well-known source of *Salmonella* contamination throughout the food industry. Pests can be sources of *Salmonella*, so having a pest control program is important to reduce

the likelihood of *Salmonella* entering your facility. A successful pest management program, which addresses both the exterior and interior of a building, should be incorporated into your food facility's sanitation program. Commonly used in agricultural environments, Integrated Pest Management is a broad approach to pest management that focuses on short- and long-term assessments and interventions to identify and implement the most economic and environmentally-conscious approach to manage pests. For instance, identifying that a door screen has a hole that is big enough to allow insects in and fixing the screen.

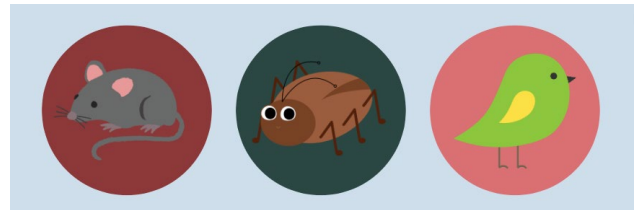


Figure 3: Pests of concern for *Salmonella* contamination in a food processing facility (i) rodents, (ii) insects, and (iii) birds. Figure developed by Claire M. Murphy using Canva.

Worker Health and Hygiene

Salmonella can be easily transferred through poor hygiene practices of workers. Sick workers and poor hygiene practices can contaminate food and cause foodborne illness outbreaks. Employees must be trained to understand the potential sources of contamination and their role in minimizing the risk. Your facility should develop health and hygiene policies and review them frequently. Additionally, employees must be trained on:

- Proper cleaning and sanitizing procedures
- How to properly wash their hands
- Occasions when handwashing must occur (e.g., before starting work, after using the bathroom)
- Cross-contamination prevention procedures (e.g., controlling traffic patterns and ensuring those working with ingredients with high risk of *Salmonella* do not cross paths with finished product)
- Reporting injury or illness
- Employee exclusion (excluding ill workers from any operations that may result in contamination)

Use Proper Cleaning and Disinfection Procedures

Food can easily be contaminated if you don't keep your facility and equipment cleaned and sanitized. While cleaning removes debris from a surface, sanitizing kills the bacteria. It is important to clean before sanitizing because unclean surfaces cannot be sanitized. It is important to have written cleaning and sanitizing procedures in place that can be easily followed. Cleaning can be divided into wet cleaning and/or dry cleaning, depending on the type of food product in your facility. Cleaning procedures can be varied but should be specific to the type of facility. For example, in some instances where the introduction of water would be harmful (e.g., dry areas in bakery), dry cleaning should be used.

Cleaning and sanitizing chemicals must be used in accordance with directions that may include specific usage directions. Maintain a schedule with descriptions of what, where, when, by whom, and how to clean and sanitize your facility. Include a corrective action plan as part of the cleaning and sanitizing procedures, so that if *Salmonella* is found through environmental monitoring, you will be prepared to resolve that problem quickly and correctly.



Figure 4: Pooling water in a food facility, posing a food safety risk. Photo source: Remco

Inspect the Facility

Food safety concerns can also arise due to improperly or poorly maintained equipment or facilities. For instance, the 2006/2007 *Salmonella* outbreak in peanut butter was caused by a roof leak and birds roosting in rafters where the rain leaked through and deposited bird feces into the plant (CDC, 2007). Therefore, it is essential to inspect

your facility and make any necessary repairs. This can include, but is not limited to:

- Conduct roof inspections on a routine basis to catch leaks early
- Maintain floors (e.g., fix cracking) and avoid pooling water
- Maintain door seals
- Repair damaged walls immediately

References and Resources

Center for Disease Control and Prevention (2007)

Multistate Outbreak of *Salmonella* Tennessee Infections Linked to Peanut Butter (FINAL UPDATE). Available at:

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