

Salmonella in Processed Foods: Applying Lessons Learned to Retail

Salmonellosis associated with peanut butter and pot pies were both large outbreaks in 2007 that have had a significant impact on the food processing industry, consumers, and regulatory agencies. Speakers at the 2008 International Association for Food Protection conference provided an in-depth look at these outbreaks. This paper draws preventive conclusions from these experiences that can apply to the retail food environment.

Our perception of *Salmonella* usually includes the recognition of many species and associated foods: *S. poona* in canteloupe, *S. Saintpaul* in tomatoes and/or peppers and *S. enteritidis* in eggs. Raw poultry is known to carry *Salmonella*, and it can inhabit the intestinal tract of humans and other animals. Processed foods like peanut butter certainly are not what first come to mind with this pathogen.

Epidemiologists have known that *Salmonella* could contaminate peanut butter and could grow. There have been two major outbreaks of salmonellosis associated with peanut butter, occurring ten years apart on opposite sides of the globe. The first was *Salmonella* Mbandaka in Australia in 1996. Then in 2007, the first *Salmonella* outbreak in the U. S. associated with peanut butter was caused by *S. Tennessee*.

The processing plant had done some product testing as well as ATP-bioluminescence in the environment, but there were no positive results. The Food and Drug Administration then tested and found three different strains of *S. Tennessee* in the roaster room from the floor drain, sweepings, and broom.

Speculation is that very low levels of *Salmonella* had been present in both plants for a long time. *Salmonella* grows over a wide range of temperatures and will survive long periods of dehydration. These bacteria are much more heat resistant at low-water activities (A_w). Therefore, roasting temperatures may not be sufficient to kill the pathogens.

Moisture was involved in both the Australian and the U. S. outbreaks. In the case of the U. S. plant, an investigation revealed a leaky roof and a faulty sprinkler system. *Salmonella* can come into a plant, restaurant, or supermarket through leaks, on feet, on packaging, and other ways; it is difficult to keep out. According to Don Zink of the FDA, one way of controlling *Salmonella* is to deny it water. “*Salmonella* contamination of processed foods is entirely preventable,” said Zink.

The outbreak in pot pies (turkey, chicken and beef) was described by Patricia White of USDA/FSIS. *Salmonella* 4,5,12:i:- contamination prompted the recall of 420 million pot pies comprising nine brands in 2007. No processing deviations were detected. FSIS testing on the line; ingredients both on-site and at suppliers were all negative. The company's tests revealed no positives except in turkey pot pies, where 17 out of 727 pies tested positive for this pathogen which is related to *S. enterica* Typhimurium. What actually happened has not been determined.

The company made in-plant improvements to eliminate the possibility of cross-contamination. In addition, they made labeling changes to better instruct consumers about cooking, as microwaving seemed to be a contributing factor in the illnesses. There are still many unanswered questions. Was there possible cross-contamination from raw to cooked? Did consumers have a misunderstanding of “prepared” (ready-to-cook vs. ready-to-eat)?

Another question involves flour; however, the crust was identical for all three pot pies, but only turkey was positive. According to Patricia White, *Salmonella* is a naturally occurring contaminant of raw flour, with a 2% chance of being present in any given sample.

There are some lessons learned that can carry over from processing to retail food facilities. Certainly the basic food safety techniques of achieving proper cooking temperatures and preventing cross-contamination must be in place. One of the corrective actions taken in the peanut butter outbreak was enhanced physical separation between raw products and ready-to-eat foods. Personal hygiene, including hand washing and no bare hand contact with ready-to-eat food, is paramount as is adherence to FDA *Food Code* recommendations for exclusion and/or restriction of ill employees.

Floor drains are a specific problem area because they are a composite of the room's environment. Proper cleaning and sanitizing techniques for floor drains should include use of products designed for cleaning drains, as well as eliminating the use of power washers or high-powered sprayers. Directing a forceful spray of water into a floor drain will aerosolize whatever contaminant is in the drain, spreading pathogens around the room.

Since denying water to *Salmonella* can help to control it, keeping a dry environment is important. In a bakery, for example, where flour could be already contaminated with low levels of the bacteria, indiscriminate use of excess water could provide an environment for rapid growth. In any area of the food facility, plumbing leaks and exterior leaks (roof, etc.) must be repaired immediately.

Food safety experts have used the following set of steps known as the “Listeria Equation” for controlling *Listeria monocytogenes*:

Traffic patterns + GMPs + Dry, uncracked, clean floors + Sanitary design + Sanitation procedures = Listeria control

Considering the characteristics of *Salmonella* as well as what occurred in the two processing environments just described, Joseph Meyer of ConAgra Foods suggested that this sequence applies to control of *Salmonella* as well. Mismanagement of any of the components of the equation may increase the risk of cross-contamination.

Restaurants and supermarkets may consider redesigning foot traffic patterns to and from the outside, as well as between departments. Good Retail Practices (GRPs), the retail equivalent of Good Manufacturing Practices (GMPs) for processors, must be in place. Good floor design and repair will eliminate standing water and allow for a dryer environment. Sanitary design of equipment and utensils assures they are durable and easily cleanable, without niches that can become a harborage for microorganisms. SOPs should be written for cleaning and sanitizing to assure the proper use of the correct chemical products for each procedure, and the use of water in a manner that minimizes the creation of aerosols.

Food safety is not a competitive marketing tactic. Lessons learned can be shared across the board to insure that the food supply in this country remains the safest in the world.

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About the Author

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