

A hand is pouring a golden-brown dressing from a glass jar into a clear glass bowl filled with a salad. The salad contains lettuce, sliced chicken, hard-boiled eggs, tomatoes, and onions. The background is blurred, showing a wooden surface and a blue object.

LISTERIA

*A detailed look at how to prevent
the dangerous pathogen in
food processing plants*

AUTHOR
Farha Aslam
Crescent House Capital, LLC

TABLE OF CONTENTS

3 INTRODUCTION

4 INDUSTRY SNAPSHOT – A LOOK AT IMPACT ON FOOD/CONSUMER SAFETY

5 SANITARY DESIGN PRINCIPLES

Environmental Monitoring

Cleaning Practices

9 CONCLUSION



INTRODUCTION

Gaining an edge in the food business is challenging. Companies are striving to come up with innovative products that are truly differentiated in the marketplace and how to get them to the consumer effectively and efficiently.

While the grocery landscape is evolving rapidly, one factor is a constant. Food companies are caretakers of their brands. Their number one task is to protect the brand - whether it is the consumer or corporate brand. This starts with product safety. Food manufacturers do not want a recall. The need to pull products off the shelf damages consumer confidence, impacts customer relationships, results in lost sales, and added costs. It can take years to regain the customer trust, shelf space, and market share. Food recalls are becoming more common and *Listeria* is one of the most consistent culprits. In order to effectively ensure food safety, processing facilities need to formulate a comprehensive program to maintain and monitor cleanliness and hygiene.

WHAT IS LISTERIA?

Listeria monocytogenes (*L. monocytogenes*) is the most common strain of pathogenic bacteria in food processing facilities. Eating food items contaminated by the bacterium *Listeria monocytogenes* can cause the infection listeriosis. The foodborne disease can be lethal, causing flu-like symptoms in healthy adults and potentially far more serious effects on children, pregnant women and the elderly including seizures, permanent disability and death.

The bacteria can be found almost anywhere in the environment including soil, water and vegetation. Controlling *Listeria* in the plant is difficult. The bacterium is often found on equipment, floors, drains and walls. It can survive under low oxygen conditions and grow in refrigerated rooms. Contamination of food products can occur throughout the production process - raw ingredients, plant personnel, storage facilities, and transportation vehicles.



INDUSTRY SNAPSHOT

A LOOK AT IMPACT ON FOOD/CONSUMER SAFETY

The Centers for Disease Control estimates that *Listeria* causes 1,600 illnesses and 260 deaths annually in the US. *Listeria* related recalls have occurred in a wide range of food including products like ready-to-eat deli meats, peanut butter, crackers and pet food.

Food recalls are becoming more common. Bacterial contamination, such as *Salmonella*, *E. coli*, and *Listeria*, is one of the most consistent culprits and is increasing. Food products recalled by the U.S. Food and Drug Administration increased 10% from 2013 to 2018. Recalled pounds regulated by the U.S. Department of Agriculture, which oversees meat production, spiked 57% in the same period, while pounds recalled for *Listeria* went up five-fold.

It is vital to address *Listeria* in the food processing environment in order to assure the safety of finished products. An effective microbial control program needs to be holistic in nature, incorporating sanitary design principles, active environmental monitoring and sensible cleaning practices.



LISTERIA CAUSES
1,600
ILLNESSES



AND 260
DEATHS ANNUALLY
IN THE US.



SANITARY DESIGN PRINCIPLES



Sanitary design of the facility and equipment is one of the most effective food safety strategies. It can prevent the development of microbiological pathogens, thereby reducing potential foodborne illness, injury and recall. Companies should employ the following six sanitary design principles to reduce the potential of *L. monocytogenes*, as well as potentially improve product quality and increase shelf life.

- **SITE SELECTION.** The food facility's location can significantly enhance or detract from food safety. Notably, plants with good access to labor, material, transportation and cleaning services would be advantaged. Production in factories near landfills, refineries, chemical plants or sewage treatment facilities could find it challenging to combat contamination introduced from adjacent areas.
- **PRODUCTION FLOW.** Pathogen control in food production plants is more effective through the separation of raw and cooked areas. In order to prevent cross-contamination, employees working in each of the two areas should have separate entrances to the plant, as well as segregated lunchrooms, locker rooms and restrooms. Product flow should prevent crossover from raw to cooked areas and should not allow cooked product to enter raw area.
- **GROUND MAINTENANCE.** The grounds surrounding the food production site must be maintained to minimize potential contamination. Driveways and parking lots should be paved to minimize dust, roofs and walls should be smooth, cracks should be sealed and drainage should adequately prevent pooling of water.
- **FACILITY MATERIALS.** The appropriate building construction material will be dependent on the product being produced, the harshness of the process and the associated risks. Generally, materials for floors, walls and ceilings should be non-porous, resistant to chemicals, and easily cleaned. Care must be taken in the placement of lighting, plumbing, airducts and electrical wiring.
- **PEST CONTROL.** Industry best practices seek to eliminate pest harborage areas and prevent entry into the building. Landscaping should be kept trimmed and away from the plant. Pests can also be kept at bay with adequate seals on doors and windows. Mesh screens and air curtains help. Lighting should be placed in locations that illuminate entrances, but do not attract insects to the building.
- **EQUIPMENT.** Equipment and utensils must meet regulatory requirements for cleanability, durability and inspectability. It is advised that equipment be made of corrosion-resistant materials that are non-porous, non-absorbent and prevent product or water collection. Hollow conveyor rollers or framing is discouraged because these can collect food material and water, creating a microbial niche.

Well-conceived facility design and maintenance is conducive to sanitary food production. The potential added costs for sanitary materials and equipment could be partially or entirely offset by reduced cleaning and sanitation expense and lower repair costs.



ENVIRONMENTAL MONITORING



Food processors need to have a proactive approach to preventing foodborne contamination. A good testing program is robust and is designed to not only find incidences of *Listeria*, but actively seek it out. The appropriate amount of testing required to mitigate risks, prevent contamination and ensure the safety of finished goods will vary, but the food industry has developed the helpful Environmental Monitoring Zone Concept. The food processing site is compartmentalized into four zones, each with its own testing protocol.

- **ZONE 1** includes all surfaces that have direct contact with food items. Common examples include slicers, mixers, conveyors, utensils, racks and work tables.
- **ZONE 2** is made up of all non-food contact surfaces in the processing area, including the likes of food carts, equipment housing, fears, ventilation equipment, forklifts, floors and drains.
- **ZONE 3** is comprised of hallways and doorways leading into food production areas or, in a large production room, further away from food handling equipment than typical Zone 2 areas. Microbial contamination in Zone 3 could be spread into Zones 1 and 2 via actions of humans or movement of machinery.

- **ZONE 4** incorporates the broader plant locations such as an employee locker rooms, dry goods storage warehouses, finished product warehouses, cafeterias, and loading dock areas.



Most environmental samples collected should be taken from Zone 1 and Zone 2, and to a lesser degree Zone 3. Very few, if any, environmental samples are required from Zone 4. When *Listeria* is found, food producers need to investigate the root cause and take swift corrective action. It is important to document the incident and the solution steps taken to preserve the institutional knowledge and to share the learnings so that others can proactively address the issue.



CLEANING PRACTICES

The fight against *Listeria* requires an effective cleaning and sanitizing program. Cleaning is a necessary first step because food producers cannot sanitize a dirty surface. The amount of cleaning needed and the sanitation required will depend on each processor's individualized hazard analysis. That said, the acronym TACT WINS characterizes eight elements essential for cleaning programs that facilitate safe food production.

- T** **TIME** is required to properly clean plant and equipment. The type of soil, method of cleaning, equipment design and plant size are factors that determine the adequate time required for cleaning.
- A** **ACTION** is the energy required to clean a surface. Manual cleaning with brushes and pads is usually required, albeit foam cleaners and chemicals are also important components.
- C** Correct cleaning compounds at the proper **CONCENTRATION** must be used to clean surfaces. For example, highly caustic cleaners on aluminum surfaces can cause oxidation. The resulting rust spots can harbor bacteria.
- T** The **TEMPERATURE** at which water and cleaners are used affects their efficacy. Each cleaner has an optimum temperature range that should be considered when developing procedures for cleaning.
- W** **WATER** is core in most cleaning programs beginning with the first rinse to remove soil from the surface, to conveying detergents, and finally to washing away remaining residue.
- I** Each **INDIVIDUAL** in the sanitation process must be trained on the proper cleaning procedure for the task he or she will be conducting and be provided the required equipment, particularly personal protective equipment.
- N** The **NATURE** of the product being produced determines the soil that needs to be cleaned. The basic soils in the food industry are fats, proteins, minerals and carbohydrates. Increasingly, the need to address food allergens is shaping the cleaning process.
- S** The material composition of the **SURFACE** being cleaned must be considered, particularly with regard to the chemicals utilized. Notably, polymer-based cleaners can make plastic conveyors brittle and porous, thereby creating opportunities for bacteria to harbor.

[CLEANING PRACTICES CONTINUED]



Once equipment is cleaned, the surface must be sanitized in order to fight microbial pathogens such as *Listeria*. Sanitation may be done with chemicals and/or heat. Positively, modern sanitizers now often have antimicrobial properties. In all cases, care must be taken to ensure residue from the sanitizers and disinfectants does not make its way into food product.

Periodically, food facilities may need to engage in a deep clean that goes beyond the plant's daily cleaning program. Deep cleaning is more thorough, targets hard to clean areas, is done with a higher concentration of chemicals and requires more time. Generally, deep cleaning is a two-day process that is performed over weekends. The frequency of deep cleaning required can vary depending on the food product. Note, if the facility has a biofilm, the deep cleaning process can dislodge embedded bacterium. To address the issue, the deep clean would then need to be repeated, preferably as quickly as possible.





CONCLUSION

Listeria is major challenge for food processors but one that can be prevented with a robust food safety program. Stringent control and monitoring practices are required. Proper cleaning and sanitation are essential. Documentation and training should be organized and ongoing. Food Safety solutions through sanitation and chemistry should be foundational and the highest of priorities for all processors.

REFERENCES

<https://www.fda.gov/safety/recalls-market-withdrawals-safety-alerts>

<https://www.fsis.usda.gov/wps/portal/fsis/topics/recalls-and-public-health-alerts>

<https://www.meatinstitute.org/ht/a/GetDocumentAction/i/97261>

<https://www.foodsafetymagazine.com/magazine-archive1/februarymarch-2003/six-steps-to-effective-sanitary-design-for-the-food-plant/>

https://www.michigan.gov/documents/mdard/Understanding_the_Environmental_Monitoring_Zone_Concept_375002_7.pdf

<https://www.foodengineeringmag.com/articles/98657-the-basics-of-cleaning-and-sanitation-in-food-plants>





ABOUT THE AUTHOR

Farha Aslam is the Managing Partner at Crescent House Capital, an investment and strategic advisory firm she founded that focuses on the agriculture, energy and food processing industries.



Farha has worked in the finance industry since 1996. She was a Managing Director at Stephens Inc. and led the firm's Food and Agribusiness equity research team. At Stephens, Farha built a top-tier research franchise that spanned the grain, ethanol, protein and packaged food sectors and successfully positioned several lead-managed equity offerings and debt financings. Her client relationships include business executives, global portfolio managers, private equity firms and sovereign funds. Prior to Stephens, Farha was a Vice-President at Merrill Lynch and a Risk Management Advisor at UBS.

Farha serves on the Board of Directors of Pilgrims Pride, a leading poultry processor, Fortrex, a company focused on food safety, as well as Saffron Road, a natural food producer and marketer. She is also a board member at Developments in Literacy. Farha graduated from the University of California with a B.A. degree in Economics. She holds a Master of Business Administration degree from Columbia University.



Fortrex is the first line of defense in food safety. The company is a leading provider of sanitation solutions in North America, offering tech-forward innovation to drive growth by helping our customers identify and avoid preventable issues while delivering real-time results. We offer cost-effective solutions to our customers, while providing the highest-level of contaminant defense. Fortrex's team of skilled food sanitors, microbiologists, technical experts and engineers are committed to keeping USDA, FDA, and CFIA processing facilities clean, safe, and audit-ready.

For more information or to schedule a free plant sanitation assessment visit www.FortrexSolutions.com.

FORTREXSOLUTIONS.COM > T: (888) 871-6335
1050 CROWN POINTE PKWY, SUITE 1000 > ATLANTA, GA