



Listeria can establish niches in the following areas:

- Equipment seams
- Gaskets
- Conveyor belts & rollers
- Floors and floor drains
- Cleaning tools & utensils – mops, squeegees, brushes, hoses
- Gear boxes
- Condensate drip pans
- Wheels of forklifts, tractors, and wagons
- Drain lines and grates
- Filters



Listeria monocytogenes in Produce Packing Houses

What is *Listeria monocytogenes* and how is it relevant to fresh produce industry?

Listeria monocytogenes is a bacterium that is commonly found in the environment in **surface water, silage, decaying vegetation, soil, animal feces, and sewage**. It grows best at temperatures between 86°F and 98°F, but has the ability to multiply at temperatures between 34°F and 113°F.

Concerns about *Listeria monocytogenes* (abbreviated LM) have been on the rise due to recent multi-state outbreaks and frequent produce recalls attributed to this pathogen. Although it typically takes large numbers of LM to make someone ill, the consequences of contracting this illness are high to both the consumer and the grower. Mortality rates for LM can be as high as 2 to 3 people for every 10 infected. Older adults, young children, pregnant women, and people with weakened immune systems are especially susceptible to illness. Pregnant women who have LM infections often have only mild symptoms or fever, but their infections may result in miscarriage, premature labor and serious illness or death in newborn infants.

Due to the ubiquitous nature of *Listeria*, fresh produce that does not receive a heat treatment or microbial “kill step” prior to consumption should be considered vulnerable to contamination with LM. Currently, there are no antimicrobial treatments available as an effective kill step for LM on fresh produce, except heat and irradiation. Additionally, FDA and USDA have a zero tolerance policy for LM (no detection of LM in 25 grams of produce) in ready-to-eat food.

Produce growers have to be vigilant in controlling LM in their operations for several reasons, including its high mortality rate, its ability to multiply under refrigeration, its common presence in agricultural settings, and the likelihood of a product recall if it is found on produce. It is important to assess your operation’s vulnerability to LM, and manage risks accordingly.

Control of *Listeria monocytogenes* in Produce Packing Houses

L. monocytogenes is unlike many other pathogens in that it has the ability to multiply over a wide range of temperatures, adapt to a variety of environmental stresses, and persist on equipment for extended periods of time. As many species of *Listeria* can be found throughout the environment, it is expected that *Listeria* will be continually reintroduced into the packing shed through the movement of workers and equipment from field to shed. Once *Listeria* is introduced into the packing shed, it can be easily spread from floors and walls to equipment by workers, pests, and machinery such as forklifts and tractors. For this reason, it is important to consider the flow of food in your operation. If possible, create product flow that would eliminate or reduce traffic of field workers and field equipment through packing areas or areas holding final product.

To control LM, growers should execute a plan that addresses risk from multiple angles. A good control plan should include a master sanitation plan and sanitation schedule, limiting product exposure to known LM sources, preventing cross contamination of raw and finished product, and regular employee training.



ATP Testing

ATP testing is a method of verifying cleaning procedures by measuring Adenosine triphosphate (ATP) – a molecule present in all living cells. ATP monitoring systems detect the amount of ATP left on surfaces after cleaning. Testing is simple – the surface to be sampled should be swabbed according to manufacturer instructions, and placed into the ATP reader. The ATP reader will indicate whether or not surfaces have been adequately cleaned.

Resources

www.cdc.gov/listeria

www.fda.gov

“Environmental Monitoring and Control of Listeria for Fresh Produce Industry”; United Fresh, Fresh Tech Learning Center.

“Guidelines for Controlling Listeria monocytogenes in Small-to-Medium-Scale Packing and Fresh Cut Operations”; Suslow & Harris, UC Davis.

“Listeria monocytogenes: Survival of the Fittest”; Linton & Bhunia, Purdue University

Methods to control the presence of Listeria in the packing house and reduce the chance of final product contamination:

- Implement an adequate sanitation plan and schedule which establishes procedures for thorough cleaning and sanitizing of equipment, utensils, floors and drains
- Prevent standing water in produce packing, storage and high traffic areas
- Prevent cross contamination of product by workers and equipment
- Do not store exposed product or equipment under condensation units or condensate-forming surfaces
- Distinguish between containers used for harvest, washed product, and culls/waste
- Use equipment and containers with surfaces that are smooth, durable, and non-absorbent for effective cleaning and sanitizing ; Absorbent materials such as bare wood, sponges, foam and carpet can harbor pathogens and cannot be effectively sanitized
- Repair or replace equipment with cracks, corrosion, pits, or damaged areas that cannot be thoroughly cleaned
- Floors should be sloped to provide adequate drainage -drains should be maintained to allow adequate drainage and prevent wastewater backup
- Maintain floor coatings to prevent water collection in cracks and to facilitate cleaning
- Designate specific equipment for cleaning floors and drains only – used for no other purpose
- Eliminate any areas of standing water outside the facility, especially in high traffic areas
- Do not set equipment directly on the floor when cleaning, and do not store clean equipment directly on the floor
- Locate outdoor staging areas for manure, compost, and culled produce away from packing shed and growing areas - prevent runoff from these areas
- Limit domestic and wild animals in harvest areas and exclude animals from packing shed
- Train employees in proper sanitation and hygiene practices

Environmental Monitoring Programs

It may be useful to implement an environmental monitoring program to test the effectiveness of your sanitation methods.

Sampling should be done in areas that would be likely to harbor LM, such as wet areas, floor drains, conveyor belts, carts, etc.

Samples that test positive should be promptly addressed using corrective actions, which may include reassessing your sanitation program to determine if modifications need to be made, and evaluating employee practices to determine if retraining is necessary.

ATP testing may also be a useful tool to validate cleaning procedures and should be used on surfaces after cleaning, but prior to sanitizing.

Jennifer Coleman
Food Safety Farm Consultant
Northern Indiana
Indiana State Department of Health
Jencoleman@isdh.in.gov
Phone: 317-476-0059



JoAnna Beck
Food Safety Farm Consultant
Southern Indiana
Indiana State Department of Health
Jbeck1@isdh.in.gov
Phone: 317-476-0056