



PROTECTING YOUR BRAND

PROTECTING YOUR BRAND FROM *LISTERIA MONOCYTOGENES*

Why is it a concern?

If contaminated food reaches the consumer, people can become ill or even die. If the contamination is linked to your food or beverage product, you will need to issue a recall. Recalls result in lost sales, lost goods, and most importantly, lost brand equity.

Listeria monocytogenes is a pathogen that can cause serious illness to humans. It causes a bacterial infection called Listeriosis. Listeriosis is associated with a variety of symptoms ranging from mild flu-like symptoms to death. The degree of illness depends on the person infected. People at highest risk for a severe case include the elderly, pregnant women, infants and the immunosuppressed.

A person with Listeriosis may experience fever, muscle aches and occasional gastrointestinal symptoms such as nausea or diarrhea. If infection spreads to the nervous system, symptoms such as headache, stiff neck, confusion, loss of balance or convulsions can occur. Infected pregnant women may experience only a mild, flu-like illness; however, infections during pregnancy can lead to miscarriage or stillbirth, premature delivery or infection of the newborn. About 5% of the 9000 food poisoning deaths each year are due to Listeriosis.

What is it?

Unique characteristics:

- ▲ Gram-positive Coccoid Rod
- ▲ Aerobic to Microaerophilic
- ▲ Psychrotrophic (34°-113° F.)
- ▲ More heat-resistant than *Salmonella*
- ▲ Grows at a water activity as low as Aw 0.92.
- ▲ Grows in 8-12% NaCl
- ▲ Grows in pH of 4.4 - 9.6
- ▲ Pathogenic

Although *Listeria monocytogenes* is the only member of the *Listeria* family which causes human illness, the presence of any member of the *Listeria* family in a food processing environment indicates that conditions are favorable for *L. monocytogenes*.

This pathogen is typically transferred via food. Dairy products, processed meats, and some vegetables are the most common food products associated with *Listeria*. Foods can become contaminated with *L. monocytogenes* anywhere along the continuum from farm to fork.

Listeria is abundant in nature. It can be found almost anywhere. Because of its pervasiveness, there is a constant re-introduction of the organism into the food plant. It can never be eliminated from the food processing environment. The goal is to **control** it within the production environment.

from *Listeria Monocytogenes*

What food products can carry *Listeria*?

Listeria monocytogenes can be carried in:

- ▲ Dairy products such as cheese, milk, ice cream, non-fat dry milk
- ▲ Processed meat & poultry products: hot dogs, fermented sausages, ready-to-eat products
- ▲ Vegetables: cabbage, lettuce, radishes, tomatoes, celery
- ▲ Fishery products

The International Life Sciences Institute in 2005 described high-risk foods for causing Listeriosis as those with the following properties:

- ▲ Have the potential for contamination with *L. monocytogenes*
- ▲ Support the growth of *L. monocytogenes* in high numbers
- ▲ Are ready-to-eat
- ▲ Require refrigeration
- ▲ Stored for an extended period of time

How can it be identified?

Listeria monocytogenes can only be identified by plating and other laboratory techniques. This process takes several days to complete, and should be conducted by a skilled microbiology laboratory.

In the production environment, ATP rapid testing can be used as an indicator of surface cleanliness. The ATP test is not specific to *Listeria*. The test indicates the presence/absence of living/dead tissue matter and thus, the overall cleanliness of the surface.

How can it be spread?

L. monocytogenes is abundant in nature. It can be isolated from soil, decaying vegetation, sewage, silage, dust and water. The organism is often present in animal and human intestinal tracts. In fact, the organism can be found in just about any damp environment.

The organism can be brought into the plant via raw materials. This includes the raw product to be processed, as well as packaging, pallets, etc. Vehicular traffic can carry in contamination. Within the plant, rolling stock and foot traffic can move *Listeria* into sensitive areas, such as filler rooms, pack lines and RTE process areas.

Humans frequently spread the bacteria. *Listeria* can be carried into the process environment on soiled footwear. Improper hand care can also result in product contamination. It is believed that approximately 10% of the general population are carriers, but the percentage is much higher in groups such as slaughterhouse workers. Perhaps one of the most prevalent causes of contamination is food plant employees who neglect personal hygiene and/or proper sanitation procedures.

It has also been shown that post-pasteurization contamination of food products can occur in plants via aerosol formation of the organism. When present in large numbers, the organism can survive in aerosol suspension for greater than 3 hours. In addition to being carried by water droplets, *Listeria* can be transported throughout a plant by air via attachment to particulate material, such as construction dust.

Plant construction or disruption of the plant environment due to plant or equipment maintenance, without thorough and effective environmental contamination control and sanitation, can result in the spread of *Listeria*.

Where is it typically found in a food processing environment?

Effective control of *L. monocytogenes* requires prevention of contamination (to the extent possible), and prevention of growth through time/temperature or formulation control. Knowledge of potential harborage sites is important, as contamination is more likely to occur when the organism has become established in a niche.

from *Listeria Monocytogenes*

Plant surveys have found *Listeria* in the following locations, listed approximately in order of prevalence:

- ▲ Floors & floor drains
- ▲ Cleaning aids such as brushes, sponges, etc.
- ▲ Product and/or equipment wash areas
- ▲ Food contact surfaces
- ▲ Condensate
- ▲ Walls and ceilings
- ▲ Compressed air
- ▲ Coolers

L. monocytogenes can survive on cold surfaces and also can multiply slowly at 34°F., defeating one traditional food safety defense - refrigeration. Commercial freezer temperature of 0°, however, will stop *L. monocytogenes* from multiplying.

Be observant for hard to reach equipment that is not easily accessible for regular and thorough cleaning. Those areas within the processing area that cannot be effectively cleaned and sanitized in a reasonable time with normal tools and supplies are perfect areas for *Listeria* to grow.

How can it be controlled?

Control of *Listeria* relies on detecting and managing harborage sites with thorough and frequent cleaning and sanitizing with an appropriate EPA sanitizer. This includes daily cleaning of floors and drains, and adequate attention to less frequently cleaned areas, such as HVAC systems, walls, coolers and freezers. Also, damaged equipment, cracks, and crevices should be properly repaired or replaced, and hollow areas eliminated. Equipment with good sanitary design is critical to the control of *Listeria*. It is essential to avoid creation of aerosols during cleaning, especially of floors and drains, to avoid spread of contamination.

Management must be committed to expending the resources necessary to resolving the problem of controlling continual re-introduction of *Listeria* into the plant environment, protecting the business and brand equity, and helping assure customer safety. Each operation needs to be following GMP's (Good Manufacturing Practices) which includes cleaning and sanitation procedures for the entire operation. The plant also needs a HACCP program. Combined, these programs will help to ensure that *L. monocytogenes* is kept in check.

Control methods for Listeria monocytogenes will be product and plant specific; however, the following general guidelines should be considered.

GMP (Good Manufacturing Practices)

- ▲ Successful control of *L. monocytogenes* requires consistency and attention to detail.
- ▲ Sanitation practices should be clearly outlined for specific plant operations. Care should be taken to address the following:
 - ◇ Priority should be given to product contact surfaces.
 - ◇ Isolate wet process areas from other production as much as possible.
 - ◇ Remove standing water as soon as possible.
 - ◇ Condensate - check and clean collection systems regularly, and plumb drip pans to the drain. Look for areas where condensation 'naturally' occurs, such as walls and ceilings.
 - ◇ Eliminate opportunities for cross contamination of raw and finished products.
 - ◇ Refrigerated areas - infrequent cleaning of coolers and freezers used to hold cooked product is a common cause of *Listeria* problems. Never clean coolers or other rooms when RTE product is present. Remove RTE product and carefully follow cleaner directions for use.
 - ◇ For heat-treated products, the focus is preventing recontamination of products during further processing following the heating step.
 - ◇ Never use a high pressure hose to clear a drain, which is a common breeding ground for *Listeria*. An aerosol will be created that will spread contamination throughout the room.
- ▲ Mid-shift clean-ups should be eliminated. They increase the opportunity for spreading *Listeria* throughout the plant, making it more difficult to control.

from *Listeria Monocytogenes*

HACCP Program (Hazard Analysis Critical Control Points)

Listeria contamination arises when the organism becomes established in a niche. When this happens, routine cleaning and sanitizing become ineffective.

Special attention areas include:

- ▲ Rollers for conveyors, especially the hollow type. Hollow equipment should be eliminated.
- ▲ On/off switches
- ▲ Rubber seals around doors
- ▲ Fibrous or porous type conveyor belts
- ▲ Open bearings within equipment such as slicers, strippers, etc.
- ▲ Hollow implements, including box cutters
- ▲ Trash cans and other ancillary items
- ▲ Standing water in production areas
- ▲ Cleaning tools, including mops and sponges. Porous, absorbent materials should be eliminated.
- ▲ Drain back-ups.

Cleaning & Sanitizing Programs

Sanitation programs must include regular cleaning, followed by sanitizing of surfaces utilizing an appropriate EPA-registered sanitizer, following label use instructions. Sanitizer product labels will indicate organism efficacy, sanitizer concentration and sanitizer exposure time.

Cleaning and sanitizing product selection will be dependent upon the food product produced. The purpose of cleaning is to remove all soils from a surface. Cleaning generally removes the visible soils. Invisible soils include microorganisms such as bacteria, yeast and molds. The purpose of sanitizing is to reduce these invisible microorganisms, including *L. monocytogenes*.

Consult your Ecolab representative for recommended cleaning and sanitizing products, procedures and dispensing systems for:

- ▲ Food contact surfaces
- ▲ Conveyor belts
- ▲ Employee hygiene
- ▲ Floors and drains
- ▲ Environmental surfaces (non-food contact)
- ▲ Coolers & freezers
- ▲ Air conditioning systems

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