



## What is *Listeria*?

There are at least 10 different species of *Listeria*.<sup>1</sup>



Some of them are harmless to people, while others can cause serious disease. *Listeria monocytogenes* is a rod-shaped bacterium that causes the disease known as listeriosis. Persons at greatest risk of infection are newborns, pregnant women,

immunocompromised people and the elderly. *Listeria ivanovii* is another type of *Listeria* that has also caused illnesses in people, and is known to cause animal illnesses.

## How do people get sick?

Eating foods contaminated with *Listeria* can cause mild to severe listeriosis illness. The most common symptoms of listeriosis are fever, headache, nausea, and vomiting. In serious cases, it can lead to miscarriage, brain infection, blood poisoning and even death. Although listeriosis is rare in Canada, it can have a very high fatality rate. A multi-state outbreak in the US in 2015 resulted in the deaths of 3 people who consumed ice cream.<sup>2</sup> In Quebec, in 2008 soft cheese products contaminated with *Listeria monocytogenes* led to 38 illnesses and 2 deaths, 16 of the cases involved pregnant women and their babies.<sup>3</sup> Similarly, in 2002 *Listeria*-contaminated cheese from BC caused more than 130 illnesses including two miscarriages.<sup>4</sup>

## Where is *Listeria* found?

*Listeria* is found in many environments including soil, vegetation, feces, and surface water. Animals including cattle, sheep and goats can also be infected or carry *Listeria* without having any illness symptoms.<sup>4</sup> Cows and goats showing no symptoms can excrete *Listeria* in their milk. When 214 raw milk samples were tested in the US up to 50% contained *Listeria monocytogenes*.<sup>5</sup>

## How does *Listeria* end up in dairy plants?

Because *Listeria* are widespread in the natural environment they can easily enter dairy plants via personnel boots, clothes and hands, carts, shipping and receiving docks, and raw milk.<sup>6</sup>

## Can *Listeria* persist in dairy environment?

**Yes!** *Listeria* can survive for long periods of time in food processing environments due to their ability to resist various stresses and form biofilms.<sup>7</sup> Biofilms are communities and layers of bacteria that can form on floors, walls, equipment, and especially on porous surfaces. They are difficult to clean, and sanitizers are not always effective against biofilm bacteria. Eliminating and preventing biofilm formation is crucial, in order to minimize the likelihood of *Listeria* persistence in dairy plants and continuous contamination of finish products. In the dairy industry, finding any type of *Listeria* spp. in the plant environment is a concern.

## Can *Listeria* survive pasteurization?

Proper pasteurization will eliminate *Listeria* from milk.

## Can pasteurized milk be contaminated?

**Yes!** Properly pasteurized milk can still become contaminated post-pasteurization. Unclean or improperly sanitized dairy equipment or containers can be a source of these bacteria.<sup>3</sup> As well, unhygienic practices by dairy plant workers can also contaminate milk contact surfaces. Contamination can occur at many stages of cheese production. Contamination can originate from starter cultures, brine, drains, floors, condensation, packaging, cheese vats and racks, shelves, cheesecloths, curd cutting knives, brushes, coolers, traffic flow, air flow and workers.<sup>8</sup>

Preventing post-pasteurization contamination is critical in the production of dairy products.

### Can refrigerated storage control the risk of *Listeria* in dairy products?

Yes, although *Listeria* are cold loving bacteria that can grow very slowly at refrigeration temperatures below 4°C. As the temperature increases, *Listeria* can grow much faster. Computer modelling shows *Listeria* may increase their numbers by about 10,000-fold when stored at 20°C for 12 hours. As the likelihood of listeriosis occurring is proportional to the number of bacteria ingested, storage of dairy products at 4°C or less is an important factor in minimizing the risk of *Listeria* infection. For dairy products temperature control is critical to *Listeria* control in dairy plants.

### What can be done to eliminate *Listeria*?

Good hygiene and proper operating practices will minimize the risk of transmission of *Listeria* to consumers. The following list includes some of the critical items to remember:

- ✓ ensure all milk is properly pasteurized
- ✓ ensure all milk contact surfaces are clean and properly sanitized prior to use
- ✓ prevent contamination of all milk contact surfaces from outside sources such as aerosols, condensation and water splash
- ✓ ensure dairy plant workers practice good personal hygiene, including changing outer clothes and boots, and washing hands, before entering the processing plant
- ✓ prevent access to plant, including washrooms by outdoors and non-essential personnel
- ✓ store all milk at 4°C or less
- ✓ sanitize drains and change solutions frequently (at least weekly) to destroy *Listeria* organisms that might grow there
- ✓ ensure sanitation program is adequate to prevent biofilm formation
- ✓ avoid the use of porous surfaces that may allow *Listeria* to become embedded and form biofilms

### References

1. McLauchlin J, Rees CED, Dodd CER. *Listeria monocytogenes* and the Genus *Listeria*. In: Rosenberg E, DeLong EF, Lory S, Stackebrandt E, Thompson F, editors. *The Prokaryotes: Firmicutes and Tenericutes*. Berlin, Heidelberg: Springer Berlin Heidelberg; 2014. p. 241-59. Available from: [http://dx.doi.org/10.1007/978-3-642-30120-9\\_210](http://dx.doi.org/10.1007/978-3-642-30120-9_210).
2. Centers for Disease Control and Prevention. Multistate outbreak of listeriosis linked to Blue Bell Creameries Products (Final Update). 2015.
3. Gaulin C, Ramsay D, Bekal S. Widespread listeriosis outbreak attributable to pasteurized cheese, which led to extensive cross-contamination affecting cheese retailers, Quebec, Canada, 2008. *J Food Prot.* 2012 Jan;75(1):71-8.
4. McIntyre L, Wilcott L, Naus M. Listeriosis outbreaks in British Columbia, Canada, caused by soft ripened cheese contaminated from environmental sources. *BioMed research international.* 2015;2015:131623.
5. Jackson EE, Erten ES, Maddi N, et al. Detection and enumeration of four foodborne pathogens in raw commingled silo milk in the United States. *J Food Prot.* 2012 Aug;75(8):1382-93.
6. Minea L, Drug O, Vasilvo C, et al. The main sources of *Listeria monocytogenes* contamination in milk processing plants. *Journal of Preventive Medicine.* 2005;13(3-4):43-51.
7. Latorre AA, Van Kessel JS, Karns JS, et al. Biofilm in milking equipment on a dairy farm as a potential source of bulk tank milk contamination with *Listeria monocytogenes*. *J Dairy Sci.* 2010 Jun;93(6):2792-802.
8. Barancelli GV, Camargo TM, Reis CM, et al. Incidence of *Listeria monocytogenes* in cheese manufacturing plants from the northeast region of Sao Paulo, Brazil. *J Food Prot.* 2011 May;74(5):816-9.

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