

EXECUTIVE SUMMARY

The contamination of food processing facilities by *Listeria monocytogenes*, the causative agent of human listeriosis, threatens the health of those who consume their products. *Listeria monocytogenes*, a bacterium found commonly in the environment, tolerates cold, moist, and salty conditions, facilitating its spread through facilities which process dairy, fish and meat products. The recent Canada-wide listeriosis outbreak associated with ready-to-eat (RTE) meats has reinforced the importance of monitoring and controlling *L. monocytogenes* through the chain of food production. Because RTE foods are commonly eaten without consumer preparation, *L. monocytogenes* can move to consumers from the facilities through the foods they produce. In British Columbia (BC), sampling for *L. monocytogenes* in food and food processing facilities is not required of producers who do not hold federal registration.

To date, there has been no comprehensive assessment of the prevalence of generic *Listeria*, the broad class of organisms which is often used as an indicator for the presence of *L. monocytogenes*, or of *L. monocytogenes* itself, in the food production sector in BC. To fill that gap, a 2009 survey was conducted in BC in order to estimate the prevalence of generic *Listeria* and *L. monocytogenes* in the foods and production environments of dairy, fish and meat facilities producing RTE foods under provincial inspection authority. An additional goal was to examine three production line sub-environments (non-food contact, close-to-food contact and food contact surfaces) in the facilities and to relate the prevalence of generic *Listeria* and *L. monocytogenes* in these sub-environments to that in foods produced in the facilities. The survey was initiated and conducted by the Food Protection Services section of the Environmental Health Services Division of the BC Centre for Disease Control (BCCDC). Collaborating with BCCDC were the Provincial Health Services Authority Laboratories and the five BC Regional Health Authorities.

From August to October 2009, 262 RTE food samples and 305 environmental swabs were collected from 53 BC dairy, fish, and meat RTE food production facilities. All dairies, all slaughterhouses, almost all fish facilities, and a sample of butchers and delis producing RTE foods under provincial inspection authority were included. Environmental swabs and food samples collected in facilities were analyzed using standard culture methods (MFHPB-30 and MFLP-74). Counts of *Listeria* colonies present in foods were performed followed by bacterial culturing in enrichment media. *Listeria monocytogenes* was differentiated from other species of *Listeria* using biochemical media.

Considering dairy, fish, and meat processors together, 9% of the foods tested harbored generic *Listeria* (all *Listeria* species together) and *L. monocytogenes* was isolated from 5% of the food products. RTE foods contaminated with *L. monocytogenes* were identified in the products of 5 of 12 fish processors surveyed, while the pathogen was found in none of the products collected from 17 dairy and 14 meat processors. Generic *Listeria* was found in 13%, and *L. monocytogenes* in 7% of the 305 environmental swab samples tested; in analysis by facility category, fish processing facilities (38%) showed the highest rates of contamination with *L. monocytogenes*. However, while *L. monocytogenes* was found in the processing environment of all three categories of production facilities, only in the fish processing facilities was it identified from food contact surfaces such as slicers, work tables, and cutting surfaces.

The survey results suggest that current practices for the control of *L. monocytogenes* in BC inspected dairy and meat facilities are effective in limiting food contamination with *L. monocytogenes*. However, there is a lack of control of *L. monocytogenes* in RTE fish processing facilities under provincial inspection authority.

Based on our findings, BCCDC recommends:

- Reminding vulnerable populations in BC of the risk associated with the consumption of food products such as soft cheeses, deli-meats and smoked fish. This advice should be set in the context of the relatively low level of reported listeriosis in BC (a median of 11 cases per year from 2000-2009), despite the high level of morbidity and mortality associated with those severe listeriosis infections which do occur. In particular, until levels of *L. monocytogenes* in BC product drop, or until a province wide testing and labeling program can be put in place, pregnant women, immunocompromised individuals and the elderly should be advised of the risks associated with the high prevalence of *L. monocytogenes* in ready-to-eat smoked fish products.
- The development of evidence-based sampling guidelines for industry and government for effective monitoring of *Listeria* spp. and *L. monocytogenes* (and other foodborne pathogens) in RTE food processing facilities and their products to include: facility environments and products to sample, sampling procedures, frequency of sampling, and recommended follow-up actions.
- Enhanced training for food inspectors on the identification and control of *Listeria* spp. in processing environments.
- It is clear from the results of this study that BC fish processing facilities producing ready-to-eat foods require special attention. The purpose of further study and of enhanced inspection should be to improve food safety for consumers of RTE fish products. Specific recommendations for fish processing facilities include:
 - Identification of all provincially licensed fish processing facilities currently producing RTE foods in order to better track output and performance.
 - An assessment of Hazard Analysis Critical Control Points (HACCP) and other control measures in place in fish processing facilities, in conjunction with ongoing microbial testing of both the processing environment and foods to allow objective assessment of the effectiveness of means to audit and track facility hygiene.
 - Encouragement of research into how *Listeria* enters and spreads through the processing environment of smaller RTE food producers.
 - In the case of facilities where *Listeria* is identified, documentation of control measures where implemented, and their impact on the presence of *Listeria* in the processing environment and in fish products, to inform the optimal incorporation of practice-based learning into policies and procedures.

- Establishment of a working group of stakeholders including industry, BC Ministry of Agriculture and Lands, BC Ministry of Health Services, BC Regional Health Authorities and BCCDC to consider the results of this and subsequent surveys of fish processing facilities, seek out system improvements and outline future policy directions.
- Additional sampling for *Listeria* spp. in BC inspected butcher and deli establishments which produce RTE meats, and continuing vigilance by both operators and food safety inspectors for breeches of hygiene which suggest the possibility of contamination by *Listeria* spp. at any BC inspected RTE processor.