Canadian Food Inspection Agency
Agence canadienne d'inspection des aliments

Bacterial Pathogens and Indicators in Ready-to-Eat Meat Sausages - April 1, 2021, to March 31, 2024

Food microbiology - Targeted surveys - Final report



Food microbiology targeted surveys - November 2025

Canada

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Summary

A targeted survey[1] analyzed 863 samples of refrigerated, prepackaged, ready-to-eat (RTE) meat sausages over a 3-year period from April 1, 2021, to March 31, 2024, for the presence of the pathogens *Listeria monocytogenes* (*L. monocytogenes*), *Salmonella* spp., and *Staphylococcus aureus* (*S. aureus*). Samples were also tested for generic *E. coli* which is an indicator of the overall hygienic and sanitary conditions of the food supply chain from production to the point of sale.

Almost all (99.9%) of the 863 samples tested were found to be satisfactory. *L. monocytogenes*, *Salmonella* spp., and *S. aureus* were not found in any samples. Generic *E. coli* at elevated levels was found in 1 of the 863 (0.1%) samples. The Canadian Food Inspection Agency (CFIA) conducted appropriate follow-up activities.

Overall, our survey results indicate that RTE meat sausages sold in Canada are generally safe for consumption. However, as with all foods, and especially those that are RTE, good hygienic practices are recommended for producers, retailers, and consumers.

Why the survey was conducted

The survey was conducted to provide enhanced oversight on the quality and safety of RTE meat sausages sold in Canadian retail stores. The CFIA conducted a baseline survey from 2018 to 2021 on RTE meats[2] (deli meats, liver pâtés, poultry breast strips, sausages) in which *L. monocytogenes* was detected in 9 out of 1,176 (0.8%) of the sausage samples tested.

RTE meat sausages are popular among Canadians[3]. These products vary widely in preparation method (cooked, dry, semi-dry), and animal source (beef, pork, chicken, turkey).

RTE meat sausages have previously been found to be contaminated with pathogens such as *L. monocytogenes*[2] and *Salmonella*[4]. Additionally, RTE meat sausages have been associated with recalls[5] and foodborne illness outbreaks[6].

Contamination with bacterial pathogens can occur at any step in the food supply chain such as during production, processing, packaging, distribution, at retail and/or during preparation for consumption. Consequently, if pathogens are present, there is a potential for foodborne illness, and particularly in those foods that are RTE.

When the survey was conducted

The survey was conducted over a 3-year period from April 1, 2021, to March 31, 2024.

Where the samples were collected from

Samples were collected from national retail chains and local/regional grocery stores located in the following 11 major cities across Canada:

- Halifax
- Moncton
- Quebec City
- Montreal
- Ottawa
- Toronto
- Winnipeg
- Saskatoon
- Calgary
- Vancouver
- Victoria

The planned number of samples to be collected from each city was based on the population of the province in which the city was located relative to the total population of Canada.

Total number and description of samples collected

A total of 863 RTE meat sausage samples were collected. Sampling was limited to refrigerated, pre-packaged sausages made from chicken, turkey, pork, or beef. A sample consisted of a single or multiple consumer sized packages of the same lot weighing at least 250g.

What the samples were tested for

All samples were tested for *L. monocytogenes,* S*almonella* spp., *S. aureus*, and generic *E. coli*. *L. monocytogenes*, *Salmonella* spp., and *S. aureus* are pathogenic bacteria while generic *E. coli* is an indicator of the overall hygienic and sanitary conditions under which the samples have been processed, stored, and transported.

Methods used to test the samples

Samples were analyzed using analytical methods published in Health Canada's *Compendium of Analytical Methods for the Microbiological Analysis of Foods*[7] that were suitable for the testing of RTE meats.

How the samples were assessed

The samples were assessed using criteria based on the principles of the following Health Canada documents: *Health Products and Food Branch (HPFB) Standards and Guidelines for Microbiological Safety of Foods – An Interpretive Summary*[8], *Policy on Listeria monocytogenes in Ready-to-Eat Foods*[9,10], and the *Food and Drugs Act* (Section 4(1)a)[11]. See table 1.

Table 1 - Assessment criteria

Bacteria	Satisfactory	Investigative	Unsatisfactory
L. monocytogenes	Not detected/25 g	Not applicable (category 1[a]) Detected and ≤ 10^2 Colony Forming Unit (CFU)/g (category 2[a])	Detected/25 g (category 1[a]) >10^2 CFU/g (category 2[a])
Salmonella spp.	Not detected/65 g	Not applicable	Detected/65 g
S. aureus	≤ 2.5 x 10^2 CFU/g	> 2.5 x 10^2 and ≤ 10^4 CFU/g	> 10^4 CFU/g
Generic *E. coli*	≤ 10^2 CFU/g	10^2 < x <10^3 CFU/g	> 10^3 CFU/g

No assessment guidelines had been established in Canada for the presence of *Salmonella* spp. in RTE sausages at the time of writing this report. As *Salmonella* spp. are considered pathogenic to humans, their presence might be considered a violation of the Food and Drugs Act Section 4(1)a[11]11 and therefore assessed as unsatisfactory.

Survey results

Almost all (99.9%) of the 863 samples tested were found to be satisfactory. *L. monocytogenes, Salmonella* spp., and *S. aureus* were not found in any of the samples. Generic *E. coli* at elevated levels (>10^2 CFU/g) was found in 1 of the 863 (0.1%) samples (table 2).

Table 2 - Analysis assessment results

Bacterial analysis	Number of samples tested	Satisfactory	Investigative	Unsatisfactory
L. monocytogenes	863	863	0	0
Salmonella spp.	863	863	0	0
S. aureus	862	862	0	0
Generic *E. coli*	862	861	1[b]	0

Survey samples are also presented by product origin (table 3), production practice (table 4), sausage type (table 5), and animal source (table 6).

[a] The pH and water activity of the sample are used to determine the product category.
[b] 200 CFU/g, Lunenberg all beef sausage, Unknown origin (Processed in Canada).

Table 3 - Assessment results by product origin

Origin	Number of samples	Satisfactory	Investigative	Unsatisfactory
Domestic	128	128	0	0
Import	103	103	0	0
Unknown[c] (domestically processed)	627	626	1	0
Unknown[c]	5	5	0	0
Total	**863**	**862**	**1**	**0**

Table 4 – Assessment results by production practice

Production practice	Number of samples	Satisfactory	Investigative	Unsatisfactory
Conventional	851	850	1	0
Organic	12	12	0	0
Total	**863**	**862**	**1**	**0**

Table 5 – Assessment results by RTE sausage type

Sausage type	Number of samples	Satisfactory	Investigative	Unsatisfactory
Cooked	553	552	1	0
Dry	293	293	0	0
Semi-dry	17	17	0	0
Total	**863**	**862**	**1**	**0**

Table 6 – Assessment results by animal source

Animal source	Number of samples	Satisfactory	Investigative	Unsatisfactory
Pork	526	526	0	0
Turkey	67	67	0	0
Beef	51	50	1	0
Chicken	32	32	0	0
Mixed	187	187	0	0
Total	**863**	**862**	**1**	**0**

What the survey results mean

Previous Canadian[2,12] and U.S.[13] studies on the microbial safety of RTE meats have shown results approximating those in our study except with respect to the detection of *L. monocytogenes*. *L. monocytogenes* was detected in 9 out of 1,176 (0.8%) RTE sausage samples in a baseline survey[2] conducted by the CFIA from 2018 to 2021, while in the current study, *L. monocytogenes* was not detected in any of the samples tested.

[c] The product origin could not be assigned from the product label, or available sample information.

Overall, our survey results indicate that RTE meat sausages sold in Canada are generally safe for consumption. However, as with all foods, and especially those that are RTE, good hygienic practices are recommended for producers, retailers, and consumers.

What is done with the survey results

All results are used to:

- inform risk management decisions
- support program design and re-design

The investigative sample triggered appropriate follow-up activities, as necessary.

Where to access the survey data

The data will be accessible on the Open Government Portal.

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