Canadian Food Inspection Agency
Agence canadienne d'inspection des aliments

Bacterial pathogens and indicators in raw fish paste - April 1, 2024, to March 31, 2025

Food microbiology - Targeted surveys - Final report



Canada

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Summary

A targeted survey[1] analysed 33 samples of refrigerated raw fish paste over a 1-year period from April 1, 2024, to March 31, 2025, for the presence of the pathogens *Salmonella* spp., and *Staphylococcus aureus* (*S. aureus*). All samples were also tested for Aerobic Colony Count (ACC) which can be an indicator of the overall hygienic and sanitary conditions of the food supply chain from production to the point of sale.

All (100%) of the samples tested had satisfactory results for both *Salmonella* spp. and *S. aureus* as neither *Salmonella* spp. nor elevated levels of *S. aureus* were detected in any of the samples. ACC at elevated levels were found in 24 of the 33 (72.7%) samples. The Canadian Food Inspection Agency (CFIA) conducted appropriate follow-up activities.

Overall, our survey results indicate that raw fish paste sold in Canada are generally safe for consumption. However, as >70% of the samples in our survey contained elevated levels of indicator organisms, this may be indicative of poor processing controls, and therefore focus should be placed on good hygienic practices for producers, retailers, and consumers.

Why the survey was conducted

Raw fish paste has a long history of use in Asian cuisine. However, in recent years it has grown in popularity in Western countries including Canada as people continue to embrace foods and flavours of cuisines from different parts of the world.

Raw fish paste is generally made using minced fish mixed with salt, egg whites and starch. As raw fish paste is not ready-to-eat (to be cooked prior to consumption), there is a concern that the quality of the fish used to make the paste may be of lower quality (scraps) in commercial grade products. Consequently, a survey was conducted to generate preliminary information on the quality and safety of raw fish paste sold at retail in Canada.

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

When the survey was conducted

The survey was conducted over a 1-year period from April 1, 2024, to March 31, 2025.

Where the samples were collected from

Samples were collected from national retail chains and local/regional grocery stores located in the following 6 major cities across Canada:

- Quebec City
- Montreal
- Toronto
- Ottawa
- Vancouver
- Calgary

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 33 fresh refrigerated raw fish paste samples were collected. 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 *Salmonella* spp., *S. aureus*, and ACC. *Salmonella* spp., and *S. aureus* are pathogenic bacteria while ACC can be 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*[2] that were suitable for the testing of fish paste.

How were samples assessed

The samples were assessed using criteria based on the principles of CFIA's *Bacteriological guidelines for fish and fish products (end product)*[3], and guidelines developed by an international food safety authority[4].

Table 1 - Assessment criteria

Bacteria	Satisfactory	Investigative	Unsatisfactory
Salmonella spp.	Not detected	Not applicable	Detected
S. aureus	≤ 10^3 Colony Forming Units (CFU)/g	> 10^3 and ≤ 10^4 CFU/g	> 10^4 CFU/g
ACC	≤ 10^5 CFU/g	> 10^5 CFU/g	Not applicable

No assessment guidelines had been established in Canada for the presence of *Salmonella* spp., *S. aureus*, or ACC in refrigerated raw fish paste 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*[5] Section 4(1)a and therefore assessed as unsatisfactory.

S. aureus can produce toxins capable of causing foodborne illness and therefore their presence at elevated levels was assessed as investigative, possibly resulting in further follow-up actions.

ACC is the total number of generally harmless bacteria that can grow in an oxygenated (aerobic) environment. ACC can be an indicator of the conditions under which a food is produced, processed, packaged and stored. Their levels in a food product are used to assess the overall sanitation conditions throughout the food chain from production to the point of sale. Their presence at some levels is tolerated, however elevated levels were assessed as investigative, possibly resulting in further follow-up actions.

Survey results

All (100%) of the samples tested were reported as satisfactory as both *Salmonella* spp., and elevated levels of *S. aureus* (> 10^3 CFU/g) were not detected in any of the samples. ACC at elevated levels (> 10^5 CFU/g) were found in 24 of the 33 (72.7%) samples

Table 2 - Analysis assessment results

Bacteria	Number of samples tested	Satisfactory	Investigative	Unsatisfactory
Salmonella spp.	33	33	Not applicable	0
S. aureus	33	33	0	Not applicable
ACC	33	9	24[a]	Not applicable

Survey results are also presented by product origin (table 3), and fish species (table 4).

[a] Counts ranged from 1.1 x 10^5 to > 2.0 x 10^7.

Table 3 - Assessment results by product origin

Product origin	Number of samples tested	Satisfactory	Investigative	Unsatisfactory
Unknown[b] (prepared in Canada)	16	4	12	0
Unknown[b]	17	5	12	0
Total	**33**	**9**	**24**	**0**

Table 4 - Assessment results by fish species

Fish species	Number of samples tested	Satisfactory	Investigative	Unsatisfactory
Basa	2	0	2	0
Cuttlefish	2	1	1	0
Dace	27	7	20	0
Surimi	2	1	1	0
Total	**33**	**9**	**24**	**0**

What the survey results mean

No previously published studies on the microbiological quality and safety of raw fish paste were found at the time of writing this report.

Overall, our survey results indicate that refrigerated raw fish paste sold in Canada are generally safe for consumption. However as >70% of the samples in our survey contained elevated levels of indicator organisms, this may be indicative of poor processing controls, and therefore focus should be placed on good hygienic practices 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 samples triggered appropriate follow-up actions.

Where to access the survey data

The data will be accessible on the Open Government Portal.

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

References

1. Canadian Food Inspection Agency, Food microbiology.
2. Health Canada, Compendium of Analytical Methods. 2011.
3. Canadian Food Inspection Agency, Bacteriological guidelines for fish and fish products (end product). 2025.
4. Food and Drug Administration Philippines, FDA Circular No. 2022-012. Guidelines on the Microbiological Requirements and Assessment of Certain Prepackaged Processed Food Products Repealing FDA Circular No. 2013-010 entitled "Revised Guidelines for the Assessment of Microbiological Quality of Processed Foods". 13 Dec 2022.
5. Health Canada, Food and Drugs Act (R.S.C., 1985, c. F-27). 1985.