Canadian Food Inspection Agency | Agence canadienne d'inspection des aliments

Bacterial Pathogens and Indicators, Viruses, and Parasites in Various Food Commodities - April 1, 2018, to March 31, 2025

Food microbiology - Targeted surveys - Interim Report



Canada

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Summary

From April 1, 2018, to March 31, 2025, a total of 38,917 food samples were tested in a suite of ongoing targeted surveys[1] to investigate the presence of bacterial pathogens and indicators, viruses, and parasites.

Of the samples tested, 99.27% were satisfactory, 0.65% were investigative, and 0.08% were unsatisfactory. The Canadian Food Inspection Agency (CFIA) conducted appropriate follow-up activities including the oversight of industry led voluntary food recalls.

Final reports, which will include a detailed analysis of the results, will be published over the next few years as the surveys are completed.

What an interim report is

An interim report provides preliminary results related to on-going targeted surveys[1] which can vary in duration from several months to several years depending on the objective of each survey.

Will final reports be published

Yes, upon conclusion of the surveys, final reports or scientific publications will be published.

What foods were tested

The presence of bacterial pathogens and indicators, viruses, and parasites was investigated in a variety of foods of the following commodities:

- raw dairy milk cheese
- fresh and frozen fruits and vegetables
- oysters
- baby food
- raw shelled nuts
- kimchi
- cream-filled pastries
- mushrooms

Why these foods were tested

The selected foods are all commonly consumed by Canadians of all ages[2]. Unfortunately, most of these commodities have been associated with recalls and outbreaks of foodborne illnesses. Contamination with pathogens can occur at any step in the food supply chain such as during production, processing, packaging, distribution, and/or at retail. Given that most of the commodities

covered by this report are consumed without further preparation, the presence of pathogens creates the potential for foodborne illness.

When the samples were collected

The samples were collected between April 1, 2018, to March 31, 2025. This report covers a period of 7 fiscal years (2018 to 2019, 2019 to 2020, 2020 to 2021, 2021 to 2022, 2022 to 2023, 2023 to 2024, and 2024 to 2025) with a fiscal year being a 12-month period from April 1 to March 31 of the following year.

Where the samples were collected from

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

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

A sample consisted of a single or multiple consumer-size packages from the same lot weighing at least 250g. 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.

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*[3], CFIA internally developed methods, or methods from other organizations such as ISO or FDA BAM.

How the samples were assessed

The samples were assessed using criteria (tables 1, 2, 3) based on the principles of the following Health Canada documents: *Health Products and Food Branch (HPFB) Standards and Guidelines for Microbiological Safety of Food - An Interpretive Summary*[4], *Policy on Listeria monocytogenes in Ready-to-Eat Foods*[5,6], and the *Food and Drugs Act* (Section 4 (1))[7]. In the absence of Health Canada

standards, policies, or guidelines, the assessment criteria are based on guidelines developed by international food safety authorities. Detailed information about the assessment criteria used for each commodity will be provided in the final reports or scientific publications which will be published after the surveys have concluded.

Table 1 - Assessment criteria for indicator organisms or commercial sterility

Analysis	Product(s)	Satisfactory assessment	Investigative assessment	Unsatisfactory assessment
Aerobic Colony Count (ACC)	Frozen corn or peas	≤$2.5x10^5$ Colony Forming Units (CFU)/g	>$2.5x10^5$ CFU/g	Not Applicable (N/A)
Generic *E. coli*	Fresh fruits and vegetables Frozen cut fruits Frozen corn or peas Mushrooms	≤10^2 CFU/g or Most Probable Number (MPN)/g	>10^2 and ≤10^3 CFU/g or MPN/g	>10^3 CFU/g or MPN/g
Generic *E. coli*	Raw shelled nuts	≤10^2 MPN/g	>10^2 MPN/g	N/A
Generic *E. coli*	Raw milk cheese	≤$5x10^2$ CFU/g or MPN/g	>$5x10^2$ and ≤$2x10^3$ CFU/g or MPN/g	>$2x10^3$ CFU/g or MPN/g
Generic *E. coli*	Frozen RTE cream-filled pastries	≤1.8 MPN/g	>1.8 and ≤10^3 MPN/g	>10^3 MPN/g
Commercial sterility	Baby foods in retort pouches	Pass	N/A	Fail

Table 2 - Assessment criteria for pathogenic bacteria

Analysis	Product(s)	Satisfactory assessment	Investigative assessment	Unsatisfactory assessment
E. coli O157	All products tested for *E. coli* O157	Not detected/25 g	N/A	Detected/25 g
Listeria monocytogenes (*L. monocytogenes*)	Category 1 products[a]	Not detected/25 g	N/A	Detected/25 g
L. monocytogenes	Category 2A and 2B products[a]	Not detected/25 g	≤10^2 CFU/g	>10^2 CFU/g
L. monocytogenes	Whole fruits and vegetables	Not detected/25 g	Detected/25 g (enumeration is required)	N/A
Salmonella spp.	All products tested for *Salmonella* spp.	Not detected/25 g	N/A	Detected/25 g
Staphylococcus aureus (*S. aureus*)	Raw milk cheese	≤10^3 CFU/g	>10^3 and ≤ 10^4 CFU/g	>10^4 CFU/g
S. aureus	Frozen RTE cream-filled pastries	≤10^2 CFU/g	>10^2 and ≤ 10^4 CFU/g	>10^4 CFU/g

Table 3 - Assessment criteria for parasites and viruses

Analysis	Product(s)	Satisfactory assessment	Investigative assessment	Unsatisfactory assessment
Cyclospora[b] Hepatitis A Virus (HAV)[b] Norovirus Genotype (I and II) (NoV (GI and GII))[b]	All products tested for parasites or viruses	Not detected	Detected	N/A

[a] Information such as storage condition (frozen or refrigerated), shelf life, and if applicable, pH and water activity were used to determine the product category.
[b] The detection methods used cannot discriminate between potentially infectious and non-infectious parasites or viruses.

Preliminary survey results

Details about each targeted survey and test results (as of March 31, 2025) can be found in table 4.

Table 4 - Survey results as of March 31, 2025

Fiscal year(s)	Product (sample plan ID)	Microorganisms tested	Number of samples tested	Satisfactory (S)	Investigative (I)	Unsatisfactory (U)	Comments
2020/2021 2021/2022 2022/2023 2023/2024 2024/2025	Imported raw dairy milk cheese (SB3015)	*L. monocytogenes* *Salmonella* spp. *E. coli* O157 *S. aureus* Generic *E. coli*	1620	1620	0	0	All satisfactory
2021/2022 2022/2023 2023/2024 2024/2025	Domestic raw dairy milk cheese (SB3098)	*L. monocytogenes* *Salmonella* spp. *E. coli* O157 *S. aureus* Generic *E. coli*	1201	1199	1	1	U= *L. monocytogenes* (1) I= *S. aureus* (1)
2021/2022 2022/2023 2023/2024 2024/2025	Non-cow raw milk cheese (SB3097)	*L. monocytogenes* *Salmonella* spp. *S. aureus* Generic *E. coli*	1130	1128	1	1	I= *L. monocytogenes* U=Generic *E. coli*
2020/2021	Domestic fresh-cut RTE prepackaged vegetable salads (F242R)	*L. monocytogenes* *Salmonella* spp. *E. coli* O157 Generic *E. coli*	15	15	0	0	All satisfactory
2020/2021	Imported fresh-cut RTE prepackaged vegetable salads (F247R)	*L. monocytogenes* *Salmonella* spp. *E. coli* O157 Generic *E. coli*	193	193	0	0	All satisfactory
2021/2022 2022/2023 2023/2024 2024/2025	Fresh-cut RTE prepackaged leafy vegetable- based salads with dressing kits (SB3209)	*L. monocytogenes* *Salmonella* spp. *E. coli* O157 Generic *E. coli*	1622	1615	0	7	U=*L. monocytogenes* (4) U=*Salmonella* spp. (3)

Fiscal year(s)	Product (sample plan ID)	Microorganisms tested	Number of samples tested	Satisfactory (S)	Investigative (I)	Unsatisfactory (U)	Comments
2021/2022 2022/2023 2023/2024 2024/2025	Fresh-cut RTE prepackaged leafy vegetable-based salads without dressing kits (SB3210)	*L. monocytogenes* *Salmonella* spp. *E. coli* O157 Generic *E. coli*	1532	1526	0	6	U=*L. monocytogenes* (6)
2021/2022 2022/2023 2023/2024 2024/2025	Imported fresh-cut leafy vegetable-based salads (SB3217)	HAV NoV (GI, GII)	1128	1127	1	N/A	I= Nov (GII)
2021/2022 2022/2023 2023/2024 2024/2025	Domestic fresh-cut leafy vegetable-based salads (SB3218)	HAV NoV (GI, GII)	439	438	1	N/A	I= Nov (GII)
2021/2022 2022/2023 2023/2024 2024/2025	Domestic whole leafy vegetables (SB3102)	*Salmonella* spp. *E. coli* O157 Generic *E. coli*	746	741	5	0	I=Generic *E. coli* (5)
2021/2022 2022/2023 2023/2024 2024/2025	Imported whole leafy vegetables (SB3101)	*Salmonella* spp. *E. coli* O157 Generic *E. coli*	1959	1956	2	1	I=Generic *E. coli* (2) U= Generic *E. coli* (1)
2021/2022 2022/2023 2023/2024 2024/2025	Imported fresh leafy herbs (SB3103)	*Salmonella* spp. *E. coli* O157 Generic *E. coli*	1503	1485	11	7	I=Generic *E. coli* (11) U=Generic *E. coli* (7)
2021/2022 2022/2023 2023/2024 2024/2025	Domestic fresh leafy herbs (SB3104)	*Salmonella* spp. *E. coli* O157 Generic *E. coli*	740	730	9	1	I=Generic *E. coli* (9) U=Generic *E. coli* (1)
2020/2021	Domestic whole fresh vegetables and herbs (F258R)	*Salmonella* spp. *E. coli* O157 Generic *E. coli*	91	91	0	0	All satisfactory

Fiscal year(s)	Product (sample plan ID)	Microorganisms tested	Number of samples tested	Satisfactory (S)	Investigative (I)	Unsatisfactory (U)	Comments
2020/2021	Imported whole fresh vegetables and herbs (F259R)	*Salmonella* spp. *E. coli* O157 Generic *E. coli*	196	196	0	0	All satisfactory
2022/2023 2023/2024 2024/2025	Imported fresh leafy herbs (seasonal focus on cilantro) (SB3081)	*Cyclospora*	952	947	5	N/A	I=*Cyclospora* (5)
2021/2022 2022/2023 2023/2024 2024/2025	Imported fresh whole vegetables (SB3105)	*Salmonella* spp. *E. coli* O157 Generic *E. coli*	2144	2143	1	0	I=Generic *E. coli*
2021/2022 2022/2023 2023/2024 2024/2025	Domestic fresh whole vegetables (SB3106)	*Salmonella* spp. *E. coli* O157 Generic *E. coli*	957	957	0	0	All satisfactory
2023/2024 2024/2025	Imported frozen corn or imported frozen peas (SB3126)	*Salmonella* spp. *L. monocytogenes* Generic *E. coli* ACC	300	268	30	1	I= *L. monocytogenes* (9) I= Generic *E. coli* (2) I= ACC (19) U= *Salmonella* spp. (1)
2024/2025	Imported frozen peas (SB3129)	*Salmonella* spp. *L. monocytogenes* Generic *E. coli* ACC	94	85	9	0	I= *L. monocytogenes* (5) I= Generic *E. coli* (1) I= ACC (2) I= Generic *E. coli* and ACC (1)
2024/2025	Imported frozen corn in large package (1kg /package) (SB3130)	*Salmonella* spp. *L. monocytogenes* Generic *E. coli* ACC	18	15	3	0	I= *L. monocytogenes* (1) I= ACC (2)
2024/2025	Imported frozen peas in large package (1kg /package) (SB3131)	*Salmonella* spp. *L. monocytogenes* Generic *E. coli* ACC	18	16	2	0	I= ACC (2)

Fiscal year(s)	Product (sample plan ID)	Microorganisms tested	Number of samples tested	Satisfactory (S)	Investigative (I)	Unsatisfactory (U)	Comments
2021/2022 2022/2023 2023/2024 2024/2025	Imported green onions (SB3223)	HAV NoV (GI, GII)	679	676	3	N/A	I= NoV (GI) (1) I= Nov (GII) (2)
2021/2022 2022/2023 2023/2024 2024/2025	Domestic green onions (SB3224)	HAV NoV (GI, GII)	263	263	0	N/A	All satisfactory
2021/2022 2022/2023 2023/2024 2024/2025	Fresh-cut fruits (SB3211)	*L. monocytogenes* *Salmonella* spp. *E. coli* O157 Generic *E. coli*	1654	1652	0	2	U=*L. monocytogenes* (2)
2021/2022 2022/2023 2023/2024 2024/2025	Frozen cut fruits (SB3112)	*L. monocytogenes* *Salmonella* spp. *E. coli* O157 Generic *E. coli*	1160	1157	2	1	I= Generic *E. coli* (2) U= *Salmonella* spp. (1)
2021/2022 2022/2023 2023/2024 2024/2025	Frozen cut fruits (bulk packaged) (SB3212)	*L. monocytogenes* *Salmonella* spp. *E. coli* O157 Generic *E. coli*	465	465	0	0	All satisfactory
2020/2021	Domestic fresh whole fruits (F260R)	*Salmonella* spp. *E. coli* O157 Generic *E. coli*	81	81	0	0	All satisfactory
2020/2021	Imported fresh whole fruits (F261R)	*Salmonella* spp. *E. coli* O157 Generic *E. coli*	194	194	0	0	All satisfactory
2021/2022 2022/2023 2023/2024 2024/2025	Imported fresh whole fruits (SB3107)	*L. monocytogenes* *Salmonella* spp. *E. coli* O157 Generic *E. coli*	1506	1489	17	0	I=*L. monocytogenes* (17)
2021/2022 2022/2023 2023/2024 2024/2025	Domestic fresh whole fruits (SB3108)	*L. monocytogenes* *Salmonella* spp. *E. coli* O157 Generic *E. coli*	736	729	7	0	I=*L. monocytogenes* (7)
2022/2023 2023/2024 2024/2025	Imported fresh berries (SB341)	*Cyclospora*	1040	1039	1	N/A	I=*Cyclospora*
2021/2022 2022/2023 2023/2024 2024/2025	Imported fresh berries (SB345)	HAV NoV (GI, GII)	1116	1116	0	N/A	All satisfactory

Fiscal year(s)	Product (sample plan ID)	Microorganisms tested	Number of samples tested	Satisfactory (S)	Investigative (I)	Unsatisfactory (U)	Comments
2021/2022 2022/2023 2023/2024 2024/2025	Domestic fresh berries (SB346)	HAV NoV (GI, GII)	551	551	0	N/A	All satisfactory
2021/2022 2022/2023 2023/2024 2024/2025	Domestic oysters (fresh) (SB3219)	HAV NoV (GI, GII)	534	505	29	N/A	I=NoV (GI) (5) I=Nov (GII) (20) I=NoV (GI and GII) (4)
2021/2022 2022/2023 2023/2024 2024/2025	Imported oysters (fresh and frozen) (SB3220)	HAV NoV (GI, GII)	120	55	65	N/A	I=NoV (GI) (13) I=NoV (GII) (15) I=NoV (GI and GII) (37)
2024/2025	Imported oysters (fresh) (SB3229)	HAV NoV (GI, GII)	16	14	2	N/A	I= Nov (GII) (2)
2021/2022 2022/2023 2023/2024 2024/2025	Raw shelled nuts (SB3119)	*Salmonella* spp. *E. coli* O157 Generic *E. coli*	1927	1925	0	2	U= *Salmonella* spp. (2)
2022/2023 2023/2024 2024/2025	Refrigerated kimchi (SB3125)	*L. monocytogenes* *Salmonella* spp. *E. coli* O157	853	853	0	0	All satisfactory
2023/2024 2024/2025	RTE frozen cream-filled pastries (SB3127)	*L. monocytogenes* *Salmonella* spp. *S. aureus* Generic *E. coli*	277	277	0	0	All satisfactory
2021/2022 2022/2023 2023/2024 2024/2025	Baby food in retort pouches (SB3214)	Commercial sterility	758	758	N/A	0	All satisfactory
2024/2025	Domestic fresh leafy herbs (SB3232)	*Cyclospora*	68	68	0	N/A	All satisfactory
2024/2025	Domestic fresh berries (SB3231)	*Cyclospora*	88	88	0	N/A	All satisfactory
2024/2025	Imported fresh whole cantaloupes (SB3133)	*Salmonella* spp. *E. coli* O157 Generic *E. coli*	417	417	0	0	All satisfactory
2018/2019 2019/2020 2021/2022 2022/2023 2023/2024 2024/2025	Frozen cut fruit (SB3063, SB3088, SB3216)	HAV NoV (GI, GII)	2518	2518	0	N/A	All satisfactory

Fiscal year(s)	Product (sample plan ID)	Microorganisms tested	Number of samples tested	Satisfactory (S)	Investigative (I)	Unsatisfactory (U)	Comments
2021/2022 2022/2023 2023/2024 2024/2025	Frozen berries (SB3215, SB3225)	HAV NoV (GI, GII)	1605	1600	5	N/A	I= NoV (GI) (3) I= Nov (GII) (2)
2021/2022 2022/2023 2023/2024 2024/2025	Mushrooms (SB3114, SB3226, SB3228)	*L. monocytogenes* *Salmonella* spp. *E. coli* O157 Generic *E. coli*	1693	1650	42	1	I= *L. monocytogenes* (42) U= Generic *E. coli* (1)
Total (%)	**-**	**-**	**38,917**	**38,631 (99.27)**	**255 (0.65)**	**31 (0.08)**	**-**

What is done with the survey results

All results are used to:

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

All investigative and unsatisfactory results triggered appropriate follow-up actions such as:

- on site visit of the manufacturer
- follow-up with the importer
- review of hygiene and sanitation procedures
- review of production and distribution records
- review of previous laboratory test results
- additional sampling and testing
- food recalls

Where to access the survey data

All of the results reported herein are considered preliminary, as the targeted surveys are still ongoing. Therefore, the data will only be accessible to the public on the Open Government portal following the publication of the final report or scientific publication.

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