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

Bacterial Pathogens and Indicators, Viruses and Parasites in Various Food Commodities - April 1, 2017 to March 31, 2021

Food microbiology - Targeted surveys - Interim report

Food microbiology targeted surveys – January 2022

Canada

Summary

From April 1, 2017 to March 31, 2021, a total of 11,840 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, 99.3% were satisfactory, 0.7% were investigative and 0.02% were unsatisfactory. The Canadian Food Inspection Agency (CFIA) conducted appropriate follow-up activities and no illnesses have been reported related to any of these samples.

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 is an interim report

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 were investigated in a variety of foods of the following commodities:

- raw and pasteurized cheese
- non-cow dairy milk
- fresh fruits and vegetables
- frozen-cut fruits
- plant-based foods
- frozen seafood
- powdered infant formula
- tahini

Why were these foods 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 were the samples collected

The samples were collected from April 1, 2017 to March 31, 2021.

Where were the samples collected from

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

- Halifax
- Saint John or Moncton
- Quebec City
- Montreal
- Toronto
- Ottawa
- Vancouver
- Kelowna or Victoria
- Calgary
- Saskatoon
- Winnipeg

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

What methods were 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] and CFIA internally-developed methods.

How were the samples 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] and the *Food and Drugs Act* (Section 4 (1))[6]. 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 which will be published after the surveys have concluded.

Table 1. Assessment criteria for indicator organisms

Analysis	Product(s)	Satisfactory assessment	Investigative assessment	Unsatisfactory assessment
Aerobic Colony Count (ACC)	Non-cow dairy milk Plant-based milk or ice cream	≤10^6 CFU/g or mL	>10^6 CFU/g or mL	Not Applicable (N/A)
Total coliforms	Non-cow dairy milk Plant-based milk or ice cream	≤10^3 CFU or MPN/g or mL	>10^3 CFU or MPN/g or mL	N/A
Generic *Escherichia coli* (*E. coli*)	Non-cow pasteurized dairy milk cheese	≤ 10^2 CFU or MPN/g	>10^2 and ≤$2x10^3$ CFU or MPN/g	>$2x10^3$ CFU or MPN/g
Generic *E. coli*	Fresh fruits and vegetables	≤ 10^2 MPN/g	>10^2 and ≤10^3 MPN/g	>10^3 MPN/g
Generic *E. coli*	Ready-to-eat (RTE) plant-based meat	≤ 10^2 CFU or MPN/g	>10^2 and ≤10^3 CFU or MPN/g	>10^3 CFU or MPN/g
Generic *E. coli*	Plant-based cheese Raw plant-based meat	≤10^2 CFU or MPN/g	> 10^2 CFU or MPN/g	N/A
Generic *E. coli*	Raw dairy milk cheese	≤$5x10^2$ CFU or MPN/g	>$5x10^2$ and ≤$2x10^3$ CFU or MPN/g	>$2x10^3$ CFU or MPN/g

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
Non-O157 Shiga-toxigenic *E. coli* (STEC)	All products tested for non-O157 STEC	Not detected/25 g	Detected	N/A
Listeria monocytogenes (*L. monocytogenes*)	Category 1 products[a]	Not detected/25 g	N/A	Detected
L. monocytogenes	Category 2A and B products[a]	Not detected/25 g	≤10^2 CFU/g	>10^2 CFU/g
L. monocytogenes	Microgreens	Not detected/25 g	Detected	N/A
Salmonella	All products tested for *Salmonella*	Not detected/25 g	N/A	Detected
Staphylococcus aureus (*S. aureus*)	Plant-based cheese Plant-based RTE meat	≤10^4 CFU/g	>10^4 CFU/g	N/A
S. aureus	Raw dairy milk cheese	≤10^3 CFU/g	>10^3 and ≤ 10^4 CFU/g	>10^4 CFU/g
S. aureus	Non-cow pasteurized dairy milk cheese	≤10^2 CFU/g	>10^2 and ≤10^4 CFU/g	>10^4 CFU/g
Enterobacteriaceae	Powdered infant formula	Not detected/10 g	Detected/10 g	N/A
Cronobacter	Powdered infant formula	Not detected/125 g	N/A	Detected/125 g

[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.

Table 3. Assessment criteria for viruses and parasites

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

[b] The detection methods used cannot discriminate between potentially infectious and non-infectious viruses or parasites.

What were the survey preliminary results

Details about each targeted survey and test results (as of March 31, 2021) can be found in table 4.

Table 4. Survey results as of March 31, 2021

Fiscal year(s)	Product	Microorganisms tested	Number of samples tested	Satisfactory (S)	Investigative (I)	Unsatisfactory (U)	Comments
2020/2021	Imported raw dairy milk cheese	*L. monocytogenes* *Salmonella* *E. coli* O157 *S. aureus* Generic *E. coli*	486	486	0	0	All satisfactory
2019/2020 2020/2021	Non-cow pasteurized dairy milk cheese	*L. monocytogenes* *Salmonella* *S. aureus* Generic *E. coli*	316	316	0	0	All satisfactory
2019/2020 2020/2021	Non-cow dairy milk	*L. monocytogenes* *Salmonella* ACC Total coliforms	309	247	62	0	I=ACC (50) I= Total coliforms (4) I= ACC & total coliforms (8)
2020/2021	Domestic fresh-cut RTE prepackaged vegetable salads	*L. monocytogenes* *Salmonella* *E. coli* O157 Generic *E. coli*	15	15	0	0	All satisfactory
2020/2021	Imported fresh-cut RTE prepackaged vegetable salads	*L. monocytogenes* *Salmonella* *E. coli* O157 Generic *E. coli*	193	193	0	0	All satisfactory
2020/2021	Domestic fresh whole vegetables	*E. coli* O157 *Salmonella* Generic *E. coli*	91	91	0	0	All satisfactory
2020/2021	Imported fresh whole vegetables	*E. coli* O157 *Salmonella* Generic *E. coli*	196	196	0	0	All satisfactory
2020/2021	Domestic fresh whole fruits	*E. coli* O157 *Salmonella* Generic *E. coli*	81	81	0	0	All satisfactory
2020/2021	Imported fresh whole fruits	*E. coli* O157 *Salmonella* Generic *E. coli*	194	194	0	0	All satisfactory
2020/2021	Domestic whole leafy vegetables	*E. coli* O157 STEC Generic *E. coli*	76	76	0	0	All satisfactory
2020/2021	Imported whole leafy vegetables	*E. coli* O157 STEC Generic *E. coli*	102	102	0	0	All satisfactory
2019/2020 2020/2021	Imported romaine lettuce	*E. coli* O157 Generic *E. coli*	457	457	0	0	All satisfactory

Fiscal year(s)	Product	Microorganisms tested	Number of samples tested	Satisfactory (S)	Investigative (I)	Unsatisfactory (U)	Comments
2019/2020 2020/2021	Imported romaine lettuce hearts	*E. coli* O157 Generic *E. coli*	682	681	1	0	I=Generic *E. coli*
2019/2020 2020/2021	Imported fresh-cut romaine lettuce	*E. coli* O157 Generic *E. coli*	516	516	0	0	All satisfactory
2019/2020 2020/2021	Fresh seed sprouts	*E. coli* O157 STEC Generic *E. coli*	457	455	1	1	I= non-O157 STEC U=Generic *E. coli*
2019/2020	Fresh microgreens	*E. coli* O157 STEC Generic *E. coli* *Salmonella* *L. monocytogenes*	75	73	2	0	I=*L. monocytogenes* I=Generic *E. coli*
2020/2021	Imported tahini	*Salmonella*	71	70	N/A	1	U= *Salmonella*
2020/2021	Powdered infant formula	*Cronobacter* *Enterobacteriaceae*	122	122	0	0	All satisfactory
2020/2021	Imported prepackaged leafy greens and salads	*Cyclospora* *Giardia*	352	350	2	N/A	I= *Cyclospora* I= *Giardia*
2017/2018 2018/2019 2019/2020 2020/2021[c]	Imported fresh berries	*Cyclospora* *Cryptosporidium* *Toxoplasma*	1396	1395	1	N/A	I=*Cyclospora*
2019/2020	Imported green onions	*Cyclospora* *Cryptosporidium* *Toxoplasma*	197	197	0	N/A	All satisfactory
2017/2018 2018/2019	Imported fresh leafy herbs	*Cyclospora* *Cryptosporidium* *Toxoplasma*	771	771	0	N/A	All satisfactory
2019/2020 2020/2021[c]	Imported fresh leafy herbs (seasonal focus on cilantro and basil)	*Cyclospora* *Cryptosporidium* *Toxoplasma*	589	587	2	N/A	I= Cyclospora (2)
2017/2018	Imported fresh leafy herbs	HAV NoV (GI, GII)	799	798	1	N/A	I=NoV (GII)
2020/2021	Domestic leafy greens and herbs	HAV NoV (GI, GII)	122	122	0	N/A	All satisfactory
2020/2021	Imported leafy greens and herbs	HAV NoV (GI, GII)	138	138	0	N/A	All satisfactory
2018/2019 2019/2020	Imported frozen-cut fruits	HAV NoV (GI, GII)	484	484	0	N/A	All satisfactory
2020/2021	Imported frozen scallops	HAV NoV (GI, GII)	112	112	0	N/A	All satisfactory
2019/2020 2020/2021	Plant-based cheese	*L. monocytogenes* *Salmonella*	358	357	1	0	I=Generic *E. coli*

Fiscal year(s)	Product	Microorganisms tested	Number of samples tested	Satisfactory (S)	Investigative (I)	Unsatisfactory (U)	Comments
		S. aureus Generic *E. coli*					
2019/2020 2020/2021	Plant-based ice cream	*L. monocytogenes* *Salmonella* ACC Total coliforms	518	515	3	0	I=*L. monocytogenes* I= ACC & total coliforms (2)
2019/2020 2020/2021	Plant-based milk	*L. monocytogenes* *Salmonella* ACC Total coliforms	714	710	4	0	I=ACC
2020/2021	Plant-based RTE sausages / burgers	*L. monocytogenes* *Salmonella* *S. aureus* Generic *E. coli*	563	563	0	0	All satisfactory
2020/2021	Plant-based Raw sausages / burgers	*E. coli* O157 *Salmonella* Generic *E. coli*	288	286	2	0	I= Generic *E. coli*
Total (%)	**-**	**-**	**11,840**	**11,756 (99.3)**	**82 (0.7)**	**2 (0.02)**	

[c] Samples tested for *Cyclospora* only

What is done with the survey results

All results are used to:

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

While no illnesses were linked to the investigative and unsatisfactory samples, these results triggered appropriate follow-up actions such as:

- facility inspections
- additional sampling and testing
- removal of affected products from the marketplace

Can I access the survey data

All of the results reported herein are considered preliminary, as the targeted survey 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.

References

1. Canadian Food Inspection Agency, Food chemistry and microbiology.
2. Public Health Agency of Canada, *Foodbook Report*. 2015.
3. Health Canada, *Compendium of Analytical Methods*. 2011.
4. Health Canada, *Health Products and Food Branch (HPFB) Standards and Guidelines for Microbiological Safety of Food - An Interpretive Summary*. 2008.
5. Health Canada, *Policy on Listeria monocytogenes in Ready-to-Eat Foods*. 2011.
6. Department of Justice, *Food and Drugs Act*., 2014.