



Targeted Survey

REPORT

2012/13 - 2013/14 Targeted Surveys

Targeted Surveys Investigating *Salmonella*,
Listeria monocytogenes and Generic *E. coli* in Tahini



Table of Contents

Executive Summary	2
1 Introduction	4
1.1 Targeted Surveys	4
1.2 Codes of Practice, Acts, and Regulations	4
2 Survey on Tahini	5
2.1 Rationale	5
2.2 Targeted Microorganisms	6
2.2.1 <i>Salmonella</i> spp.	6
2.2.2 <i>Listeria monocytogenes</i>	7
2.2.3 Generic <i>E. coli</i> as an Indicator of Fecal Contamination	7
2.3 Sample Collection	7
2.4 Analytical Methods and Assessment Guidelines	8
2.5 Limitations	9
3 Results	9
3.1 Sample Distribution	9
3.2 Assessment Results	11
4 Discussion and Conclusion	12
5 References	14
Appendix A List of Acronyms	16
Appendix B Global Foodborne Disease Outbreaks Associated with Tahini Contaminated with Bacterial Pathogens (2000 - March 2014)	17
Appendix C Tahini Recalls in the U.S. and Canada (2007 - March 2014)	18
Appendix D Analytical Methods Used for Microbial Analysis	19

Executive Summary

Targeted surveys are used by the Canadian Food Inspection Agency (CFIA) to focus its surveillance activities on areas of highest risk. The information gained from these surveys provides both support for the prioritization of the Agency's activities to areas of greater concern and scientific evidence to address areas of lesser concern. Originally started under the Food Safety Action Plan (FSAP), targeted surveys have been incorporated into the CFIA's regular surveillance activities as a valuable tool for generating essential information on certain hazards in foods, identifying/characterizing new and emerging hazards, informing trend analysis, prompting/refining human health risk assessments, assessing compliance with Canadian regulations, highlighting potential contamination issues, and promoting compliance.

In recent years, foodborne outbreaks of salmonellosis associated with tahini have been reported worldwide. Tahini is a sesame seed-based processed low moisture food or food ingredient. Contaminated sesame seeds and/or cross-contamination due to poor hygiene practices during processing are believed to be the main sources and routes of contamination. Once contaminated, *Salmonella* can survive in tahini during the shelf-life and could cause illness upon consumption. If contaminated tahini is used as an ingredient, the tahini-based products subsequently become contaminated. In addition, contamination of tahini with *Listeria monocytogenes* (*L. monocytogenes*) is also a safety concern as this bacterium is widely distributed in the environment and can survive and/or grow in tahini-based high moisture foods under refrigeration conditions.

Considering the above factors and their relevance to Canadians, tahini has been selected as one of the food ingredients for enhanced surveillance. Over the course of four years of targeted surveys on tahini (2010/11 to 2013/14), approximately 2,400 samples of tahini were collected from Canadian retail locations and tested for the presence of bacterial pathogens of concern.

The main objectives of the 2012/13 and 2013/14 surveys were to generate baseline data on bacterial pathogens *Salmonella* and *L. monocytogenes*, and on generic *Escherichia coli* (*E. coli*), an indicator of fecal contamination, for tahini available in the Canadian market. In a total of 1166 tahini samples analyzed, *L. monocytogenes* was not detected in any of the samples, levels of generic *E. coli* were found to be acceptable in all the samples and *Salmonella* was found in four tahini samples (0.3%). These unsatisfactory findings resulted in four products recalls. The survey results suggest that the majority of tahini in the Canadian market sampled during these surveys were produced under Good Manufacturing Practices (GMPs) and/or Good Agricultural Practices (GAPs). However, the results also indicate that contamination of tahini with *Salmonella* can occur, which could represent a food safety risk.

The CFIA regulates and provides oversight to the food industry, works with provinces and territories, and promotes safe handling of foods throughout the food production chain. However, it is important to note that the food industry, importers, and retail sectors are ultimately responsible for the food they produce, import, and sell, while individual consumers are responsible for the safe handling of the food they have in their possession. Moreover, general advice for the consumer on the safe handling of foods is widely available. The CFIA will continue its surveillance activities and inform the Canadian public and stakeholders of its findings.

1 Introduction

1.1 Targeted Surveys

The Canadian Food Inspection Agency (CFIA) monitors both domestic and imported foods for the presence of allergenic, microbiological, chemical, and physical hazards. One of the tools used to maintain this oversight are targeted surveys, which are a means to establish baseline information on specific hazards and to investigate emerging risks. Targeted surveys are part of the Agency's core activities along with other surveillance strategies, which include the National Chemical Residue Monitoring Program (NCRMP), the National Microbiological Monitoring Program (NMMP), and the Children's Food Project (CFP). The surveys are complementary to other CFIA surveillance activities in that they examine hazards and/or foods that may not be routinely included in these monitoring programs.

Targeted surveys are used to gather information regarding the possible occurrence or prevalence of hazards in defined food commodities. These surveys generate essential information on certain hazards in foods, identify or characterize new and emerging hazards, inform trend analysis, prompt or refine human health risk assessments, assess compliance with Canadian regulations, highlight potential contamination issues, and/or influence the development of risk management strategies as appropriate.

Due to the vast number of hazard and food commodity combinations, it is not possible, nor should it be necessary, to use targeted surveys to identify and quantify all hazards in foods. To identify food-hazard combinations of greatest potential health risk, the CFIA uses a combination of scientific literature, the media, and/or a risk-based model developed by the Food Safety Science Committee, a group of federal, provincial and territorial subject matter experts in the area of food safety.

These targeted surveys (2012/13 and 2013/14) represents part of the collection of approximately 3,000 samples of tahini and sesame seeds over four years of targeted surveys between 2010/11 and 2013/14 fiscal years. The surveys were designed to gather baseline information on the occurrence of bacterial pathogens of concern in tahini available to Canadians at retail.

1.2 Codes of Practice, Acts, and Regulations

International food safety standards, codes of practice, and guidelines relating to food, food production and food safety are developed under the joint Food and Agriculture Organization of the United Nations (FAO)/World Health Organization (WHO) Codex Alimentarius Commission. Producers of tahini are encouraged to follow these international codes of practice. Of relevance for this survey are the *Regional Standard for Tehena*

(CODEX STAN 259-R-2007)¹ and the *Recommended International Code of Practice - General Principles of Food Hygiene* (CAC/RCP 1-1969, Rev. 4-2003)². The standard highlights hygienic requirements for the production of tahini products, and the code addresses Good Manufacturing Practices (GMPs) which, when applied, control and reduce the potential for contamination with microbial, chemical, and physical hazards at all stages of the production of foods and food products from primary production to packaging.

Tahini products available in the Canadian market must comply with the *Food and Drugs Act* (FDA)³ and the *Food and Drug Regulations* (FDR)⁴, which prescribe certain restrictions on the production, importation, sale, composition and content of foods and food products. Section 4(1)a of the FDA prohibits the sale of food contaminated with foodborne pathogens, while sections 4(1)e and 7 prohibit the sale of unsafe food and food produced under unsanitary conditions.

The targeted surveys are primarily conducted for surveillance and not for regulatory compliance verification purposes. However, bacterial pathogens detected in any samples tested under this survey will trigger food safety investigations, including activities such as follow-up sampling, inspections of facilities, and health risk assessments. Depending on the findings of the investigation, a recall of the affected product may be warranted.

2 Survey on Tahini

2.1 Rationale

Tahini is a sesame seed-based high fat and low moisture processed food or food ingredient. Low moisture foods do not support the growth of bacterial pathogens. Therefore, they have been traditionally considered safe food products. This concept has been challenged by worldwide outbreaks of salmonellosis associated with tahini over the last decade^{12, 15, 17} (Appendix B). Tahini has been reported as an unusual food source of *Salmonella* by the World Health Organization (WHO) International Food Safety Authorities Network (INFOSAN)⁷. Increased surveillance activities in Canada⁵ and the U.S.⁶ have also triggered non-outbreak associated recalls of *Salmonella* contaminated tahini over the last few years (Appendix C).

Salmonella contamination in tahini has been attributed to contaminated sesame seeds and/or cross-contamination^{8,9}. Raw sesame seeds are agricultural products that can be contaminated by *Salmonella* during primary production and storage^{9, 10, 11}. Low roasting temperatures and insufficient roasting process for producing tahini may not be sufficient to eliminate *Salmonella* in contaminated seeds⁸. In addition, cross-contamination after the roasting process due to poor sanitation practices and poor hygiene conditions during

production, packaging, or storage has been believed to be the main route of entry of *Salmonella* into processed tahini^{9,13}.

Once contaminated, *Salmonella* can survive in tahini during an extended period of storage⁸ and can be more resistant to heat treatment in the high fat and low moisture environment¹⁴. Even low levels of *Salmonella* in tahini were able to cause foodborne illnesses^{12,15}. If contaminated tahini is used as an ingredient in a high moisture food, such as hummus, *Salmonella* can survive during the product shelf-life under refrigeration conditions¹⁶, and could cause illness upon consumption^{15,17}.

Contamination of tahini with *Listeria monocytogenes* (*L. monocytogenes*) is also a safety concern as this bacterium is widely distributed in the environment. Tahini does not support the growth of *L. monocytogenes*. However, tahini-based high moisture food (e.g., hummus) support the survival or growth of *Listeria*^{18,19}, which represents a potential food safety risk to elderly, pregnant and immunocompromised individuals. Indeed, various hummus products contaminated with *L. monocytogenes* were recalled in the U.S. in 2013 and 2014¹⁷.

Based on the above information, tahini had been selected as one of the priority groups of food ingredients for targeted surveillance. The overall objective was to gather baseline information on the occurrence of bacterial pathogens of concern in tahini available to Canadians at retail. These targeted surveys (2012/13 and 2013/14) were part of the information collection of the four years of surveys (2010/11 -2013/14) on tahini. The 2012/13 and 2013/14 surveys had a focus on investigating the presence of bacterial pathogens *Salmonella* and *L. monocytogenes*, and on the presence and levels of generic *Escherichia coli* (*E. coli*) - an indicator of fecal contamination, in tahini.

2.2 Targeted Microorganisms

2.2.1 *Salmonella* spp.

Salmonellae are found naturally in the intestines of animals, such as poultry and swine²⁰. Most outbreaks associated with *Salmonella* are linked to the consumption of contaminated food of animal origin (e.g., chicken, eggs, and pork). However, tahini has been reported as an unusual food source of *Salmonella* by international food safety authorities⁷. Foodborne illnesses of salmonellosis have been reported to be associated with the consumption of contaminated tahini^{12,15}.

2.2.2 *Listeria monocytogenes*

L. monocytogenes is widely distributed in the environment and has been isolated from food processing equipment and a wide variety of ready-to-eat (RTE) foods ¹⁷. Likely sources of the contamination include incoming ingredients and the processing and packaging environment. Compared to other bacterial pathogens, *L. monocytogenes* has a wide range of growth temperatures (i.e., - 0.4 to 45 °C) that includes the typical refrigeration temperature of 4°C ²¹. Contamination of tahini with this pathogen is a potential issue as tahini is widely used as an ingredient in RTE high moisture food such as hummus that support the growth of *Listeria* under refrigeration conditions ¹⁹ and could cause illness.

2.2.3 Generic *E. coli* as an Indicator of Fecal Contamination

Typically, *E. coli* bacteria that inhabit the large intestines of humans and animals are harmless. Due to their regular presence in stools of humans and animals, the occurrence of *E. coli* in foods indicates direct or indirect contamination with fecal matter. The presence of generic *E. coli* in foods can also indicate a potential contamination with pathogenic enteric microorganisms, such as *Salmonella*. It is important to note that the presence of generic *E. coli* in food only implies an increased risk of contamination with pathogenic microorganisms but does not conclusively indicate that these pathogenic organisms are present. A high level of generic *E. coli* in tahini is an indication of unsanitary condition or poor hygiene practices during processing and final packaging of the product.

2.3 Sample Collection

All samples were collected from national chain and local/regional grocery stores, other conventional retail and natural food stores located in various cities across Canada. The number of samples collected in the various regions was based on the relative proportion of the population in the respective regions. Samples of tahini were collected year-round during the 2012/13 and 2013/14 fiscal years from April 1st to March 31st.

In these surveys, a sample consisted of one container of tahini available at retail. The samples were shipped at room temperature. If issues or questions arose about the conditions in which the sample was shipped, the sample was declared unfit for analysis.

2.4 Analytical Methods and Assessment Guidelines

Samples were analysed using the analytical methods published in Health Canada's *Compendium of Analytical Methods* for the Microbiological Analysis of Foods²² (Appendix D). These methods are used for regulatory testing by the CFIA and are fully validated for the analysis of fresh fruits and vegetables, including leafy herbs.

The assessment criteria presented below (Table 1) are based on the principles of the *Health Products and Food Branch Standards and Guidelines for Microbiological Safety of Foods*²³ and associated methods published in Health Canada's *Compendium of Analytical Methods*²².

Table 1 Assessment Guidelines in Tahini

Bacterial Analysis * (Method Identification Number)	Assessment Criteria		
	Satisfactory	Investigative	Unsatisfactory
<i>Salmonella</i> spp.** (MFLP-29 modified & MFHPB-20 if required for confirmation)	Absent in 25 g	N/A	Present in 25 g
<i>L. monocytogenes</i> (MFLP-28, MFHPB-30, and MFLP-74)	Absent in 25 g	Detected ≤ 100 CFU/g	Detected > 100 CFU/g
Generic <i>E. coli</i> ** (MFHPB-19)	≤ 100 MPN/g	100 < x ≤ 1000 MPN/g	> 1000 MPN/g

* Compendium of Analytical Methods²².

** No criteria have been established by Health Canada at this time for tahini and sesame seeds. However, in the absence of specified criteria, the presence of *Salmonella* in tahini is considered to be a violation of FDA Section 4(1)a and the detection of generic *E. coli* at levels above 1,000 MPN/g is considered to be a violation of FDA Section 7, and are therefore assessed by the CFIA as unsatisfactory.

Unsatisfactory sample assessments are subject to follow-up actions, such as directed follow-up sampling, inspection of establishment, health risk assessment, and/or product action (e.g., product recall).

If samples had been assessed as investigative for *L. monocytogenes* or generic *E. coli*, some form of follow-up activity would have been required, such as further sampling to verify the levels of the micro-organisms in the sample in question.

2.5 Limitations

Results obtained for a targeted survey sample are from the analysis of a single sample unit. This sampling and testing strategy generally precludes the extrapolation of the laboratory result to the whole production lot as it is not statistically representative. This imposes certain limitations in the generalisation of the results in the absence of additional information.

3 Results

3.1 Sample Distribution

A total of 1166 tahini samples were collected, including 558 (47.9%) samples of domestically processed tahini, 595 (51.0%) samples of imported tahini, and 13 (1.1%) samples of tahini with no information on country of origin (Table 1). Of these samples, 41.2% of the tahini samples (480 samples) originated from seven Middle Eastern countries (Table 1). Organic tahini samples (398 samples) accounted for 34.1% of the total samples collected. In addition, a small percentage (4.1%, 48 samples) of the samples was labeled as raw tahini products, in which sesame seeds were not roasted under standard heating temperatures in the production of tahini.

Table 2 Tahini Sample Distribution by Country of Origin

Country of Origin	Production Practices		Total	
	Conventional	Organic*	Number of Samples	Percentage of Total
	Number of Samples	Number of Samples		
Canada**	185	373	558	47.9
<i>Subtotal - Domestic</i>	185	373	558	47.9
Egypt	2	0	2	0.2
Israel	70	0	70	6.0
Jordan	5	0	5	0.4
Lebanon	398	0	398	34.1
Saudi Arabia	1	0	1	0.1
Syria	1	0	1	0.1
Turkey	2	1	3	0.3
<i>Subtotal – Imported from the Middle East</i>	479	1	480	41.2
China	6	0	6	0.5
Greece	69	18	87	7.5
Japan	1	0	1	0.1
Taiwan	2	0	2	0.2
United States	15	3	18	1.5
Vietnam	1	0	1	0.1
<i>Subtotal –Imported (All)</i>	573	22	595	51.0
<i>Unidentified***</i>	10	3	13	1.1
Total	768 (65.9%)	398 (34.1%)	1166	100

*Tahini that was mechanically processed from organic sesame seeds with a label bearing organic certification number was considered organic tahini.

** Imported ingredients may have been used.

*** Unidentified: Products had no information on country of origin listed on the label.

3.2 Assessment Results

Four tahini samples (0.3%) were found to be unsatisfactory due to the presence of *Salmonella* (Table 3). *L. monocytogenes* was not detected in any of the tahini samples. Generic *E. coli* counts were not found to exceed 100 MPN/g in any of the tahini samples. *Salmonella* was not detected in most (99.7%) tahini samples.

Table 3 Summary of Results of Tahini Samples

Product	Number of Samples	Assessment		
		Unsatisfactory	Investigative	Satisfactory
Domestic	558	0	0	558
Imported	595	4	0	591
Unidentified	13	0	0	13
Total	1166 (100%)	4 (0.3%)	0 (0%)	1162 (99.7%)

The four *Salmonella* contaminated tahini samples were imported from Middle Eastern countries, three were imported from Lebanon and one was imported from Israel (Table 4). None of the unsatisfactory samples was raw tahini product.

Table 4 Summary of Unsatisfactory Samples

Product Type/Production Practice/Country of Origin	Pathogen detected
Tahini /Conventional /Lebanon	<i>Salmonella</i> Senftenberg
Tahini /Conventional /Lebanon	<i>Salmonella</i> Liverpool
Tahini /Conventional /Lebanon	<i>Salmonella</i> Havana
Tahini/Conventional /Israel	<i>Salmonella</i> Senftenberg

As a result of these unsatisfactory findings, the CFIA conducted food safety investigations. Four product recalls resulted from the unsatisfactory samples and subsequent investigations. It is important to note that there were no reported illnesses associated with consumption of any of the *Salmonella* contaminated tahini during the survey.

4 Discussion and Conclusion

In these surveys (2012/13 and 2013/14), 1166 samples of tahini were tested for pathogenic bacteria *Salmonella*, *L. monocytogenes* and the indicator of fecal contamination, generic *E. coli*. Four (0.3%) tahini samples were found to be contaminated with *Salmonella*. *L. monocytogenes* was not detected in any of the samples. Levels of generic *E. coli* were found to be acceptable (<100 CFU/g) in all the samples. Generic *E. coli* is used as an indicator to evaluate adherence to GMPs during processing of foods. High levels of generic *E. coli* in tahini indicate poor sanitary conditions or poor hygiene practices during processing of tahini. However, the acceptable levels of generic *E. coli* in the tahini samples, especially in *Salmonella* contaminated tahini samples, cannot be used to indicate GMPs status of the tahini samples. As these tahini samples were collected from retail, generic *E. coli* might die off or levels of generic *E. coli* might have decreased in the low moisture environment and over the long shelf-life of the tahini.

The CFIA conducted appropriate follow-up activities including food safety investigations, directed sampling and review of importation procedures, as well as health risk assessments conducted by Health Canada for the samples contaminated with *Salmonella*. Four products, all imported from the Middle East, were recalled from the Canadian market. There were no reported illnesses linked to the recalled tahini during the surveys.

The 2012/13 and 2013/14 survey results also indicate that approximately half of the tahini samples were imported (51.0%) and tahini imported from Middle Eastern countries accounted for 41.2% of the total number of samples. The results suggest that tahini imported from the Middle East is readily available in the Canadian retail market.

Over the past decade, outbreaks of salmonellosis associated with tahini have been reported worldwide. *Salmonella* contaminated tahini imported from Middle Eastern countries were implicated in salmonellosis that occurred in Australia and New Zealand between 2002 and 2003¹² and in the U.S. in 2011¹⁵ and in 2012¹³. Middle Eastern tahini contaminated with *Salmonella* were also found in the United Kingdom and in Canada in 2003 following the tahini associated salmonellosis outbreaks in Australia¹². These data suggest that tahini from Middle Eastern countries are globally distributed and contamination with *Salmonella* can occur. Indeed, these surveys (2012/13-2013/14) also identified four tahini products contaminated with *Salmonella* (0.3% of the samples) that were from the Middle East. All contaminated tahini were recalled from the Canadian market. One brand of tahini was recalled three times for contamination with *Salmonella* (September 2011 & February 2012 in 2011/12 survey, and June 2012 in 2012/13 survey) during the four years of targeted surveys on tahini. It was also reported that the same brand of tahini was implicated in the 2011 salmonellosis outbreak in the U.S.¹⁵

The findings of the surveys on tahini suggest that tahini contaminated with *Salmonella* can occur. However, the overall findings of the surveys on tahini also suggest that the majority of the tahini on the Canadian market sampled during these surveys were produced and handled under GAPs and/or GMPs.

While the food industry, importers, and retail sectors are ultimately responsible for the food they produce, import, and sell, and individual consumers are responsible for the safe handling of the food they have in their possession, the CFIA regulates and provides oversight to the food industry, and promotes safe handling of foods throughout the food production chain. The CFIA will continue its surveillance activities and will inform stakeholders of its findings.

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Appendix A List of Acronyms

CFIA: Canadian Food Inspection Agency

E. coli: *Escherichia coli*

FAO: Food and Agriculture Organization of the United Nations

FDA: *Food and Drugs Act*

FDR: *Food and Drug Regulations*

FSAP: Food Safety Action Plan

GAPs: Good Agricultural Practices

GMPs: Good Manufacturing Practices

HC: Health Canada

INFOSAN: International Food Safety Authorities Network

PHAC: Public Health Agency of Canada

Salmonella spp.: *Salmonella* species

USFDA: United States Food and Drug Administration

WHO: World Health Organization

°C: Degree Celsius

g: gram

Appendix B Global Foodborne Disease Outbreaks Associated with Tahini Contaminated with Bacterial Pathogens (2000 - March 2014)

List Number	Year	Country	Microorganism	Vehicle	Number of Cases	Source
1	1995	USA	<i>Salmonella</i> Brandenburg	Tahini	137	CDC Line list
2	2001	Sweden, Norway, Germany	<i>Salmonella</i> Typhimurium	Halva	41	CDR Weekly Aug 16 2001
3	2002	Australia	<i>Salmonella</i> Montevideo	Tahini	55	Eurosurveillance Weekly 2003 Volume 7 / Issue 38 Cases linked to imported Egyptian tahini
4	2003	Australia	<i>Salmonella</i>	Tahini	3	OzFoodNet Annual Report
5	2004	Australia	<i>Salmonella</i> Typhimurium	Hummus	920	Department of Human Services Victoria Australia
6	2007	USA	<i>Salmonella</i> Heidelberg	Hummus	802	CDC line list
7	2007	USA	<i>Salmonella</i> Heidelberg	Hummus	11	CDC line list
8	2011	USA	<i>Salmonella</i> Bovismorbificans	Tahini & Hummus	23	MMWR Vol.61 (46)
9	2013	USA	<i>Salmonella</i> Mbandaka/Monte video	Tahini	16 (one death)	CDC Line list

Information in this appendix was gathered by Judy D. Greig, Laboratory for Foodborne Zoonoses, PHAC (Public Health Agency of Canada). The data presented were collected from several sources of information, such as peer-reviewed journals, newspapers, press releases, health units, national laboratory and government websites.

Appendix C Tahini Recalls in the U.S. and Canada (2007 - March 2014)

Date of Issue	Recalled Products	Reason for Recall	Authority
2007-05-10, 24, 28 *	Tahini, imported from the U.S.	<i>Salmonella</i>	CFIA
2007-05-22	Tahini, U.S. products	<i>Salmonella</i>	US FDA
2007-05-25*	Tahini, U.S. products	<i>Salmonella</i>	US FDA
2009-09-04	Tahini, U.S. Products	<i>Salmonella</i>	US FDA
2010-07-19 **	Tahini, imported from Lebanon	<i>Salmonella</i>	CFIA
2010-08-23 **	Tahini, imported from Lebanon	<i>Salmonella</i>	CFIA
2011-02-10, 14	Tahini, Imported from Syria	<i>Salmonella</i>	CFIA
2011-09-23 **	Tahini, imported from Lebanon, Brand	<i>Salmonella</i>	CFIA
2012-01-31, 02-01 **	Tahini, imported from Lebanon	<i>Salmonella</i>	CFIA
2012-04-05 **	Tahini, imported from Syria	<i>Salmonella</i>	CFIA
2012-06-26 **	Tahini, imported from Lebanon	<i>Salmonella</i>	CFIA
2013-02-25 **	Tahini, imported from Lebanon	<i>Salmonella</i>	CFIA
2013-04-28	Tahini, imported from Turkey and re-packaged in the U.S.	<i>Salmonella</i>	US FDA
2013-06-24 **	Tahini, imported from Israel	<i>Salmonella</i>	CFIA
2013-07-16**	Tahini, imported from Lebanon	<i>Salmonella</i>	CFIA

* These recalls related to the same brand of tahini products distributed in Canada and the U.S.

** These recalls resulted from positive samples collected under the targeted surveys.

Appendix D Analytical Methods Used for Microbial Analysis

Bacterial Analysis	Method Identification Number (Date Issued)	Title of Method*
<i>Salmonella</i> spp.	MFLP-29 (June 2012, modified)**	The Qualicon Bax® System Method for the Detection of <i>Salmonella</i> in a Variety of Food and Environmental Samples
	MFHPB-20 (March 2009)	Methods for the Isolation and Identification of <i>Salmonella</i> from Foods and Environmental Samples
<i>L. monocytogenes</i>	MFLP-28 (November 2011)	The Qualicon Bax® System Method for the Detection of <i>Listeria monocytogenes</i> in a Variety of Food
	MFHPB-30 (February 2011)	Isolation of <i>Listeria monocytogenes</i> and Other <i>Listeria</i> spp. from Foods and Environmental Samples
	MFLP-74 (February 2011)	Enumeration of <i>Listeria monocytogenes</i> in Foods
Generic <i>E. coli</i>	MFHPB-19 (April 2002)	Enumeration of Coliforms, Faecal Coliforms and <i>E. coli</i> in Foods

**Compendium of Analytical Methods* ²².

** MFLP-29 was performed as written with the following modification: Secondary enrichment was performed as outlined for cantaloupes, i.e., transferred from buffered peptone broth as specified to RVS and TBG broths (Rappaport-Vassiliadis Soya Peptone broth and Tetrathionate Brilliant Green broth) and incubated for 24 ± 2 h at 42.5°C. After incubation 2 ml from each of RVS and TBG are combined to one sample and analysis proceeds at step 7.3.1.4 of the method.