Canadian Food Inspection Agency
Agence canadienne d'inspection des aliments

Food Microbiology – Targeted Surveys
FINAL REPORT

Viruses in Sun-Dried Tomatoes

April 1, 2016 – March 31, 2017

Canada

Summary

Sun-dried tomatoes are a popular food item as they are very versatile and can be used as ingredients in a variety of foods such as salads, sandwiches, soups and sauces. Unfortunately, sun-dried tomatoes have previously been associated with foodborne illness outbreaks worldwide, predominantly linked to viruses. Sun-dried tomatoes can become contaminated with viral pathogens during production, harvest, post-harvest handling, processing, packaging and distribution. Since sun-dried tomatoes are often consumed without further preparation, the presence of viral pathogens creates a potential risk for foodborne illnesses.

Considering the factors mentioned above and their relevance to Canadians, sun-dried tomatoes were selected for targeted surveys. Over the course of this study (April 1, 2016 to March 31, 2017), a total of 221 samples of air-packed sun-dried tomatoes were collected from retail locations in 11 cities across Canada and tested for enteric viruses of concern (Hepatitis A virus (HAV) and Norovirus (NoV) (Genotype I and II (GI, GII)). NoV (GI) RNA was not detected in any of the samples tested, while HAV RNA was detected in an imported sample and NoV (GII) RNA was detected in another imported sample.

In response to the viral RNA positive samples, the Canadian Food Inspection Agency (CFIA) conducted appropriate follow-up activities which included a food safety investigation and Good Importing Practices (GIP) inspections at the importer. Following the food safety investigation, no product recalls were deemed necessary partly because there were no reported illnesses linked to the viral RNA positive sample and because the analytical methods used to analyse the samples cannot discriminate between infectious and non-infectious viral RNA, rendering it challenging to determine the immediate health significance of a viral RNA positive sample.

Overall, our survey results suggest that almost all sun-dried tomatoes are safe for consumption. Regardless, sun-dried tomatoes are a known potential source of foodborne illness. As with all foods, safe handling practices are recommended for producers, retailers and consumers.

What Are Targeted Surveys?

Targeted surveys are used by the Canadian Food Inspection Agency (CFIA) to focus its surveillance activities on areas of highest health risk. The information gained from these surveys provides support for the allocation and prioritization of the Agency's activities to areas of greater concern. Originally started as a project under the Food Safety Action Plan (FSAP), targeted surveys have been embedded in the CFIA's regular surveillance activities since 2013. Targeted surveys are a valuable tool for generating information on certain hazards in foods, identifying and characterizing new and emerging hazards, informing trend analysis, prompting and refining health risk assessments, highlighting potential contamination issues, as well as assessing and promoting compliance with Canadian regulations.

Food safety is a shared responsibility. The Canadian Food Inspection Agency works with federal, provincial, territorial and municipal governments and provides regulatory oversight of the food industry to promote safe handling of foods throughout the food production chain. The food industry and retail sectors in Canada are responsible for the food they produce and sell, while individual consumers are responsible for the safe handling of the food they have in their possession.

Why Did We Conduct This Survey?

Sun-dried tomatoes are a popular food item as they are very versatile and can be used as an ingredient in a variety of foods such as salads, sandwiches, soups and sauces. Unfortunately, sun-dried tomatoes have previously been associated with foodborne illness outbreaks worldwide[1-4] due to contamination by the Hepatitis A virus. Sun-dried tomatoes can become contaminated with pathogens during production, harvest, post-harvest handling, processing, packaging and distribution.

Given the above, sun-dried tomatoes were selected for targeted surveys over a one fiscal year period starting in 2016. The purpose of this targeted survey was to gather baseline information on the occurrence of enteric viruses in air-packed sun-dried tomatoes available at retail in Canada. This report details results of the entire survey period (April1, 2016 to March 31, 2017).

What Did We Sample?

For this survey, a sample consisted of a single unit (e.g., individual consumer-size package(s) from a single lot) with a total weight of at least 250 g. All samples were collected from national retail chains and local/regional grocery stores located in 11 major cities across Canada. These cities encompassed four geographical areas: Atlantic (Halifax and Saint John), Quebec (Quebec City, Montreal), Ontario (Toronto, Ottawa), and the West (Vancouver, Kelowna, Calgary, Saskatoon and Winnipeg). The number of samples collected from these cities was in proportion to the relative population of the respective areas. Samples were collected between April 1, 2016 and March 31, 2017. A variety of bulk or pre-packaged air-packed sun-dried tomatoes were sampled. Samples included conventional and organic product of domestic or imported origin.

What Analytical Methods Were Used and How Were Samples Assessed?

Samples were analyzed using CFIA internally-validated methods (Table 1) that detect the presence of Hepatitis A virus (HAV) and Norovirus (NoV) (Genotype I and II (GI, GII)) RNA.

At the time of writing this report, no assessment guidelines had been established in Canada or internationally for viruses in sun-dried tomatoes. In addition, the analytical methods used to analyse the samples detect viral RNA and cannot discriminate between viable (potentially infectious) from non-viable (non-infectious) viruses. Consequently, the detection of viral RNA was assessed as investigative indicating that further consideration is warranted to determine which follow-up activities would be the most appropriate.

Table 1 - Analytical Methods and Assessment Guidelines for Viruses in Sun-Dried Tomatoes

Viral Analysis	Method Number	Assessment Criteria	
		Satisfactory	Investigative
Hepatitis A	CFIA-VAD-02	Not detected	Detected
Norovirus (GI, GII)	CFIA-CRNVA-05 RT-PCR	Not detected	Detected

What Were the Survey Results?

A total of 221 samples of sun-dried tomatoes were analysed for HAV and NoV (GI, GII) RNA. No NoV (GI) RNA was detected in any of the samples tested, while HAV RNA was detected in 1 sample (0.5%) and NoV (GII) RNA was detected in 1 (0.5%) sample. Sample assessment results can be found in Table 2.

Table 2 - Assessment Results of Sun-Dried Tomatoes

Product Type	Total Number of Samples	Assessment Results			
		Satisfactory Assessment	Investigative Assessment		
			HAV	NoV(GI)	NoV(GII)
Sun-dried Tomatoes	221	219	1	0	1
Total (%)	**221**	**219 (99.1%)**	**1 (0.5%)**	**0**	**1 (0.5%)**

Of the 221 samples tested, 210 (95%) were conventional and 11 (5%) were organically produced. Both the HAV and NoV (GII) viral RNA positive samples were conventionally produced.

Of the 221 samples tested, 11 (5%) of the samples tested were domestic, 194 (88%) were imported and 16 (7%) were of unknown origin. Both the HAV and NoV (GII) viral RNA positive samples were imported.

What Do the Survey Results Mean?

In this survey, 99.1% of the sun-dried samples analyzed were free of specific enteric viruses tested for. NoV (GI) RNA was not detected in any samples. HAV RNA was detected in one (0.5%) sample and NoV (GII) RNA was detected in one (0.5%) sample.

Prevalence studies of viruses in sun-dried tomato samples not related to an outbreak are very limited. The results from this survey show a similar NoV (GI) RNA, lower NoV (GII) RNA and higher HAV RNA prevalence rate than a 2010 study[5] conducted in Italy of enteric viruses in ready to eat vegetables available at an Italian open-air market. The Italian study did not detect any HAV RNA or NoV (GI) RNA in bulk dried tomatoes (0/25) or in dried tomatoes in oil (0/5), while the study did detect NoV (GII) RNA in 12/25 bulk dried tomatoes and 3/5 dried tomatoes in oil. The difference in prevalence rate observed between this and the Italian study may be attributed to differences in study design, sampling location type, sample type, sample size and testing methodologies.

In response to the viral RNA positive samples, the Canadian Food Inspection Agency (CFIA) conducted appropriate follow-up activities which included a food safety investigation and Good Importing Practices (GIP) inspections at the importer. Following the food safety investigation, no product recalls were issued partly because there were no reported illnesses linked to the viral RNA positive samples and because the analytical methods used to analyse the samples cannot discriminate between infectious and non-infectious viral RNA rendering it challenging to determine the immediate health significance of a viral RNA positive sample.

Overall, our survey results suggest that almost all sun-dried tomatoes are safe for consumption. Regardless, sun-dried tomatoes are a known potential source of foodborne illness. As with all foods, safe handling practices are recommended for producers, retailers and consumers.

References

1. Donnan, E.J., et al., *A Multistate Outbreak of Hepatitis A Associated with Semidried Tomatoes in Australia, 2009.* Clinical Infectious Diseases, 2012. **54**(6): p. 775-81.

2. Gallot, C., et al., *Hepatitis A Associated with Semidried Tomatoes, France, 2010.* Emerging Infectious Diseases, 2011. **17**(3): p. 566-567.

3. Petrignami, M., et al., *Update: A food-borne outbreak of hepatitis A in the Netherlands related to semi-dried tomatoes in oil, January - February 2010.* Eurosurveillance, 2010. **15**(20).

4. Carvalho, C., et al., *A possible oubreak of hepatitis A associated with semi-dried tomatoes, England, July - November 2011.* Eurosurveillance, 2012. **17**(6).

5. Serracca, L., et al., *Potential Risk of Norovirus Infection Due to the Consumption of "Ready to Eat" Food.* Food and Environmental Virology, 2012. **4**(3): p. 89-92.