



Canadian Food
Inspection Agency

Agence canadienne
d'inspection des aliments

Phthalates in Flatbread and Vegan Products - April 1, 2018 to March 31, 2019

Food chemistry - Targeted surveys - Final report



Summary

Targeted surveys provide information on potential food hazards and enhance the Canadian Food Inspection Agency's (CFIA's) routine monitoring programs. These surveys provide evidence regarding the safety of the food supply, identify potential emerging hazards, and contribute new information and data to food categories where it may be limited or non-existent. They are often used by the agency to focus surveillance on potential areas of higher risk. Surveys can also help to identify trends and provide information about how industry complies with Canadian regulations.

Phthalates (also called plasticizers) are chemicals used to make plastics more flexible and harder to break. The major source of phthalate exposure is eating and drinking foods that have been in contact with plastic containers and/or foods containing phthalates. Exposure to phthalates is of concern, as studies have linked these substances to reduced reproductive health and development in animal studies. In people, increased levels of phthalates are associated with adverse health effects, for example obesity and reduced masculinization in newborn boys. For certain phthalates (DEHP, DBP and DIBP), food is thought to be the main exposure source. Increased phthalate levels in people were found to be associated with the consumption of fatty foods^{1,2,3}.

This targeted survey generated baseline surveillance data regarding phthalate levels in selected foods on the Canadian retail market. A total of 599 domestic and imported samples of flatbreads and vegan products (dairy alternatives, mayonnaise, meat alternatives and tofu) were collected and tested for phthalates. Of these samples, 526 (88%) did not contain detectable levels of phthalates. In this survey, 6 phthalates were examined; the phthalate concentration is reported as the sum of the concentrations of all phthalate forms observed. The phthalate levels ranged from 0.5 parts per million (ppm) to a maximum of 24 ppm. The levels detected were comparable to those previously recorded.

There are no regulations in Canada for phthalate levels in food. All levels of phthalate found in the products tested in this survey were evaluated by Health Canada (HC) and deemed safe for consumption by Canadians; no product recalls were required.

What are targeted surveys

Targeted surveys are used by the 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 our 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. We work with federal, provincial, territorial and municipal governments and provide 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

Phthalates (also called plasticizers) are chemicals used to make plastics more flexible and harder to break. They are commonly used in PVC (polyvinyl chloride plastics). They have a wide variety of industrial uses that include the manufacture of household and consumer goods such as lubricating oils, solvents, personal care products and food packaging. Phthalates can migrate from plastic food packaging and from the gaskets of lids for glass containers into foods, particularly those foods that are oily or that have a high fat content. Noteworthy, phthalates in non-fatty foods including bread were as reported a significant source of phthalates³. Previous CFIA surveys identified flatbreads as the grain product with the highest phthalate levels⁴.

Exposure to phthalates is of concern, because these substances are linked to reduced reproductive health and development in animal studies. In people, increased levels of phthalates are associated with adverse health effects, for example obesity and reduced masculinization in newborn boys. Phthalates encompass a broad range of compounds. For certain phthalates, food is believed to be the main source of exposure. Increased phthalate levels in human blood and urine have been associated with the consumption of specific foods, especially fatty foods^{1,2,3}. DEHP is the most commonly used and best-studied of the phthalates². Recently, a dietary exposure assessment to DBP, BBP, DEHP and DINP was carried out by the European Food Safety Authority (EFSA) where the concentration is expressed as DEHP equivalents³. In this survey, 6 phthalates were examined. They included BBP, DBP, DNOP, DEHP, DINP and DIDP. The phthalate concentration is reported as the sum of the concentrations of all phthalate forms observed.

The main objectives of this targeted survey were to generate additional baseline surveillance data on the level of phthalates available on the Canadian retail market, and to compare the phthalate levels in foods in this survey with that of previous targeted surveys.

What did we sample

A variety of domestic and imported flatbreads and vegan products (dairy/meat alternatives, vegan mayonnaise and tofu) were sampled between April 1, 2018 and March 21, 2019. Samples of products were collected from local/regional retail locations located in 6 major cities across Canada. These cities encompassed 4 Canadian geographical areas:

- Atlantic (Halifax)
- Quebec (Montreal)
- Ontario (Toronto and Ottawa)
- West (Vancouver and Calgary)

The number of samples collected from these cities was in proportion to the relative population of the respective areas. The shelf life, storage conditions, and the cost of the food on the open market were not considered in this survey.

Table 1. Distribution of samples based on product type and origin

Product type	Number of domestic samples	Number of imported samples	Number of samples of unspecified^a origin	Total number of samples
Flatbreads	97	38	73	208
Vegan products	121	156	114	391
Grand total	218	194	187	599

^a Unspecified refers to those samples for which the country of origin could not be assigned from the product label or available sample information

How were samples analyzed and assessed

Samples were analyzed by an ISO/IEC 17025 accredited food testing laboratory under contract with the Government of Canada. The results are based on the food products as sold and not necessarily as they would be consumed.

Currently, no maximum level, tolerance, or standard has been established by Health Canada for phthalate levels in food; therefore, compliance with numeric Canadian regulations was not evaluated in this survey. The European Union has set migration limits for phthalates from food contact materials: 0.3 mg per kg of food for BBP, 1.5 mg per kg of food for DEHP, 9 mg per kg

of food DINP and DIDP, and 30 mg per kg of food for DBP³. The United States has set a limit of 0.006 milligram per liter (0.6 ppb) in bottled water⁵.

In the absence of a specific maximum level, the levels of phthalates detected were assessed by Health Canada on a case-by-case basis using the most current scientific data available.

What were the survey results

A total of 599 domestic and imported flatbreads and 391 vegan products (dairy alternatives, mayonnaise, meat alternatives and tofu) were tested for 6 phthalates in this targeted survey. Of these samples, 526 (88%) did not contain detectable levels of phthalates. The phthalate concentration is reported as the sum of the concentrations of all phthalate forms observed. The phthalate levels ranged from 0.5 ppm to a maximum of 24 ppm. Table 2 illustrates the phthalate levels found.

BNP was the most commonly detected phthalate, found in 9% of samples. DEHP was the second most frequently detected phthalate (4% of samples). BDP and DIDP were only found in 4 and 2 samples, respectively. No other compounds were detected in the products tested.

Table 2. Summary of targeted survey results on phthalates in flatbreads and vegan products

Product type	Number of samples	Number of samples (%) with detected levels	Minimum phthalate levels (ppm)	Maximum phthalate levels (ppm)	Average phthalate levels ^b (ppm)
Flatbreads	208	54 (26)	0.57	15.00	2.70
Vegan products	391	19 (5)	0.50	24.00	3.61
Dairy alternative	76	6 (8)	0.59	2.78	1.17
Mayonnaise	53	3 (6)	0.72	3.19	1.64
Meat alternative	125	7 (6)	0.50	7.57	3.45
Tofu	137	3 (2)	0.54	24.00	10.85
Grand total	599	73 (12)	0.50	24.00	2.94

^b Only positive results were used to calculate the average phthalate levels

What do the survey results mean

The levels of phthalates found in this targeted survey were compared to those previously found in similar product types⁴. In the 2012 to 2015 survey years, the grain products with highest phthalate levels detected were flatbreads, therefore these products were targeted in this survey year. The maximum levels of phthalates found closely matched those previously observed.

In previous survey years, nut and seed butters were found to contain high levels of phthalates⁴. In this survey vegan products that are also often derived from nuts and seeds were tested. In comparison to previous survey years, the detection rate and the average phthalate levels in this product type were lower. In the 2012 to 2015 survey years, the highest phthalate levels detected in nut and seed butters were associated with DIDP. In that survey, DIDP was most frequently detected in oils and fats. This indicates that DIDP is highly lipophilic and therefore, as observed, products tested in the current survey with lower fat content were expected to have lower total phthalate levels than pure nut butters.

Table 3. Minimum, maximum and average concentration of phthalates across various studies

Product type	Study	Number of samples	Number of samples (%) with detected levels	Minimum phthalate levels (ppm)	Maximum phthalate levels (ppm)	Average phthalate levels ^c (ppm)
Flatbreads	CFIA survey, 2018	208	54 (26)	0.57	15.00	2.70
Grain products	CFIA survey, 2012 to 2015	460	167 (36)	0.27	23.3	1.60
Vegan products	CFIA survey, 2018	391	19 (5)	0.50	24.00	3.61
Nut/seed butters	CFIA survey, 2012 to 2015	100	59 (59)	0.5	315	17.2

^c Only positive results were used to calculate the average phthalate levels

Currently, no maximum level, tolerance, or standard has been established by Health Canada for phthalate levels in food and therefore, compliance with a numerical standard was not evaluated in this survey. All levels of phthalate found in the products tested in this survey were evaluated by Health Canada and deemed safe for consumption by Canadians; no product recalls were required.

References

1. Muncke J. (2012). [Phthalates](#). Food Packaging Forum.
2. [Scientific Panel on Food Additives, Flavourings, Processing Aids and Materials in Contact with Food. Opinion of the Scientific Panel on Food Additives, Flavourings, Processing Aids and Materials in Contact with Food \(AFC\) on a request from the Commission related to Bis\(2-ethylhexyl\)phthalate \(DEHP\) for use in food contact materials.](#) (2005). EFSA Journal 243, pp. 1-20.
3. [Public Consultation on EFSA's draft assessment of five phthalates used in plastic food contact materials.](#) (2019). European Food Safety Authority.
4. 2012-2015 Phthalates in Selected foods. [unpublished results]. Canadian Food Inspection Agency.
5. [Guidance for Industry: Bottled Water Quality Standard: Establishing an Allowable Level for di\(2-ethylhexyl\)phthalate: Small Entity Compliance Guide.](#) (2015). United States. Food and Drug Administration.