



Canadian Food
Inspection Agency

Agence canadienne
d'inspection des aliments

Phthalates in selected foods – April 1, 2012, to March 31, 2018

Food chemistry - Targeted surveys - Final report



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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, 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 4517 domestic and imported samples of different types of foods were collected and tested for the presence of 6 phthalates. Of these samples, 3540 (78%) did not contain detectable levels of phthalates. The total phthalate levels ranged from 0.26 parts per million (ppm) to 2608 ppm.

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 and deemed safe for consumption by Canadians.

What targeted surveys are

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 the survey was conducted

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. Phthalates can also migrate into food before it is packaged, while in contact with food contact materials during processing. Various foods have been identified as commodities which may have elevated levels of phthalates. The aim of this survey is to collect further data on these product types.

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}. Bis(2-ethylhexyl) phthalate (DEHP) is the most commonly used and best-studied of the phthalates². Recently, a dietary exposure assessment to DEHP, butyl benzyl phthalate (BBP), dibutylphthalate (DBP), and diisononyl phthalate (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, di-N-octyl phthalate (DNOP), DEHP, DINP, and diisodecyl phthalate (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 was sampled

A total of 4517 domestic and imported foods were sampled between April 1, 2012, and March 31, 2018. Samples of products were collected from local/regional retail locations located in 11 major cities across Canada. These cities encompassed 4 Canadian geographical areas:

- Atlantic (Halifax and Saint John)
- Quebec (Montreal and Quebec City)
- Ontario (Ottawa and Toronto)
- West (Calgary, Kelowna, Saskatoon, Vancouver, and Winnipeg)

The number of samples collected from these cities was in proportion to the relative population of the respective areas.

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

Product type	Details	Number of domestic samples	Number of imported samples	Number of samples of unspecified^a origin	Total number of samples
Beverages	Bottled water, drinks (energy, fruit, soft, sport, iced tea), juices	125	408	56	589
Dairy products	Cheese, dips, frozen desserts, frozen yogurt, puddings, yogurt	144	524	98	766
Fats and oils	Animal fats, butter, mayonnaise, oils, salad dressings, shortening	131	272	260	663
Grain-based foods	Baked goods, breads, breakfast cereals, cookies, oatmeal	103	325	213	641
Infant/toddler foods	Infant/toddler cereals, formula, meals, purees, snacks	47	472	26	545
Meat	Deli meat, ham, luncheon meat, salami, sausage, wieners	103	44	3	150
Nut/seed butters	Almond, blends, cashew, chestnut, hazelnut, hemp seed, Lotus seed, macadamia, pea, peanut, pecan, pistachio, pumpkin seed, soy, sunflower seed, tahini/sesame, walnut	328	190	79	597
Processed fruit and vegetables	Canned/pickled/preserved vegetables (artichoke, eggplant, garlic, mushroom, peppers, sundried tomato, and mixtures), jams and jellies, olives	33	101	36	170
Ready-to-eat (RTE) meals	Frozen meal or soup for family or adult, frozen pizza	21	131	98	250
Sauces	Cooking, fish, hot, pasta, pesto, steak/BBQ, and teriyaki sauces	34	75	37	146
Total	All product types	1069	2542	906	4517

Table notes

^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 samples were analyzed and assessed

Samples were analyzed by either a CFIA laboratory or an ISO/IEC 17025 accredited food testing laboratory under contract with the Government of Canada. The laboratories quantified 6 phthalates: BBP, DBP, DEHP, DIDP, DINP, and DNOP. The phthalate concentration is reported as the sum of the concentrations of all phthalate forms detected. 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 milligrams per liter (ppm) of DEHP in drinking water¹⁶. 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.

Results of the survey

A total of 4517 domestic and imported food products were tested in this survey. Of these samples, 3540 (78%) did not contain detectable levels of phthalates. The concentration, reported as the sum of the concentrations of all phthalate forms, ranged from 0.26 ppm in a soybean oil to 2608 ppm in a palm oil. Ready-to-eat (RTE) meals had the highest detection rate (52%), and beverages had the lowest detection rate (0.3%). Fats and oils had the highest (72 ppm) average level of phthalates and beverages had the lowest (0.48 ppm) average level of phthalates in this survey. [Table 2](#) summarizes these results.

Table 2. Summary of results from phthalates testing

Product type	Number of samples	Number of samples with detected levels (%)	Minimum ^b (ppm)	Maximum (ppm)	Average ^c (ppm)
Beverages	589	2 (0.3)	0.40	0.56	0.48
Dairy products	766	102 (13)	0.29	18	1.9
Fats and oils	663	189 (29)	0.26	2608	72
Grain-based foods	641	180 (28)	0.27	23	1.7
Infant/toddler foods	545	50 (9)	0.27	3.6	1.0
Meat	150	8 (5)	0.60	6.7	1.9
Nut/seed butters	597	246 (41)	0.50	315	8.5
Processed fruit and vegetables	170	44 (26)	0.29	17	2.3
RTE meals	250	131 (52)	0.27	62	2.0
Sauces	146	25 (17)	0.55	302	33
Total	4517	977 (22)	0.26	2608	18

Table notes

^b Minimum positive (non-zero) result.

^c Only positive results were used to calculate averages.

The most frequently found phthalate found in this survey was DINP (659 samples), followed by DEHP (273), DBP (209), DIDP (199), and BBP (8). DNOP was not detected in any of the samples tested. The number of phthalates found in individual samples ranged from 1 to 4, where 695 samples contained 1 phthalate, 204 samples contained 2 phthalates, 201 samples contained 3 phthalates, and 11 samples contained 4 phthalates. The [Appendix](#) contains more detailed results from this survey, including the average level and frequency of individual phthalates ([Table A-1](#)) and the results for each year of the survey period ([Table A-2](#)).

Beverages

A total of 589 beverage samples were sampled in this survey. These included 171 fruit and/or vegetable juices, 105 sport beverages, 102 tea-based beverages, 100 bottled water samples, 51 carbonated soft drinks, 35 fruit-based beverages, 17 energy drinks, and 8 fruit-flavored beverages. Phthalates were not detected in 587 samples or 99.7% of samples, which is the lowest detection rate in this survey. The 2 samples that contained phthalates were carbonated soft drinks, and they contained 0.40 ppm and 0.56 ppm, for an average total level of 0.48 ppm, which is the lowest average level in this survey.

Dairy products

The dairy products that were sampled in this survey consisted of 435 cheese samples, 106 frozen yogurt samples, 102 frozen dairy desserts (cheesecake, ice cream, ice milk), 79 dairy-based dips, 34 puddings, 5 yogurts, and 5 yogurt beverages, for a total of 766 samples. Phthalates were detected in 102 samples, or 13%. Total phthalate levels ranged from 0.29 ppm to 18 ppm, with an overall average level of 1.9 ppm in dairy products.

Fats and oils

This survey sampled 663 fats and oils, including vegetable oils/fats (258), animal fats (199), salad dressings (155), and mayonnaise (51). Phthalates were detected in 189 samples (29%) and the overall average level for all fats and oils was 72 ppm. The vegetable-based oils and fats had the highest average level (101 ppm) and the highest detection rate (51%). Animal fats, including dairy butter and rendered beef, chicken, and pork fat, had an average level of 8 ppm and a positive detection rate of 19%. Salad dressings, including both oil-based and dairy-based dressings, had an average level of phthalates of 3.3 ppm and a positive detection rate of 10%. Mayonnaise samples had the lowest average total phthalates level (2.1 ppm) and a detection rate of 12%.

Total phthalate levels in fats and oils ranged from 0.26 ppm in a soybean oil sample to 2608 ppm in a red palm oil sample. This red palm oil sample had the highest level seen in the entire survey, and palm oils had the highest average levels among all the subcategories in the survey (298 ppm). There were 20 fat and oil samples that contained more than the category average of 72 ppm, and 15 of these samples (75%) were red palm oils. However, the other 40 red palm oil samples had much lower total phthalate levels, even samples of the same product taken at different locations and/or dates. This suggests that the high levels are more likely caused by differences in how the batches of red palm oil were processed or packaged, rather than by the oil itself.

Grain-based foods

Pre-packaged baked goods (194) were sampled in this survey, including bagels, breads, buns, cakes, cookies, croissants, English muffins, flatbreads, muffins, pastries, pies, tortillas/wraps, and waffles. Breakfast cereals and oatmeal marketed to adults and children were also sampled (447 samples). In total, 641 grain-based foods were sampled, and 180 of these contained detectable levels of phthalates (28% of samples). The levels found ranged from 0.27 ppm in a tortilla sample to 23 ppm in a naan sample, with an average level of 1.7 ppm total phthalates. The baked goods had an average level of 2.1 ppm and a detection rate of 59%, and the breakfast cereals and oatmeal had an average level of 1.1 ppm and a detection rate of 15%.

Infant foods

The foods intended for infants and toddlers that were sampled in this survey included dairy-based infant formulas (250 samples), infant cereals (128 samples), soy-based infant formulas (103 samples), RTE meals including infant purees and toddler meals (54 samples), and infant snacks (10 samples) for a total of 545 infant/toddler foods. Phthalates were detected in 50 samples, for a detection rate of 9%. Levels found ranged from 0.27 ppm in an infant oatmeal sample to 3.6 ppm in an infant snack for an overall average level of 1.0 ppm. Infant snacks had the highest detection rate (40%) and the highest average level (1.6 ppm) in this category, while the lowest detection rate was in infant cereals (5%) and the lowest average level was found in the RTE meals (0.55 ppm).

Meat

This survey sampled 150 pre-packaged processed meats such as deli meats, ham, salami, and wieners. Of these samples, 117 samples were packaged in plastic bags, boxes, packages, or shrink/vacuum wrap and 33 were packaged in metal cans. Only 8 of the samples contained detectable levels of phthalates, or 5%, and all of these were packaged in plastic. None of the canned samples contained detectable phthalate levels. Levels ranged from 0.60 ppm in a salami sample to 6.7 ppm in a pepperoni sample, with an average level of 1.9 ppm.

Nut/seed butters

The 597 nut and seed butters that were sampled in this survey included peanut (102), almond (88), cashew (76), tahini/sesame (74), soy nut (68), hazelnut (68), sunflower seed (46), blended nuts/seeds (33), pumpkin seed (26), chestnut (4), pecan (3), lotus seed (2), pistachio (2), walnut (2), hemp nut (1), macadamia nut (1), and pea (1). Phthalates were detected in 246 samples (41%), ranging from 0.50 ppm in several seed butters to 315 ppm in a peanut butter sample. Overall, the average level found in nut and seed butters was 8.5 ppm. Nut butters had a detection rate of 48% and an average level of 7.9 ppm, and seeds/soy/hemp/pea butters had a detection rate of 30% and an average level of 10 ppm total phthalates.

Processed fruit and vegetable products

A total of 170 processed fruit and vegetable products were sampled, including 113 fruit-based jams, jellies, and preserves, and 57 pickled, marinated, or preserved fruit or vegetables packaged with oil (artichoke, eggplant, garlic, mango, mixed vegetables, mushroom, olives, peppers, sundried tomatoes, zhacai/mustard). Phthalates were detected in 44 of these samples (26%), with levels ranging from 0.29 ppm in an orange marmalade sample to 17 ppm in a sample of mixed vegetables packed in oil. The average level found in this category was 2.3 ppm. The fruit and vegetables packaged in oil had a higher detection rate (53%) and higher average level (2.8 ppm) than the fruit-based preserves which had a 12% detection rate and average level of 1.1 ppm.

RTE meals

This survey sampled 250 RTE frozen meal products, including individual meals, soups, family-sized meals, and pizza products. Phthalates were detected in 131 (52%) of these samples. Levels ranged from 0.27 ppm in both a frozen pizza sample and a spaghetti meal sample to 62 ppm in a microwavable pizza snack sample, with an overall average level of 2.0 ppm.

Sauces

A total of 146 sauces were sampled, including 85 dairy-based pasta sauces (alfredo, carbonara, cream, rosé, etc.), 33 dairy-based cooking sauces (butter chicken, curry, korma, masala, peanut, satay, etc.), 20 pesto samples, 5 hot sauces, 1 fish sauce, 1 steak sauce, and 1 teriyaki sauce. Phthalates were detected in 25 (17%) of these samples, with levels ranging from 0.55 ppm in both a pesto and a hot sauce, to 302 ppm in a pesto sample. Overall, sauces had an average level of 33 ppm total phthalates. Within these samples, in categories containing more than 1 sample, the highest average level (78 ppm) was found in cooking sauces and the highest detection rate was in hot sauces (80%). The lowest average level (2.1 ppm) and the lowest detection rate was in pasta sauces (5%). In the categories that contained single samples, the fish and teriyaki sauce samples did not contain any detected phthalates, and the steak sauce sample contained 0.84 ppm total phthalates.

What the survey results mean

In this survey, 22% of samples tested contained detectable levels of at least 1 of the 6 phthalates that were included in the analysis method. RTE meals had the highest positive detection rate (52%), and beverages had the lowest detection rate (0.3%). The highest average total phthalate level was found in fats and oils (72 ppm), and the lowest average level was found in beverages (0.48 ppm). The most frequently found phthalate in the survey was DINP (15%) and the phthalate that had the highest average level was DIDP (70 ppm), as shown in the [Appendix](#).

Table 3 presents the current survey data compared with other studies where phthalates were analyzed in similar commodities. These studies are the Health Canada Total Diet Study (Health Canada TDS⁴), the 24th Australian Total Diet Study (FSANZ TDS⁵), and published studies from Belgium (Holderbeke et al.⁶), Canada (Cao et al.⁷), China (Guo et al.⁸, Yang et al.⁹), Denmark

(Peterson et al.¹⁰), Italy (Nanni et al.¹¹, Cavaliere et al.¹², and Sannino¹³), Turkey (Sungur et al.¹⁴), and the USA (Schechter et al.¹⁵). The current survey is bolded in the table for ease of identification.

Average levels in the current survey were similar to or less than the comparison surveys in dairy products, grain-based foods, infant food and formula, meat products, nut/seed butters, processed fruits and vegetables, and RTE meals. Levels in the current survey are higher than the comparison surveys for beverages, fats and oils, and sauces. Differences in the results between these surveys can likely be attributed to the types of samples tested and the specific phthalates analyzed in each study. The detection rates in the current survey are lower than the detection rates in the comparison studies that reported this value. This is due to differences in the limit of detection (LOD) in each study or survey. The current survey's LOD ranged between 0.1 ppm and 0.5 ppm depending on the individual phthalate, analysis method, and sample type. The comparison surveys generally had lower LODs, ranging from 0.00001 ppm and 4.0 ppm, depending on the individual phthalate, analysis method, and sample type.

Table 3. Minimum, maximum, and average results of total phthalates between various studies

Product type	Survey/study	Year(s)	Number of phthalates analyzed	Total number of samples	Number of samples with detected levels (%)	Average ^d level (ppm)
Beverages	CFIA	2013-2018	6	589	2 (0.3)	0.48
Beverages	Health Canada TDS	2011-2015	21	16	7 (44)	0.10
Beverages	Schechter et al.	2013	9	10	6 (60)	0.021
Dairy products	CFIA	2013-2018	6	766	102 (13)	1.9
Dairy products	Health Canada TDS	2011-2015	21	9	6 (67)	1.1
Cheese	Cao et al.	2014	1	40	30 (75)	2.8
Dairy products	Schechter et al.	2013	9	9	9 (100)	0.26
Fats and oils	CFIA	2013-2018	6	663	189 (29)	72
Fats and oils	Health Canada TDS	2011-2015	21	5	4 (80)	0.12
Olive oil	Sungur et al.	2015	6	14	14 (100)	2.6
Olive oil	Nanni et al.	2011	4	172	NR ^e	2.5
Olive oil	Cavaliere et al.	2008	6	16	15 (94)	2.3
Grain-based foods	CFIA	2013-2018	6	641	180 (28)	1.7
Grain-based foods	Yang et al.	2018	4	12	NR ^e	0.33
Grain-based foods	FSANZ TDS	2016	3	96	NR ^e	3.2
Grain-based foods	Health Canada TDS	2011-2015	21	16	15 (94)	0.20
Grain-based foods	Guo et al.	2012	9	6	NR ^e	0.43
Infant food and formula	CFIA	2013-2018	6	545	50 (9)	0.99
Infant food and formula	FSANZ TDS	2016	3	24	NR ^e	0.70
Infant food and formula	Health Canada TDS	2011-2015	21	9	9 (100)	0.051
Infant food and formula	Peterson et al.	2000	4	22	NR ^e	5.5

Product type	Survey/study	Year(s)	Number of phthalates analyzed	Total number of samples	Number of samples with detected levels (%)	Average ^d level (ppm)
Meat products	CFIA	2013-2018	6	150	8 (5)	1.9
Bacon and battered chicken	FSANZ TDS	2016	3	20	NR ^e	1.4
Meat products	Health Canada TDS	2011-2015	21	11	8 (73)	0.13
Meat products	Schecter et al.	2013	9	6	6 (100)	0.21
Meat products	Guo et al.	2012	9	6	NR ^e	0.12
Nut/seed butters	CFIA	2013-2018	6	597	246 (41)	8.5
Peanut butter	FSANZ TDS	2016	3	4	NR ^e	55
Nuts, peanut butter, seeds	Health Canada TDS	2011-2015	21	3	3 (100)	0.10
Nuts	Holderbeke et al.	2014	8	6	NR ^e	0.095
Processed fruit and vegetables	CFIA	2013-2018	6	170	44 (26)	2.3
Processed fruit and vegetables	FSANZ TDS	2016	3	12	NR ^e	2.1
Processed fruit and vegetables	Health Canada TDS	2011-2015	21	7	6 (86)	0.063
Vegetables in oil	Sannino	2009	12	18	NR ^e	1.2
RTE meals	CFIA	2013-2018	6	250	131 (52)	2.0
RTE meals	FSANZ TDS	2016	3	8	NR ^e	15
RTE meals	Health Canada TDS	2011-2015	21	8	7 (88)	0.095
RTE meals	Schecter et al.	2013	9	7	7 (100)	0.10
Sauces (BBQ, pasta, pesto)	CFIA	2013-2018	6	146	25 (17)	33
Sauces (BBQ, ketchup, marinade)	Schecter et al.	2013	9	6	5 (83)	0.060
Sauces and seasonings	Guo et al.	2012	9	10	NR ^e	0.065

Table notes

^d Only positive results were used to calculate averages.

^e NR: not reported.

The results of this targeted survey were used 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. All levels of phthalate found in the products tested in this survey were evaluated by Health Canada and deemed safe for consumption by Canadians.

How to access the survey data

The data associated with this report will be accessible on the [Open Government Portal](#).

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Appendix

Table A1. Average levels and frequency (positive samples as % of total samples) of individual phthalates in detected samples

Product type	BBP average ^f (ppm) (% positive)	DBP average ^f (ppm) (% positive)	DEHP average ^f (ppm) (% positive)	DIDP average ^f (ppm) (% positive)	DINP average ^f (ppm) (% positive)
Beverages	n/a ^g	n/a ^g	n/a ^g	0.56 (0.2)	0.40 (0.2)
Dairy products	n/a ^g	0.27 (0.1)	0.82 (2)	1.5 (0.8)	2.1 (11)
Fats and oils	0.57 (0.8)	0.61 (2)	11 (15)	143 (12)	6.5 (19)
Grain-based foods	0.54 (0.2)	0.86 (18)	1.2 (3)	0.89 (2)	1.8 (15)
Infant foods	n/a ^g	0.83 (4)	1.7 (0.6)	0.53 (0.6)	0.88 (5)
Meat	n/a ^g	n/a ^g	n/a ^g	n/a ^g	1.9 (5)
Nut/Seed butters	1.3 (0.3)	0.50 (0.2)	2.0 (16)	28 (9)	2.3 (32)
Processed fruit and vegetables	n/a ^g	n/a ^g	1.9 (11)	1.6 (9)	2.4 (10)
RTE meals	n/a ^g	0.57 (22)	0.50 (2)	5.9 (6)	1.5 (38)
Sauces	n/a ^g	n/a ^g	12 (5)	59 (8)	1.8 (9)
Grand total	0.74 (0.2)	0.76 (5)	5.3 (6)	70 (4)	2.8 (15)

Table notes:

^f Only positive results were used to calculate averages.

^g n/a: not applicable; no positive results.

Table A-2. Levels of total phthalates in this survey by commodity and year sampled

Product type	Fiscal year sampled	Total number of samples	Number of samples with detected levels (%)	Minimum ^h level (ppm)	Maximum level (ppm)	Average ⁱ level (ppm)
Beverages	2012	491	0 (0)	n/a ^j	n/a ^j	n/a ^j
	2013	98	2 (2)	0.40	0.56	0.48
Dairy products	2013	45	5 (11)	0.29	8.2	2.1
	2014	148	25 (17)	0.51	18	2.9
	2015	148	14 (9)	0.50	7.0	2.2
	2016	425	58 (14)	0.50	8.5	1.4
Fats and oils	2013	80	47 (59)	0.26	1703	91
	2014	268	79 (29)	0.60	2608	81
	2015	237	61 (26)	0.51	1631	48
	2016	76	1 (1)	0.84	0.84	0.84
	2017	2	1 (50)	0.98	0.98	0.98
Grain-based foods	2013	241	144 (60)	0.27	23	1.6
	2014	100	17 (17)	0.51	4.6	1.6
	2015	100	11 (11)	0.57	5.7	2.7
	2017	200	8 (4)	0.64	6.8	2.4
Infant foods	2012	198	0 (0)	n/a ^j	n/a ^j	n/a ^j
	2013	72	34 (47)	0.27	2.6	0.76
	2014	50	4 (8)	0.66	2.0	1.2
	2015	50	3 (6)	0.75	3.6	2.6
	2016	175	9 (5)	0.51	2.8	1.2
Meat	2017	150	8 (5)	0.60	6.7	1.9
Nut/seed butters	2014	100	59 (59)	0.50	315	17
	2015	99	45 (45)	0.54	17	3.5
	2017	398	142 (36)	0.50	296	6.4
Processed fruit and vegetables	2012	63	7 (11)	1.2	2.2	1.6
	2013	50	7 (14)	0.29	1.7	0.57
	2014	29	14 (48)	0.52	9.3	2.2
	2015	28	16 (57)	0.54	17	3.3
RTE meals	2013	150	104 (69)	0.27	11	1.5
	2014	50	16 (32)	0.55	15	1.8
	2015	50	11 (22)	0.51	62	7.3
Sauces	2014	35	9 (26)	0.55	76	10
	2015	36	10 (28)	0.55	302	32
	2016	75	6 (8)	1.2	236	67

Table notes:

^h Minimum positive (non-zero) result.

ⁱ Only positive results were used to calculate averages.

^j n/a: not applicable; no positive results.