Canadian Food Inspection Agency
Agence canadienne d'inspection des aliments

Children's Food Project - Annual report

2017

Canada

Summary

The Canadian Food Inspection Agency (CFIA) uses a number of different monitoring programs for chemical residues and contaminants in food to ensure that the food supply is safe and compliant with Canadian standards. The Children's Food Project (CFP) complements these activities by specifically collecting information on chemical residues and contaminants in manufactured foods frequently consumed by, and targeted to, infants and children. Because of their smaller body weight, their development and growth, and their consumption patterns this group may be at higher risk from exposure to these chemicals.

The main objective of the 2017 CFP was to collect data and assess the compliance of infant foods to Canadian standards for residues of pesticides and metals. Previous years have analyzed pesticides, metals, veterinary drug residues, aflatoxins and environmental contaminants.

In the 2017 CFP, a total of 534 samples of infant and toddler foods were purchased in the Ottawa, Ontario and Gatineau, Quebec areas between April 1, 2017 and March 31, 2018. These samples included infant cereal, fruit and vegetable purees, infant and toddler grain-based snacks and juices. All samples were analyzed for pesticide residues and only juice samples were tested for metals.

The overall compliance rate of the infant and toddler food samples tested for pesticides and metals was 99.8%. 373 out of a total of 534 samples tested did not contain any detectable pesticide residues. 1 sample was not compliant with Canadian regulations, but was not considered a safety risk by Health Canada (HC).

Approximately 86.3% of the 51 samples of juice did not contain detectable levels of metals/elements of concern (arsenic, cadmium, lead and mercury). The levels of these elements found in the remaining samples had a 100% compliance rate.

Data obtained from surveillance programs like the CFP are useful in the assessment of the dietary exposure of Canadian children to pesticide residues, veterinary drug residues, metals/elements and aflatoxin M1 in infant foods. All data was reviewed by HC and no health risk was identified to Canadian infants and toddlers.

What is the children's food project

The CFP began in 2003 to look at levels of pesticide residues and metals/elements, in foods for infants and children. Because of their smaller body weight, their development and growth, and their consumption patterns, this group may be at higher risk from exposure to these chemicals.

The CFIA uses a number of different monitoring programs to ensure that the food supply is safe and compliant with Canadian standards. The CFP complements these activities by specifically collecting information on domestically produced and imported manufactured foods frequently consumed by and targeting children (for example, infant formula, cereal-based products, fruit juices and beverages). Together, the data from these programs help health authorities assess potential exposure to chemical residues and contaminants in a number of foods consumed by Canadian children.

The main objective of the 2017 CFP was to collect data and assess the compliance of infant foods to Canadian standards for residues of pesticides and metals

What did we sample

In total, 534 domestic and imported infant foods were sampled from retail stores located in Ottawa, Ontario and Gatineau, Quebec between April 1, 2017 and March 31, 2018. Of the 534 samples, 304 were labelled as organic. Both imported and domestically-produced foods were sampled with 6 products manufactured in Canada, 106 imported from other countries and 31 products from an unknown country of origin.

Table 1. Breakdown of products sampled in 2017 to 2018

Infant food	Number of domestic samples	Number of import samples	Number of samples from unspecified origin[a]	Total number of samples
Infant cereal	19	104	0	123
Fruit and vegetable purees	52	140	21	213
Grain-based snacks (for example, cookies, puffs, bars)	21	94	32	147
Juice - toddler/infant	28	15	8	51
Total	**120**	**353**	**61**	**534**

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

Sampling limitations

Due to the limited number of samples and products analyzed, care must be taken when interpreting these results. Regional differences, impact of product shelf-life, storage conditions, or cost of the commodity on the open market were not examined in this survey. Samples were tested as sold, which means the product was tested as is and not prepared according to package instructions.

How were samples analyzed and assessed

Analytical testing for the various types of analytes was performed by ISO/IEC 17025 accredited food testing laboratories under contract with the Government of Canada.

Pesticide analysis
The samples were tested for a range of pesticide residues which are commonly used in farming to control insects, fungus, and weeds. A summary of the pesticide residues analyzed can be found in Appendix A.

Metal/Elemental analysis
Many metals or elements are present in food due to their natural presence in the environment, but they could also be present due to the use of pesticides, agricultural chemicals, environmental contamination or processing. Juice samples were tested for a range of metals and elements. The focus of this report will be on four elements of primary concern to human health, which are arsenic, cadmium, lead and mercury.

Assessment of results
All results from samples tested in the project were evaluated against Canadian standards established by HC. For pesticides, the maximum residue limit (MRL) is the maximum amount of residues that is expected to remain in or on food products when a pesticide is used according to product label directions. For elements, the maximum level (ML) is the maximum level of a contaminant that could safely remain in food products.

Canadian pesticide MRLs are listed in the maximum residue limit database[1] published on the HC website. In the absence of an MRL, pesticide residues must comply with the general MRL of 0.1 ppm as stated in section B.15.002 (1) of the *Food and Drug Regulations*.

Maximum levels for contaminants in food are found in the list of contaminants and other adulterating substances in foods. The maximum level for lead in fruit juices is 0.05 ppm and for arsenic, it's 0.1 ppm. Non-compliant results were assessed by HC. Results from this survey were assessed by HC and were not considered to be of concern to children or infants.

What were the results

Pesticides

All 534 samples taken as part of the survey were tested for pesticides. No detectable levels of pesticide residues were found in 69.9% of the infant foods tested (373 samples). The results from the remaining 161 samples were 99.8% compliant with Canadian regulations. Only 1 sample (a fruit and vegetable puree) was determined to be unsatisfactory for glyphosate. The glyphosate result was reviewed by HC and determined to be safe for children and infants.

In this study, 304 of the 534 samples were labelled as "organic". There were no pesticide residues detected in 78.6% (239 samples) of organic products tested. 64 of the 65 remaining samples with detected levels of pesticide were below Canadian MRLs. All non-compliant organic residue results were sent to the Organics office for review.

Metals/Elements

A total of 51 juice samples were tested for metals/elements and 86.3% did not have detected levels for arsenic, cadmium, lead and mercury. Juices were tested because Canadian regulations exist for arsenic and lead. A summary of metal/element results can be found in Appendix B. All metal/element results were sent to HC's Bureau of Chemical Safety for review and samples were considered safe for children and infants.

Arsenic

Arsenic is an element that naturally occurs in the earth's crust and can be found in 2 chemical forms: organic (contains carbon atoms) and inorganic. In general, inorganic arsenic is more toxic to humans than organic arsenic. Long-term exposure to high levels of inorganic arsenic is known to contribute to the risk of human cancer and can affect the gastrointestinal tract, kidneys, liver, lungs and skin.[2] For most Canadians, the primary source of exposure to arsenic is food, followed by drinking water, soil and air.[3]

A total of 11.8% of juice samples had detected levels of total arsenic (includes organic and inorganic forms). All levels were below the maximum level of 0.1 ppm.

Cadmium

There are no Canadian MLs for cadmium levels in food and are assessed on a case-by-case basis. Cadmium can be present in water and soil through the use of phosphate fertilizers or sewage sludge. Food grown in cadmium containing soils is the primary source of cadmium exposure in the general population.[4] Kidneys and bones are affected by cadmium toxicity.[4]

There were no detected levels of cadmium in any of the juice samples.

Lead

Lead exposure may occur from a number of environmental and food sources. Chronic exposure to low levels of lead can be harmful to human health. Lead occurs naturally in the environment and has many industrial uses, such as in mining, smelting and battery manufacturing.[5] The greatest sources of a child's environmental exposure to lead are oral exposure from food and water along with ingestion of house dust and soil contaminated with lead.[5]

2 samples of juice (3.9%) had low levels of lead. All levels were below the maximum level of 0.05 ppm.

Mercury

Mercury is released naturally from rocks, soils and volcanoes. Industrial activities have also increased the amount of mercury in the environment.[6] Mercury contamination is a concern because it is toxic, persists in the environment, and can bio-accumulate in the food chain. The health effects of mercury depend on its chemical form (elemental, inorganic, organic), the route and level of exposure. Methyl mercury is the more toxic organic form and is easily absorbed and can cross the blood-brain barrier. Children and the developing fetus are particularly susceptible to the harmful effects of methyl mercury.

There were no detected levels of mercury in any of the juice samples.

Conclusion

The results of the CFP were shared with HC and the Organics office and they determined that none of the samples tested posed a health risk to Canadian infants. There were no product actions or recalls resulting from this sampling and testing on the basis of health risk. The infant foods tested in this survey, whether domestically produced or imported, are safe for consumption.

CFIA is committed to ensuring a safe food supply for all Canadians, including the vulnerable populations such as infants and young children. In the coming year, pesticide residues, toxic metals/elements (arsenic, cadmium, mercury and lead), veterinary drug residues and aflatoxin M1 will be examined in pureed infant food containing meat, ready-to-eat meals, pasta, and dairy and soy-based infant formula samples.

References

1. Maximum Residue Limits for Pesticides. (2012). Canada. Health Canada.
2. Arsenic. 2008. Canada. Health Canada. 2008
3. Arsenic in Drinking Water. 2006. Canada. Health Canada.
4. Scientific Opinion of the Panel on Contaminants in the Food Chain on a Request from the European Commission on Cadmium in Food. (2009). The EFSA Journal, 980, pp. 1-139.
5. Final Human Health State of Science Report on Lead. 2013. Canada. Health Canada.
6. Mercury and Human Health. 2008. Canada. Health Canada.

Appendix A: List of pesticides

A	B	C	D	E	F	G	H	I	J	K	L	M
N	O	P	Q	R	S	T	U	V	W	X	Y	Z

- 1-napthol
- 2,4-D
- 2,3,5,6-Tetrachloroaniline
- 2,6-diisopropylnaphthalene
- 3-hydroxyCarbofuran
- 5-hydroxythiabendazole

A

- Abamectin
- Acephate
- Acetamiprid
- Acetochlor
- Acibenzolar-s-methyl
- Aclonifen
- Acrinathrin
- Alachlor
- Aldicarb
- Aldicarb sulfone
- Aldicarb sulfoxide
- Aldrin
- Allethrin-d-trans
- Allidochlor
- Ametryn
- Aminocarb
- Anilofos
- Aramite
- Aspon
- Atrazine
- Atrazine-desethyl
- Azaconazole
- Azinphos-ethyl
- Azinphos-methyl
- Azoxystrobin

B

- Benalaxyl
- Bendiocarb
- Benfluralin
- Benodanil
- Benomyl
- Benoxacor
- Bensulide
- Benzoylprop-ethyl
- BHC-alpha
- BHC-beta
- Bifenazate
- Bifenox
- Bifenthrin
- Biphenyl
- Bitertanol
- Boscalid
- Bromacil
- Bromophos
- Bromophos-ethyl
- Bromopropylate
- Bromuconazole
- Bufencarb
- Bupirimate
- Buprofezin
- Butachlor
- Butafenacil
- Butocarboxim
- Butocarboxim sulfoxide
- Butralin
- Butylate

C

- Cadusafos
- Captafol
- Captan
- Carbaryl
- Carbendazim
- Carbetamide
- Carbofenthion
- Carbofuran
- Carbosulfan

- Carboxin
- Carfentrazone-ethyl
- Chlorantraniliprole
- Chlorbenside
- Chlorbromuron
- Chlorbufam
- Chlordane-cis
- Chlordane-trans
- Chlordimeform
- Chlorfenapyr
- Chlorfenson
- Chlorfenvinphos (e+z)
- Chlorfluazuron
- Chlorflurenol-methyl
- Chloridazon
- Chlorimuron-ethyl
- Chlormephos
- Chlorobenzilate
- Chloroneb
- Chloropropylate
- Chlorothalonil
- Chloroxuron
- Chlorpropham
- Chlorpyrifos
- Chlorpyrifos-methyl
- Chlorthal-dimethyl (Dacthal)
- Chlorthiamid
- Chlorthion
- Chlorthiophos
- Chlortoluron
- Chlozolinate
- Clodinafop-propargyl
- Clofentezine
- Clomazone
- Cyanazine
- Cyanofenphos
- Cyanophos
- Cyazofamid
- Cycloate
- Cycloxydim
- Cycluron
- Cyfluthrin (I,II,III,IV)
- Cyhalothrin-lambda
- Cypermethrin
- Cyprazine
- Cyproconazole
- Cyprodinil
- Cyromazine

D

- Deltamethrin / Tralomethrin (Total)
- Demeton-O
- Demeton-S
- Demeton-s Methyl (total)
- Demeton-s-methyl sulfone
- Demeton-s-methyl sulfoxide
- Desmedipham
- Desmetryn
- Di-allate
- Dialofos
- Diazinon
- Diazinon o analogue
- Dichlobenil
- Dichlofenthion
- Dichlofluanid
- Dichlormid
- Dichlorvos
- Diclobutrazole
- Diclocymet
- Diclofop-methyl
- Dicloran
- Dicofol
- Dicrotophos
- Dieldrin
- Diethatyl-ethyl
- Diethofencarb
- Difenoconazole
- Diflubenzuron
- Dimethachlor
- Dimethametryn
- Dimethoate
- Dimethomorph
- Dimetilan
- Dimoxystrobin
- Diniconazole
- Dinitramine
- Dinotefuran
- Dioxacarb
- Dioxathion
- Diphenamid
- Diphenylamine
- Dipropetryn
- Disulfoton
- Disulfoton sulfone
- Diuron
- Dodemorph
- Dodine

E

- Edifenphos
- Emamectin (Total)
- Endosulfan sulfate
- Endosulfan-alpha
- Endosulfan-beta
- Endrin

- EPN
- Epoxiconazole
- EPTC
- Erbon
- Etaconazole
- Ethalfluralin
- Ethiofencarb
- Ethiofencarb sulfone
- Ethiofencarb sulfoxide
- Ethiolate
- Ethion
- Ethiprole
- Ethirimol
- Ethofumesate
- Ethoprop
- Ethoxyquin
- Ethylan
- Etofenprox
- Etoxazole
- Etridiazole
- Etrimfos

F

- Famoxadone
- Fenamidone
- Fenamiphos
- Fenamiphos sulfone
- Fenamiphos sulfoxide
- Fenarimol
- Fenazaquin
- Fenbuconazole
- Fenchlorphos (Ronnel)
- Fenfuram
- Fenhexamid
- Fenitrothion
- Fenobucarb
- Fenoxanil
- Fenoxycarb
- Fenpropathrin
- Fenpropidin
- Fenpropimorph
- Fenpyroximate
- Fenson
- Fensulfothion
- Fenthion
- Fentrazamide
- Fenvalerate & Esfenvalerate
- Fipronil
- Fipronil sulfone
- Flamprop-isopropyl
- Flamprop-methyl
- Flonicamid
- Fluazifop-butyl
- Flubendiamide
- Flucarbazone-sodium
- Fluchloralin
- Flucythrinate
- Fludioxonil
- Flufenacet
- Flumetralin
- Flumioxazin
- Fluopicolide
- Fluorochloridone
- Fluorodifen
- Fluoxastrobin
- Fluquinconazole
- Fluridone
- Flusilazole
- Flutolanil
- Flutriafol
- Fluvalinate
- Fluxapyroxad
- Folpet
- Fonofos
- Forchlorfenuron
- Formetanate
- Fosthiazate
- Fuberidazole
- Furathiocarb

G

- Glyphosate
- Griseofulvin

H

- Haloxyfop
- Heptachlor
- Heptachlor epoxide endo
- Heptachlor epoxide exo
- Heptenophos

- Hexachlorobenzene
- Hexaconazole
- Hexazinone
- Hexythiazox

I

- Imazalil
- Imazamethabenz-methyl
- Imazethapyr
- Imidacloprid
- Indoxacarb
- Iodofenphos
- Ipconazole
- Iprobenfos
- Iprodione
- Iprovalicarb
- Isazophos
- Isocarbamide
- Isocarbophos
- Isofenphos
- Isofenphos-methyl
- Isoprocarb
- Isopropalin
- Isoprothiolane
- Isoproturon
- Isoxadifen-ethyl
- Isoxathion

K

- Kresoxim-methyl

L

- Leptophos
- Lindane (gamma-BHC)
- Linuron
- Lufenuron

M

- Malaoxon
- Malathion
- Mandipropamid
- MCPA
- Mecarbam
- Mepanipyrim
- Mephosfolan
- Metaconazole
- Metalaxyl
- Metazachlor
- Methabenzthiazuron
- Methamidophos
- Methidathion
- Methiocarb
- Methiocarb sulfone
- Methiocarb Sulfoxide
- Methomyl
- Methoprene
- Methoprotryne
- Methoxychlor
- Methoxyfenozide
- Methyl Pentachlorophenyl sulphide
- Methyl trithion
- Metobromuron
- Metolachlor
- Metolcarb
- Metosulam
- Metoxuron
- Metribuzin
- Mevinphos (Total)
- Mexacarbate
- Mirex
- Molinate
- Monocrotophos
- Monolinuron
- Myclobutanil

N

- Naled
- Napropamide
- Naptalam
- Neburon
- Nicotine
- Nitralin
- Nitrapyrin
- Nitrofen
- Nitrothal-isopropyl
- Nonachlor-cis
- Nonachlor-trans
- Norflurazon
- Norflurazon desmethyl
- Novaluron
- Nuarimol

O

- o,p'-DDD (o,p'-TDE)
- o,p'-DDE
- o,p'-DDT
- Octhilinone
- Ofurace
- Omethoate
- Ortho-phenylphenol
- Oxadiazon
- Oxadixyl
- Oxamyl
- Oxamyl-oxime
- Oxycarboxin
- Oxychlordane
- Oxyfluorfen

P

- Pesticide Screen
- Phenoxy Herbicides Screen
- p,p'-DDD (p,p'-TDE)
- p,p'-DDE
- p,p'-DDT
- Paclobutrazol
- Paraoxon
- Parathion
- Parathion-methyl
- Pebulate
- Penconazole
- Pencycuron
- Pendimethalin
- Penoxsulam
- Pentachloroaniline
- Pentachlorobenzene
- Pentachlorobenzonitrile
- Permethrin (Total)
- Phenmedipham
- Phenthoate
- Phorate
- Phorate sulfone
- Phorate sulfoxide
- Phosalone
- Phosmet
- Phosphamidon
- Picolinafen
- Picoxystrobin
- Pinoxaden
- Piperonyl butoxide
- Piperophos
- Pirimicarb
- Pirimiphos-ethyl
- Pirimiphos-methyl
- Prallethrin
- Pretilachlor
- Primisulfuron-methyl
- Prochloraz
- Procymidone
- Prodiamine
- Profenofos
- Profluralin
- Promecarb
- Prometon
- Prometryne
- Pronamide
- Propachlor
- Propanil
- Propargite
- Propazine
- Propetamphos
- Propham
- Propiconazole
- Propoxur
- Prothiophos
- Pymetrozine
- Pyracarbolid
- Pyraclostrobin
- Pyraflufen-ethyl
- Pyrazophos
- Pyridaben
- Pyridalyl
- Pyridaphenthion
- Pyridate
- Pyrifenox
- Pyrimethanil
- Pyriproxyfen
- Pyroquilon
- Pyroxsulam

Q

- Quinalphos
- Quinomethionate
- Quinoxyfen
- Quintozene
- Quizalofop
- Quizalofop-ethyl

R

- Resmethrin

S

- Schradan
- Secbumeton
- Sethoxydim
- Simazine
- Simeconazole
- Simetryn
- Spinetoram
- Spinosyn A+D
- Spirodiclofen
- Spiromesifen
- Spirotetramat
- Spiroxamine
- Sulfallate
- Sulfentrazone
- Sulfotep
- Sulfoxaflor
- Sulprophos

T

- TCMTB
- Tebuconazole
- Tebufenozide
- Tebufenpyrad
- Tebupirimfos
- Tecnazene
- Tepraloxydim
- Terbacil
- Terbufos
- Terbumeton
- Terbutryne
- Terbutylazine
- Tetrachlorvinphos
- Tetraconazole
- Tetradifon
- Tetraiodoethylene
- Tetramethrin
- Tetrasul
- Thiabendazole
- Thiacloprid
- Thiamethoxam
- Thiazopyr
- Thiobencarb
- Thiodicarb
- Thiofanox
- Thiofanox sulfone
- Thiofanox sulfoxide
- Thiophanate-methyl
- Tolclofos-methyl
- Tolfenpyrad
- Tolyfluanid
- Tralkoxydim
- Triadimefon
- Triadimenol
- Tri-allate
- Triazophos
- Tribufos
- Trichlorfon
- Triclosan
- Tricyclazole
- Trietazine
- Trifloxystrobin
- Trifloxysulfuron
- Triflumizole
- Trifluralin
- Triforine
- Trimethacarb
- Triphenyl phosphate
- Tris (1,3-Dichloroisopropyl) Phosphate
- Tris(2-butoxyethyl) Phosphate
- Tris(2-chloroethyl) Phosphate
- Tris(chloropropyl) Phosphate

V

- Vernolate
- Vinclozolin

Z

- Zengxiaoan
- Zinophos
- Zoxamide

Appendix B: Metals results found in infant foods and formula

Metal analyte	Product type	Total number of samples	Total number negative	Total number positive	Minimum (ppm)	Maximum (ppm)	Mean (ppm)[b]
Aluminum	Juice	51	21	30	0	2.2	0.351
Antimony	Juice	51	51	0	0	0	0.000
Arsenic	Juice	51	45	6	0	0.031	0.001
Beryllium	Juice	51	51	0	0	0	0.000
Boron	Juice	51	0	0	0.47	5.4	2.342
Cadmium	Juice	51	51	0	0	0	0.000
Chromium	Juice	51	46	5	0	0.05	0.004
Copper	Juice	51	51	0	0	0	0.000
Iron	Juice	51	12	39	0	7.7	1.573
Lead	Juice	51	49	2	0	0.009	0.000
Magnesium	Juice	51	0	51	18	140	62.196
Manganese	Juice	51	0	51	0.08	3.4	0.500
Mercury	Juice	51	51	0	0	0	0.000
Molybdenum	Juice	51	51	0	0	0	0.000
Nickel	Juice	51	41	10	0	0.06	0.007
Selenium	Juice	51	51	0	0	0	0.000
Tin	Juice	51	51	0	0	0	0.000
Titanium	Juice	51	51	0	0	0	0.000
Zinc	Juice	51	36	15	0	0.6	0.094

[b] Average of positive results only.