



Canadian Food
Inspection Agency

Agence canadienne
d'inspection des aliments

2016 Children's Food Project – Annual Report



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 objectives of the 2016 CFP were to:

- collect data and assess the compliance of infant foods to Canadian standards for residues of veterinary drugs and pesticides
- collect baseline data on the levels of aflatoxin M1 in infant foods and formula containing milk

Previous years have analyzed pesticides, metals, veterinary drug residues, aflatoxins and environmental contaminants.

In the 2016 CFP, a total of 241 samples of infant and toddler foods were purchased in the Ottawa, Ontario and Gatineau, Quebec areas in August, 2016. These samples included infant formula, meat-based or dairy-based infant foods and infant snacks (0 to 2 years). Samples were analyzed for pesticide residues, veterinary drug residues and aflatoxin M1 (in dairy-based samples).

The overall compliance rate of the infant food samples tested for pesticide and veterinary drug residues was 100%. Over 70% of the 241 samples tested did not contain any detectable pesticide residues. Veterinary drug residues were not detected in approximately 94% of the 237 samples of infant formula or infant food containing meat or dairy. In all but 1 sample, veterinary drug residues detected were compliant with Canadian Maximum Residue Limits (MRLs) established by Health Canada (HC) or, in cases where no regulations exist, below the limit of quantitation.

A total of 114 milk-based infant food and formula samples were tested for aflatoxin M1. Aflatoxin M1 was detected in 8 samples at levels well below the Codex Alimentarius maximum level (ML) of 0.5 parts per billion (ppb). The levels of aflatoxin M1 were assessed by HC and were not considered to be of concern to infant health.

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 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, 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 objectives of the 2016 CFP were to:

- collect data and assess the compliance of infant foods to Canadian standards for residues of veterinary drugs and pesticides
- collect baseline data on the levels of aflatoxin M1 in infant foods and formula containing milk

What did we sample

In total, 241 samples of domestic and imported infant foods were sampled from retail stores located in Ottawa, Ontario and Gatineau, Quebec in August, 2016. Of the 241 samples, 56 were labelled as organic. Both imported and domestically-produced foods were sampled with 34 products manufactured in Canada and the remaining products (207) imported from at least 5 other countries.

Table 1. Breakdown of products sampled in 2016

Infant food	Number of samples
Infant formula (milk-based)	86
Toddler/Baby meals	49
Infant foods (pureed meat, pureed meat with vegetables, pureed meat with fruits)	44
Canned pasta (containing meat and/or cheese)	31
Yogurt	18
Infant biscuit	6
Infant formula (soy-based)	4
Infant cereal (for example, rice, wheat, mixed grains, cereals mixed with fruit)	2
Pudding	1

Infant food	Number of samples
Total	241

Sampling limitations

Due to the low 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

Samples were tested for a wide array of pesticides which are commonly used to control insects and weeds. Additionally, residues present in livestock feed and forage can be transferred to the meat or milk of animals. A summary of the [pesticide residues analyzed](#) can be found in Appendix A.

Veterinary drug analysis

Samples containing meat and milk were analyzed for residues of a variety of veterinary drugs, which can be administered to food-producing animals. Some drugs are administered to individual animals to treat specific diseases, while others are administered to groups of animals, usually through medicated feed or water, to prevent or treat disease or to promote growth. The [veterinary drugs analyzed](#) in samples are listed in Appendix A.

Aflatoxin M1 analysis

Aflatoxins are natural compounds released by *Aspergillus* molds. These molds thrive in hot, humid climates and are not typically detected in Canadian crops. Aflatoxin B1 has been classified by the International Agency for Research on Cancer (IARC) as causing cancer in humans.¹ When dairy cows are fed aflatoxin-contaminated feed, aflatoxin B1 is converted to aflatoxin M1, which is transferred to the milk. Animal studies have shown that aflatoxin M1 causes cancer in the same way as aflatoxin B1^{2,3,4}. For this reason, all samples of milk-based infant formula and yogurt were analyzed for aflatoxin M1.

Assessment of results

The pesticide and veterinary drug residue results from samples tested in the project were evaluated against MRLs established by HC. The pesticide 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. The veterinary drug residue MRL is the level of residue that could safely remain in the tissue or food product derived from a food-producing animal that has been treated with a veterinary drug.

Canadian pesticide MRLs are listed in the [MRL Database](#) published on the HC website⁵. In the absence of an MRL, pesticide residues must comply with the General MRL (GMRL) of 0.1 ppm as stated in section B.15.002(1) of the *Food and Drug Regulations*.

Canadian MRLs for veterinary drug residues in foods of animal origin (meat, milk, eggs and honey) are published in the [List of Maximum Residue Limits \(MRLs\) for Veterinary Drugs in Food](#) on HC's website⁶. In the absence of an MRL or proposed MRL for a veterinary drug, the CFIA deems any food product containing a residue at or above the limit of quantitation (LOQ) to be non-compliant.

What were the results

Pesticides

A total of 1042 tests for pesticide residues were carried out on the 241 samples tested. As of 2015, the scope of pesticide testing under the CFP was expanded by adding 6 herbicides, including glyphosate. 4 of these herbicides (diquat, paraquat, 2,4-D, and 2-methyl-4-chlorophenoxyacetic acid (MCPA)) were not detected in any of the samples tested. No detectable levels of pesticide residues were found in 71.1% of the infant foods tested (169 samples). There were 72 samples that had a detectable level of one or more pesticide residues, all of which were 100% compliant with regulatory levels. See [Table B-1](#) in Appendix B for levels.

In this study, 56 of the 241 samples were labelled as "organic". There were no pesticide residues detected in 91.1% of organic products tested. All of the organic products contained compliant levels of pesticide residues but these residues are not permitted in organic farming. 1 of the products was domestic and contained a very low level of DDT. This level is consistent with environmental contamination with DDT and not from deliberate use of a pesticide. No further product action was required. The remaining four organic products were imported products with a single pesticide residue per sample. In this case, the results were forwarded to the certification body for follow-up with the manufacturers to determine the source of the pesticides. The levels of pesticides in all 4 of these cases were low, suggesting that the pesticides were not deliberately applied.

Veterinary drugs

A total of 1513 tests for veterinary drug residues were carried out on 237 samples of infant foods containing meat or dairy ingredients. No residues were detected in 94.1% of the samples. In this study, 53 of the samples containing meat or dairy ingredients were labelled as "organic" or containing 70% or greater organic ingredients. 51 of these contained no detectable veterinary drug residues. The remaining 2 samples contained residues of ractopamine (see [Table C-1](#) in Appendix C for levels).

Aflatoxin M1

A total of 114 milk-based infant food samples were tested for aflatoxin M1. As Canada does not have an established ML for aflatoxin M1 in milk or milk-based products, compliance was not assessed. The aflatoxin levels detected were compared to the Codex (an international standard setting body) ML of 0.5 ppb for aflatoxin M1 in milk. Aflatoxin M1 was detected in 7 of the 63 samples of infant formula and in 1 sample of 6 samples of infant biscuits at levels well below the Codex ML. Levels ranged from 0.018 ppb to 0.080 ppb in powdered formulas. 1 infant biscuit sample contained 0.022 ppb of aflatoxin M1.

Conclusion

The results of the CFP were shared with HC to determine risk and none of the samples tested posed a health risk to Canadian infants. There were no product actions or recalls resulting from this survey. The infant foods, 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 and toxic metals (arsenic, cadmium, mercury and lead) will be examined in pureed infant food, infant cereals, infant snacks and fruit juice samples.

References

1. Chemical Agents and Related Occupations - A Review of Human Carcinogens, in IARC Monographs on the Evaluation of Carcinogenic Risks to Humans. IARC Monographs. (2012). International Agency for Research on Cancer, 100, pp. 1-599.
2. F. Galvano, et al., Survey of the occurrence of aflatoxin M1 in dairy products marketed in Italy: second year of observation. Food Additives & Contaminants. (2001). 18(7), pp. 644-646.
3. Shipra Rastogi, et al., Detection of Aflatoxin M1 contamination in milk and infant milk products from Indian markets by ELISA. Food Control. (2004). 15(4), p. 287-290.
4. [Antibiotic Growth-Promoters in Food Animals](#). (2004). Italy. Food and Agriculture Organization.
5. [Maximum Residue Limits for Pesticides](#). (2012). Canada. Health Canada.
6. [List of Maximum Residue Limits \(MRLs\) for Veterinary Drugs in Foods](#). (2018). Canada. Health Canada.

Appendix A

Pesticide residues

Pesticide residues examined in products containing dairy

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

A

- Alachlor
- Alachlor metabolite
- Aldrin

B

- BHC-alpha
- BHC-beta

C

- Chlordane-cis
- Chlordane-trans
- Chlorpyrifos

D

- Dicofol
- Dieldrin

E

- Endosulfan sulfate
- Endosulfan-alpha
- Endosulfan-beta
- Endrin

F

- Fenchlorphos (Ronnell)

H

- Heptachlor
- Heptachlor epoxide endo
- Heptachlor epoxide exo

- Hexachlorobenzene

L

- Lindane (gamma-BHC)

M

- Methoxychlor
- Mirex
- Myclobutanil

N

- Nuarimol

O

- o,p'-DDD (o,p'-TDE)
- o,p'-DDE

P

- Pesticide Screen
- Phenoxy Herbicides Screen

Q

- Quizalofop-ethyl

T

- Tefluthrin

- o,p'-DDT

- p,p'-DDD (p,p'-TDE)
- p,p'-DDE
- p,p'-DDT

- Oxychlordane

- Permethrin-cis
- Permethrin-trans



Pesticide residues examined in products containing meat

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

- 3-hydroxycarbofuran

A

- Acephate
- Acetamiprid
- Alachlor
- Alachlor metabolite
- Aldicarb
- Aldicarb Sulfone
- Aldicarb sulfoxide
- Aldrin
- Aminocarb
- Atrazine
- Atrazin-desethyl
- Azoxystrobin

B

- Bendiocarb
- Benoxacor
- BHC-alpha
- BHC-beta
- Bifenthrin
- Boscalid
- Bufencarb
- Buprofezin

C

- Carbaryl
- Carbofenthion
- Carbofuran
- Carboxin
- Carfentrazone-ethyl
- Chlordane-cis
- Chlordane-trans
- Chlorfenvinphos (e+z)
- Chloroneb
- Chlorpropham
- Chlorpyrifos
- Chlorpyrifos-methyl
- Clofentezine
- Clothianidin
- Coumaphos
- Cyfluthrin (I,II,III,IV)
- Cyhalothrin-lambda

D

- Deltamethrin
- Diazinon
- Dichlofenthion
- Dichlorvos
- Dicofol
- Dieldrin
- Difenconazole
- Diflubenzuron
- Dimethoate
- Dioxacarb
- Disulfoton
- Diuron

E

- Endosulfan sulfate
- Endosulfan-alpha
- Endosulfan-beta
- Endrin
- Ethion
- Ethofumesate

F

- Fenchlorphos (Ronnell)
- Fenoxypyr-ethyl
- Fenpropathrin
- Fenthion
- Fenvalerate & Efenvalerate
- Fipronil
- Fipronil Desulfinyl
- Fipronil sulfide
- Fluridone
- Fluroxypyr-1-methylhepyl ester
- Fluvalinate
- Fonofos

H

- Heptachlor
- Heptachlor epoxide endo
- Heptachlor epoxide exo
- Hexachlorobenzene
- Hexazinone

I

- Imazalil
- Imidacloprid
- Indoxacarb
- Isoprocarb

L

- Lindane (gamma-BHC)
- Linuron

M

- Malathion
- Metalaxyl
- Methidathion
- Methiocarb
- Methiocarb sulfone
- Methiocarb sulfoxide
- Methomyl
- Methoxychlor
- Methoxyfenozide
- Metalochlor
- Metribuzin
- Mirex
- Myclobutanil

N

- Nonachlor-cis
- Nonachlor-trans
- Norflurazon

O

- o,p'-DDD (o,p'-TDE)
- o,p'-DDE
- o,p'-DDT
- Ortho-phenylphenol
- Oxamyl
- Oxychlorane

P



- Pesticide Screen
- Phenoxy Herbicides Screen
- p,p'-DDD (p,p'-TDE)
- p,p'-DDE
- p,p'-DDT
- Parathion
- Parathion-methyl
- Permethrin (Total)
- Phorate
- Phorate sulfone
- Piperonyl butoxide
- Profenofos
- Promecarb
- Pronamide
- Propachlor
- Propanil
- Propetamphos
- Propiconazole
- Propoxur
- Pyraclostrobin
- Pyridaben
- Pyriproxyfen

Q

- Quizalofop-ethyl

R

- Resmethrin

S

- Simazine

T

- Tebufenozide
- Tefluthrin
- Terbufos
- Trifloxystrobin
- Tetrachlorvinphos
- Thiabendazole
- Thiamethoxam
- Thiobencarb
- Tribufos

Veterinary drug residues

Veterinary drug residues tested in products containing dairy

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

A

- Amoxicillin
- Ampicillin

C

- Chlortetracycline
- Ciprofloxacin
- Cloxacillin

D

- Danofloxacin
- Dicloxacillin
- Difloxacin
- Doxycycline



E

- Enrofloxacin
- Erythromycin

F

- Flumequine

J

- Josamycin

L

- Lincomycin

M

- Marbofloxacin

N

- Norfloxacin

O

- Oxacillin
- Oxolinic acid
- Oxytetracycline

P

- Penicillin G
- Penicillin V

S

- Sarafloxacin
- Sulfamerazine
- Sulfapyridine
- Spiramycin
- Sulfamethazine
- Sulfaquinoxaline
- Sulfachloropyridazine
- Sulfamethizole
- Sulfathiazole
- Sulfadiazine
- Sulfamethoxazole
- Sulfisoxazole
- Sulfadimethoxine
- Sulfamethoxy-pyridazine
- Sulfadoxine
- Sulfamonomethoxine

T

- Tetracycline
- Trimethoprim
- Tylosin
- Tilmicosin

Veterinary drug residues tested in products containing meat

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

A

- Amoxicillin
- Ampicillin

C

- Cefazolin
- Cephalixin
- Chloramphenicol



- Chlortetracycline
- Ciprofloxacin

- Clindamycin

- Cloxacillin

D

- Danofloxacin
- Desethylenciprofloxacin

- Desfuroyl ceftiofur cysteine disulfide
- Dicloxacillin

- Doxycycline

E

- Enrofloxacin

- Erythromycin

G

- Gamithromycin

J

- Josamycin

L

- Lincomycin

N

- Nafcillin

- Neospiramycin

- Norfloxacin

O

- Ofloxacin
- Oleandomycin

- Oxacillin

- Oxytetracycline

P

- Penicillin G

- Pirlimycin

S

- Sarafloxacin
- Spiramycin
- Sulfabenzamide
- Sulfacetamide
- Sulfachloropyridazine

- Sulfadiazine
- Sulfadimethoxine
- Sulfadoxine
- Sulfaethoxypyridazine
- Sulfamerazine

- Sulfamethazine
- Sulfamethoxypyridazine
- Sulfaquinoxaline
- Sulfathiazole

T

- Tetracycline
- Thiamphenicol
- Tiamulin

- Tildiprosin
- Tilmicosin
- Trimethoprim

- Tulathromycin
- Tylosin
- Tyvalosin

Appendix B

Table B-1 Pesticide residues detected and percent compliance (by residue) in infant foods and infant formula

Residue	Number of tests	Number of positives	% Positive	Number of violations	Levels (ppm)	MRL (ppm)
Glyphosate	241	61	25.31%	0	0.0055 - 0.61	0.1 - 20
AMPA	241	9	3.73%	0	0.0065 - 0.046	0.08 or 20 (alone or in combination with glyphosate)
Chlorpropham	241	4	1.66%	0	0.01 - 0.031	15
Thiabendazole	241	4	1.66%	0	0.02 - 0.052	10
DDT	241	1	0.41%	0	0.0083	1

Appendix C

Table C-1 Veterinary drug residues detected and percent compliance (by residue) in infant foods and infant formula

Residue	Number of tests	Number of positives	% Positive	Number of non-compliances	% Compliance by sample
Ractopamine	154	11	7.14%	0	100%
Thiabendazole	106	2	1.89%	0	100%
Levamisole	106	1	0.94%	0	100%

Note: Thiabendazole was not detected by the pesticide screen but was detected in the veterinary drug screen. Thiabendazole is not within the scope of the pesticide method for dairy products. One level (0.0065 ppm) is below the LOQ and is considered compliant. The other level (0.0237 ppm) is above the LOQ. However, thiabendazole is also used as a pesticide and has an MRL of 10 ppm.