Canadian Food Inspection Agency | Agence canadienne d'inspection des aliments

Children's Food Project

2009-2010 Report on Sampling

Foods intended for children aged 2 – 15 years

Canada

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Executive Summary

The main objectives of the 2009 – 2010 Children's Food Project (CFP) were:

- to assess the compliance status for pesticide residues in foods consumed by children aged 2 – 15 years;
- to provide data to Health Canada that can be used for health risk assessment of foods consumed by children;
- to gather preliminary pesticide data from a new scope of pesticide residues in foods commonly consumed by children aged 2 – 15 years.

In the 2009 – 2010 CFP, a total of 821 processed and manufactured food samples were purchased in the Ottawa – Gatineau area. Samples included a variety of candy, cereals, chocolate, dairy products, juice, meat products, nuts and seeds and processed fruit and vegetable products. The samples were obtained from national grocery stores, small local grocery stores and drugstores. The samples were analyzed for pesticide residues and metals. A total of 2530 analytical tests were performed which corresponds to more than 223 750 results.

The scope of pesticide residue analysis encompasses over 400 pesticide residues. Most samples were analyzed for pesticide residues. The methods included an LC/ESI-MS-MS multi-residue method (142 analytes) introduced in the 2008 – 2009 CFP; a multi-residue GC-MS method that detects carbamate, organochlorine or organophosphate compounds (299 analytes) or a multi-residue method that detects pesticide residues in dairy products (32 analytes); and single-residue method used to detect benomyl (carbendazim residues), dithiocarbamate and ethylenebisdithiocarbamate (EBDC) fungicides, ethylene thiourea (ETU), formetanate and thiabendazole in selected samples. All 821 samples were analyzed for metals using an analytical method capable of detecting 18 different metals – aluminium, antimony, arsenic, beryllium, boron, cadmium, chromium, copper, iron, mercury, manganese, molybdenum, nickel, lead, selenium, tin, titanium, and zinc.

Of the 803 samples tested for pesticide residues, 643 (80.1%) contained no detected pesticide residues. The remaining 160 samples (19.9%) had detected levels of pesticide residues, with 57 (7.1%) containing more than one specific analyte. Of the 160 samples with detected pesticide residues, 11 (1.4% of all samples) contained pesticide residue levels in excess of established MRLs or the 0.1 ppm General Maximum Residue Limit (GMRL) and were therefore in violation of paragraph 4(d) of the *Food and Drugs Act* (*FDA*). The violative products are unlikely to pose a significant risk to the health of children. The majority of the pesticide residue results (98.6 %) were in compliance with Canadian MRLs.

Heavy metals that may pose the greatest inherent risk to human health at low levels include arsenic, cadmium, mercury and lead. The levels of most metals detected in this study were below established MRLs and tolerances. Consistent with previous year's results, higher arsenic levels were found in several rice-based and seafood products. All of the metals detected were within the range of typical background concentrations observed in similar foods.

Introduction to the Children's Food Project Report

The Children's Food Project (CFP) report provides a summary of pesticide residue and metal analysis results conducted in fiscal year 2009 – 2010. The objective of the CFP report is to:

- Summarize the results and assess the compliance of the levels of pesticide residues and metals in foods consumed by children aged 2 – 15 years;
- Provide pesticide residue and metals data to Health Canada from foods consumed by children for risk assessment;
- Gather preliminary pesticide data from a new scope of pesticide residues in foods commonly consumed by children aged 2 – 15 years.

The first section of the report is a detailed overview of the CFP. Included is the purpose of the project, a summary of past CFP results and project limitations. Additionally, a brief overview of analytical requirements is described. A short discussion is also provided on the regulatory framework for pesticide residues and metals in Canada.

The second section of the report describes the design of the CFP for the 2009 – 2010 fiscal year. A description of the CFP's commodity groups and the criteria for sample inclusion are provided. Additionally, the specifics of the analytical methods chosen for the analysis of pesticide residues and metals are also described.

The results of the CFP are reported in section 3. A general discussion is provided on the pesticide residues and metal levels detected in children's foods.

The final section of the CFP report summarizes the results of this year's project.

1 The Children's Food Project

1.1 Project purpose

As part of the 'Building Public Confidence in Pesticide Regulation and Improving Access to Pest Management Products' initiative (http://www.tbs-sct.gc.ca/hidb-bdih/initiative-eng.aspx?Hi=36), the Canadian Food Inspection Agency (CFIA) received funding to undertake limited monitoring of pesticides in foods consumed by children. In January 2003, the CFIA initiated the 'Young Children's Food Chemical Residues Project' (later renamed the 'Children's Food Project' [CFP]) to test children's foods for pesticide residues.

The general objective of the CFP is to ensure continued compliance of pesticide residues in children's foods, with specific aims to:

- gather data to determine the prevalence of pesticide residues in children's foods;
- identify foods that represent a potential health risk from illegal or inappropriate uses of pesticides;

- determine compliance with pesticide MRLs and metal MRLs and tolerances specified under the *Pest Control Products Act* (*PCPA*) and the *Food and Drug Regulations* and covered by the *Food and Drugs Act* (*FDA*).

1.1.1 Summary of past CFP results

Presented in Table 1-1 is a summary of pesticide residue results for each sampling year since project inception.

Table 1-1 Summary of pesticide results obtained in previous Children's Food Projects

Age Group Targeted	Remarks and pesticide residue results	Sampling Year	Sample Size
0 – 18 months	• Overall compliance rate of 99.76%	*2002 - 2003*	412
2 – 10 years	• Scope expansion to include some veterinary drug residues and metals • Overall compliance rate of 100%	*2003 - 2004*	594
0.5 – 15 years	• Overall compliance rate of 98.8%	*2004 - 2006*	1523
0.5 – 15 years	• Overall compliance rate of 100%	*2006 - 2007*	350
3 – 15 years	• Overall compliance rate of 98.6%	*2007 - 2008*	836
0 – 24 months	• Pesticide residue scope expansion from 300 to 400 residues • Overall compliance rate of 99.7%	*2008 – 2009*	382

1.1.2 Limitations of CFP

The CFP is designed to be a case study. It is not designed to gather statistically valid information on the type and levels of chemical residues and metals in children's foods. This would require more samples and substantially increase project costs.

The sampled foods are chosen based on market availability and do not necessarily correspond to the relative importance of this type of food in the diets of Canadian children. No statistical methods are used to establish sampling plans that take into consideration the prevalence of a food (e.g., cereal grains) to the different samples obtained (e.g., infant cereals, cookies). Products were not targeted (except when marketed at children) and picked at random. Very few duplicate products were tested.

The results of the case study should not be directly compared to the results of the Pesticide Data Program (PDP) of the United States Department of Agriculture (USDA) <http://www.ams.usda.gov/AMSv1.0/PesticideDataProgram> or Health Canada's Canadian Total Diet Study <http://www.hc-sc.gc.ca/fn-an/surveill/total-diet/index-eng.php> The aims of these programs differ from the purposes of this project in several ways, including:

- objective (case study versus monitoring of food supply);
- choice of pesticide residues and contaminants investigated;
- choice of analytical methods used (i.e. instrument type, sensitivity);
- nature of the sampling procedure (i.e. random, targeted);
- degree of preparation of the food samples (i.e. as purchased, as consumed).

1.2 Analytical testing

To analyze samples with unknown pesticide treatments, the CFIA laboratories develop, validate and carry out analytical methods capable of simultaneously determining a large number of pesticide residues. The majority of the samples in the CFP were analyzed by accredited third party laboratories. The CFIA has established requirements for the acceptance of analytical results from third party laboratories. These laboratories must have analytical methods that meet or surpass the equivalent CFIA method performance parameters. The analytical methods used in the CFP may differ year-to-year. The current CFP analytical methods are described in Section 2.2.

1.3 Maximum residue limits (MRLs) and tolerances

1.3.1 Regulatory Guidelines

Two federal organizations share the responsibility for regulating the levels of pesticide residues in food. Health Canada's Pest Management Regulatory Agency (PMRA) is responsible for registering pesticides that can be used domestically and establishing Maximum Residue Limits (MRLs) for pesticide residues in foods while the CFIA enforces MRLs and tolerances in food. Through monitoring programs like the National Chemical Residue Monitoring Program (NCRMP), special surveys and projects like the CFP, the CFIA acquires incidence information and specific residue data on commodity-pesticide residue combinations.

1.3.2 Pesticides

An approach to increase the availability of fresh food commodities is through the selective use of pesticides and other agricultural chemicals. These chemicals are applied to food crops for various purposes, including: protection against pest pressures (moulds, insects, etc.), increase in yield, to expand the geographical location in which crops can be grown, extend shelf-life and improve the appearance of many foods. A consequence of using agricultural chemicals during food production is that foods can sometimes retain chemical residues which may be of concern to Canadian consumers.

Health Canada determines 'whether the consumption of the maximum amount of residues, that are expected to remain on food products when a pesticide is used according

to label directions, will not be a concern for human health. The maximum amount of residues expected is then legally established as a maximum residue limit (MRL)'.[1]

Pesticide residue results obtained in the CFP are compared to the applicable standards established by Health Canada at the time of sampling. Standards are published in the following sources:

- MRLs for pesticide residues are specified under the *Pest Control Products Act* (PCPA) and can be found on Health Canada's *Consumer Product Safety* website <http://www.hc-sc.gc.ca/cps-spc/pest/protect-proteger/food-nourriture/mrl-lmr-eng.php>, but are legally enforced under the *Food and Drugs Act (FDA);*
- Pesticide residues that lack MRLs must comply with the Canadian General MRL of 0.1 ppm. The 0.1 ppm MRL is enforced under the *FDA* and specified in *Division 15* of the *Food and Drug Regulations* (*FDR*) <http://laws-lois.justice.gc.ca/eng/C.R.C.-C.870/page-1.html#anchorbo-ga:l_B-gb:l_15>;
- The 0.05 ppm MRL for ethylene thiourea (ETU) is enforced under the *FDA* and established in *Division 1* of the (*FDR*) <http://laws-lois.justice.gc.ca/eng/C.R.C.-C.870/page-1.html#anchorbo-ga:l_B-gb:s_B_01_001>.

1.3.3 Metals

Metals occur naturally in food, but may also result from agricultural chemical use, environmental contamination, fertilizers, canning (i.e., tin, nickel) or from the addition of food additives and nutritional supplements. As a result, the presence of metal analytes in food is anticipated.

Metals such as chromium, copper, iron, manganese, selenium and zinc are essential minerals required for good health. While inadequate amounts of an essential mineral in the diet can be detrimental to human health, high levels of certain metals may result in toxic effects. Metals of particular concern to human health include arsenic, cadmium, lead and mercury. Arsenic (inorganic) is considered a human cancer-causing agent. Furthermore, ongoing arsenic exposure can lead to cardiovascular and circulatory effects.[2] Cadmium exposure (namely inorganic cadmium) can produce adverse health effects on the kidney, stomach and bones.[3] Chronic lead exposure can cause anaemia, kidney toxicity and may result in damage to the central nervous system and brain. Young children and the developing foetus are most susceptible to lead toxicity. Health effects from mercury exposure will vary depending on the chemical form. Inorganic mercury may cause gastrointestinal and kidney damage. Ongoing exposures to organic mercury compounds, such as methyl mercury, can be detrimental to a child's developing brain, and sensory changes can be observed in both children and adults.

Agricultural chemicals that contain metals are regulated and monitored in the same way as pesticides. Similarly to pesticide MRLs, metal MRLs, tolerances and standards are regulated by Health Canada and enforced by the CFIA. The existing guidelines include:

- A 50 ppm MRL established under the *Pest Control Products Act* for copper compounds on all fruit and vegetable products;

- Metal tolerances are established under Division 15 of the *Food and Drug Regulations* and can be found on Justice Canada's website <http://laws.justice.gc.ca/eng/C.R.C.-C.870/page-1.html#anchorbo-ga:l_B-gb:l_15>
- Health Canada's website lists Canadian Standards (Maximum Levels) for Various Chemical Contaminants in Foods: http://www.hc-sc.gc.ca/fn-an/securit/chem-chim/contaminants-guidelines-directives-eng.php

Even in the absence of a specific MRL, tolerance or standard, all foods sold in Canada must comply with Part I, Section 4(1)(a) of the *Food and Drugs Act*, which states that no person shall sell an article of food that has in or on it any poisonous or harmful substance. If the level is found to be elevated, the potential risk to human health may be assessed by Health Canada in order to determine if risk management actions are required.

2 Design of the 2009-2010 Children's Food Project

The design of the 2009 – 2010 CFP is described in sections 2.1 and 2.2. New sampling strategies occur year to year when new information is collected from previous CFIA testing activities or when new analytical capabilities arise from the CFIA laboratories.

2.1 CFP sampling

The NCRMP targets federally-registered food commodities, such as foods of animal origin (meat, eggs, honey, and dairy products), maple products, processed products, and fresh fruits and vegetables (analyzed as the unwashed, unpeeled, raw commodity). Alternatively, the CFP collects information on chemical residues in manufactured foods frequently consumed by children (e.g., fruit snacks, cereal-based products, fruit juices and beverages, etc.). These non-federally registered foods (manufactured and imported foods) are also the focus of targeted surveys, deliverables of the Food and Consumer Safety Action Plan <http://hc-sc.gc.ca/ahc-asc/activit/strateg/fcsap-paaspac-eng.php>. Together, the data from these programs help health authorities assess potential exposure to pesticide residues and metals in most foods consumed by Canadian children. The results from these activities can be found at the following CFIA web address: http://www.inspection.gc.ca/english/fssa/microchem/resid/reside.shtml

2.1.1 Sample selection for 2009 – 2010

The multitude of food available and targeted at children, as well as the different consumption patterns of children of different age groups, makes it impossible for the CFIA to test all of these different foods on an annual basis. To overcome this challenge, different foods for different age groups are sampled each year.

In 2008 – 2009, baby and toddler foods were sampled. In 2009 – 2010, foods for children aged 2 to 15 years of age were targeted. The foods collected for this age group were similar to the food samples collected in 2007 – 2008 (age group 3 – 15 years).

The samples in the CFP include both domestic and imported manufactured foods. The samples were packaged in a variety of packaging formats: glass and plastic bottles, cans, boxes, cartons and bags. Samples included products with both short shelf-lives (i.e., perishable, frozen) and longer shelf-lives. Samples were purchased from several national grocery chains, drugstores, and at smaller local and ethnic markets in the Ottawa-Gatineau area. The number of samples purchased from each grocery store was related to the availability of products and/or brands and does not reflect the relative demographic composition of or the relative amounts of food consumed by Canadian children.

2.1.2 Sample breakdown for 2009 – 2010

A total of 821 samples were included in the 2009 – 2010 CFP. Of these, 252 (31%) were cereal-based, 26 were confectionery (3%), 57 (7%) were dairy-based, two were fish and seafood based (<1%), 16 were legume-based (2%), 10 were meat-based (1%), seven were nuts and seeds (<1%) and 451 (55%) were fruit- and vegetable-based. Table 2-1 provides a summary of the different types of children's food samples selected in the 2009 – 2010 project.

Table 2-1 Breakdown of sampled products in the 2009 – 2010 CFP

Product type	Food category	Sample description	Number of samples
Cereals and grains	Baked goods	Tarts, pies, fudge, cupcakes, pastries, cake	16
	Baking goods	Cake mixes, coating mixes, muffin mixes, pie crust mixes, cookie dough, stuffing mixes	20
	Breads	Bread, baguette, rolls, buns, pita	5
	Cereals	Breakfast cereals	21
	Chips	Corn chips, pretzels, taco shells, cheese-flavoured snacks	12
	Cookies	Cookies, snaps, wafers, biscuits	67
	Couscous	Whole wheat couscous, flavoured couscous	2
	Crackers	Crackers, bread sticks, rusks	28
	Donuts	Donuts, twists, rolls, buns, cakes	6
	Ice cream cups	Cups and cones	2
	Pancake mixes	Pancake, waffle and dumpling mixes	7
	Pasta	Assorted pasta, whole wheat pasta, noodles, egg noodles, rice pasta	26
	Pizza	Crust and sauce	1
	Rice	Flavoured rice, wild rice, long grain, basmati, sushi	7
	Rice snacks	Crisps, cakes, squares, pudding, crackers, rice beverage	14
	Snack bars	Granola, cereal and nut-based snack bars	16
	Soups	Oriental noodle & artificial flavouring	1

Product type	Food category	Sample description	Number of samples
	Spreads	Corn syrup	1
Confectionery	Candy	Real fruit-based candy	7
	Chocolate	Bars, chips, Halloween, squares, baking	18
	Misc. snacks	Marshmallows	1
Dairy	Cheeses	Parmesan, mozzarella, cheddar, string cheese	7
	Milk products	Dairy drinks, yogurt drinks, ice cream bars, milkshakes	7
	Puddings	Puddings, custards	10
	Spreads	Cheese spreads, dips	2
	Yogurts	Yogurt beverages, stirred yogurt, tubes, immune-strengthening	31
Fish and seafood	Canned fish	Flavoured tuna	1
	Soups	Clam chowder soup	1
Legumes *Legumes cont'd*	Canned beans	Canned kidney beans, maple-flavoured canned beans	2
	Canned peas	Chick peas, hummus	2
	Peanut products	Peanut butter, beverage, nuts	5
	Soy products	Soy beverages, tofu, soy-based pudding, dressing	7
Meat	Soups	Beef soup, chicken noodle soup, chicken and pasta soup, meatball	10
Nuts and seeds	Non-dairy beverages	Almond beverage	1
	Snack nuts	Cashews	1
	Snack seeds	Pumpkin and sunflower seeds	2
	Spreads	Almond butter, tahini, chestnut puree	3
Processed fruits and vegetables	Applesauce	Unsweetened, flavoured, apple and mango, apple and cranberry, cinnamon	8
	Bottled fruits	Mandarin orange slices, bottled prunes	2
	Bottled vegetables	Garlic, olives, mixed vegetables, ginger	6
	Boxed vegetables	Tomatoes	1
	Canned fruits	Peaches, fruit cocktails, pears, mangos, lychees, pineapple, ackees, pie fillings, longans, jackfruit, cherries, cranberry	38
	Canned juices	Tomato, apple, pineapple, vegetable cocktails	6
	Canned pasta	Spaghetti, animal pasta, alphabet pasta with sauce	5
	Canned soups	Vegetable, barley, minestrone, cream soups, squash	11

Product type	Food category	Sample description	Number of samples
Processed fruit and vegetables cont'd	Canned vegetables	Peas, corn, asparagus, mixed vegetables, carrots, tomatoes, beans, squash, mushrooms, beets, potatoes, okra, vine leaves, water chestnuts, artichoke, bean sprouts, pinto beans, bamboo shoots, banana blossom, spinach, palms	79
	Chips	Plantain chips	2
	Condiments	Ketchup, relish, seasonings	7
	Dried fruits	Raisins, cranberries, dates, apricots, figs, papaya, banana, coconut, plums, prunes	15
	Dried fruits & nuts	Trail mixes	2
	Dried vegetables	Wasabi peas, sun dried tomatoes	2
	Frozen fruit juice	Orange, white & red grape, punch, watermelon	5
	Frozen vegetables	Hash browns	1
	Fruit juices	Apple, juice snacks, pineapple, grape, cherry, passion fruit, guava, youngberry, wild berry, raspberry, lemon, pomegranate, citrus, strawberry, kiwi, mulberry, mango, peach, banana, lychee, nectarine, blueberry, apricot, pear, grapefruit, lemonade	93
	Fruit nectars	Guyabano, mango, pear, orange, grapefruit, peach, banana & strawberry, guava, cherry, peach, pear, blackcurrant	19
	Fruit snacks	Fruit salads and purees in plastic cups, animal shapes, fruit tape, gels	62
	Jams	Blueberry, raspberry, mincemeat, cherry, strawberry, apricot, pie filling, apple jelly, fruit spreads	12
	Non-dairy beverages	Hemp beverage, coconut milk	2
	Pickled products	Pickles, pickled vegetables, red cabbage, green tomatoes	7
	Potato snacks	Potato chips	9
	Puddings	Gelatin-based fruit flavoured snacks (Nata de coco, pineapple, strawberry)	5
	Salads	Tabouleh	1
	Salad dressings	Orange salad dressing	1
	Salsa	Hot, regular, tomatillo-based, Mexican, chunky, mild	9
	Sauces	Curry, BBQ, pasta sauce, plum sauce, sweet and sour sauce, dessert sauce, pizza sauce	23
	Soups	Vegetable, cream soups, lentil, carrot, corn	7

Product type	Food category	Sample description	Number of samples
	Spreads	Banana spread, eggplant appetizer, baba ghannouj, pesto	6
	Vegetable juices	Garden cocktails, gourd drinks, mixed fruit and vegetable beverages	5

2.2 Sample testing

The scope of analytical testing in the CFP has been relatively consistent from year to year. Analytical testing is performed using multi-residue methods (MRMs) and single-residue methods (SRMs). MRMs are capable of detecting large numbers of pesticide residues and metals and are generally more cost-efficient. SRMs are capable of detecting single residues or residues belonging to one chemical family. SRMs are less cost-effective.

2.2.1 Multi-Residue Methods - Pesticides and Metals

The CFIA received federal funding to purchase new analytical equipment and develop and validate a new pesticide detection method to enhance surveillance of Canada's food supply. The 2008 – 2009 CFP was the first CFIA project/program to include pesticide analyses from a method developed and validated for the BPC initiative. The pesticide MRM is applicable for determining 142 pesticide residues in processed fruit- and vegetable-based foods. The method detection limits (MDLs) of the analytes range between 0.001 and 1.2 ppm. The reference method (CFIA method PMR-006-V1.0) is entitled 'Determination of Pesticides in Infant Foods using Liquid Chromatography Electrospray Ionization Mass Spectrometry (LC/ESI-MS/MS)'. The analytical scope of this MRM is provided in Appendix A.

In total, 264 samples underwent LC/ESI-MS-MS testing in the 2009 – 2010 CFP. A limited number of samples were selected due to the limited amount of resources for in-house testing. Furthermore, sample analysis was limited to the validated food matrices, which include processed fruit and vegetables, fruit juices and nectars. The CFIA has new third party lab contracts in place for LC/ESI-MS-MS analysis and testing is scheduled to begin in the 2010 – 2011 version of the CFP. Analysis will expand to consist of other food matrices, including cereals, dairy and fish and seafood and meat-based products.

The existing MRM used by third party laboratories for pesticide residue analysis in processed products (meat-based, cereal-based and fruit- and vegetable-based) is similar to the CFIA reference method entitled 'Determination of Pesticides in Honey, Fruit Juice and Wine (With Solid Phase Extraction Clean-Up and GC/MSD and HPLC Fluorescence Detection)'. The method (referred to as 'FPH053') scope includes 299 pesticide residues which are listed in Appendix B. The MDLs of the analytes range between 0.001 ppm and 0.0162 ppm. The MRM used by the contract laboratory for pesticide residue analysis in dairy-based products is based on the CFIA reference method entitled 'The Determination of Organochlorine Pesticides and Polychlorinated Biphenyls PCB's in Dairy, Raw Milk, Egg and Egg Products by GC/ECD'. The MDLs range from 0.0001 ppm to 0.00485 ppm. The scope of pesticide residues included in this method (entitled 'D-E') is presented in Table B-2 in Appendix B.

As part of the metals testing completed for the 2009 – 2010 CFP, the third party metals MRM was expanded to include antimony, beryllium and molybdenum. The CFIA does not provide a reference method for multi-metals analysis. However, third party laboratories must meet the MDLs for metals specified by the CFIA (see Appendix C). The following 18 metals are now included in the metals MRM: aluminum, antimony, arsenic, beryllium, boron, cadmium, chromium, copper, iron, mercury, manganese, molybdenum nickel, lead, selenium, tin, titanium and zinc.

2.2.2 Single Residue Methods - Pesticides

There were six single residue tests performed in the Children's Food Project. The CFIA-validated SRM MDLs for benomyl (carbendazim), dithiocarbamate, ethylene diamine (EDA), ethylene thiourea (ETU), formetanate and thiabendazole are outlined in Appendix D. Benomyl, carbendazim, formetanate and thiabendazole are also detectable in the LC/ESI-MS-MS MRM.

2.2.3 Analysis Summary

Summarized in Table 2-2 is the distribution of analytical tests and results for the 821 samples tested in the 2009 – 2010 Children's Food Project.

Table 2-2 Number and type of analytical tests and results performed in the 2009 – 2010 CFP

Program	Product types								Total tests	Total results
	Cereals & grains	Confectionery	Dairy	Fish and seafood	Legumes	Meat	Nuts and seeds	Processed fruits & vegetables		
Benomyl	55	0	0	0	1	2	0	55	113	113
EBDC(DC)	60	0	0	0	1	1	1	155	218	218
EBDC(EBDC)	60	0	0	0	1	1	1	155	218	218
EBDC(ETU)	60	0	0	0	1	1	1	155	218	218
Formetanate	50	1	0	0	1	1	0	51	104	104
Metals D	1	0	47	0	7	0	3	2	60	1 080
Metals P	251	26	10	2	9	10	4	280	592	10 656
Pesticides D-E	1	0	47	0	7	0	3	2	60	1 920
Pesticides FPH053	251	8	10	2	9	10	4	280	574	171 626
Pesticides LC/ESI-MS-MS	0	0	0	0	0	0	0	264	264	37 488
Thiabendazole	54	1	0	0	3	3	0	48	109	109
Total	843	36	114	4	40	29	17	1 447	2 530	223 750

3 Results and Discussion

When applicable, the results obtained in this study are compared to the results from other CFP years and to those of the NCRMP. It is important to consider the following when interpreting the results of this survey:

1) pesticides may be added to food for pest management purposes (including copper-based fungicides), and, when used appropriately, and according to product label instructions, may be detected at low, safe levels;
2) detected metals may result from multiple sources. No concrete conclusions can be made on the source(s) of detected metals;
3) manufactured products may contain ingredients from many countries with no known origin. The results (i.e. compliance rates) should not be interpreted as indicative of the product type or product origin.

3.1 Results and discussion for pesticide residues

3.1.1 Compliance summary

A total of 2 248 analyses for pesticide residues were carried out on 803 samples, corresponding to 212 014 results. Of these, 160 samples (19.9%) contained at least one pesticide residue. Of the 160 samples with detected residues, 11 (1.37% of all samples) were in violation of the 0.1 ppm General MRL. The overall sample compliance rate is therefore 98.6%. This rate is comparable to the overall sample compliance rates in both the CFP and NCRMP within the last five years.

Table 3-1 summarizes the violations. 2-phenylphenol was detected in a taco shell product of unknown origin. Although this pesticide residue has multiple MRLs specified under the PCPA in various foods, it does not have a specific MRL in/on cereals in Canada. Pirimiphos-methyl residues triggered nine of the 11 violations. There are no pesticide MRLs in Canada for pirimiphos-methyl. This pesticide, however, is widely used around the world as an insecticide on cereal crops. Chlorpyrifos was detected in cookies from Turkey. There are several chlorpyrifos MRLs in meat and fresh fruits and vegetables in Canada; no MRLs exist for cereal products. Since no Canadian MRLs exist for these pesticide residues in cereal products, these products are in violation of paragraph 4(d) of the *Food and Drugs Act* (i.e. the product is adulterated). These products are unlikely to pose a significant risk to human health.

Table 3-1 Summary of violations in 2009-2010

Product type	Food category	Origin	Residue detected	Level detected (ppm)	Violation
Cereals and grains	**Baked goods**	Argentina	Pirimiphos-methyl	0.194	No specific MRL set; Exceeds GMRL
	Baked goods	Italy	Pirimiphos-methyl	0.145	
	Cereals	Portugal	Pirimiphos-methyl	1.246	
	Chips	Unknown	2-phenylphenol	0.503	
	Cookies	Turkey	Chlorpyrifos	0.189	
	Cookies	Italy	Pirimiphos-methyl	0.106	
	Cookies	Netherlands	Pirimiphos-methyl	0.881	
	Cookies	Scotland	Pirimiphos-methyl	0.481	
	Crackers	Netherlands	Pirimiphos-methyl	0.884	
	Pancake mix	Greece	Pirimiphos-methyl	0.969	
	Pasta	Unknown	Pirimiphos-methyl	0.380	

Figure 3-1 illustrates the distribution of samples found to contain no detected pesticide residues, non-violative residue levels (detected residue levels that are at or below the established MRLs) and violative residue levels (detected residue levels that exceed the MRLs at the time of analysis).

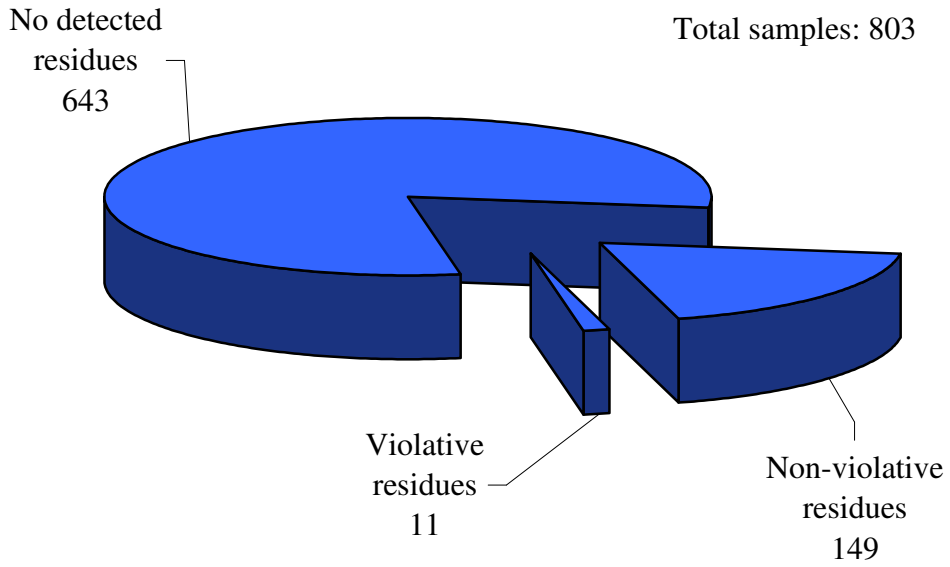

Figure 3-1 Distribution of sample residue results

3.1.2 Results by country of origin

The 2009 – 2010 CFP included samples from 49 countries. Table 3-2 is a summary of pesticide tests and compliance results by sample origin. Included in the summary are the total number of samples, the number of 'positive' samples (samples with one or more

detected pesticide residue result), the number of sample violations observed and the sample compliance rate. Of the 49 countries whose products were sampled, 27 (55.1%) had samples with detected pesticide residues. All sample results from Canada were compliant with Canadian MRLs.

Table 3-2 Pesticide residues by sample origin

Sample origin	*Number samples	Number positive samples	Positive samples (% total)	Number violations	% Overall compliance
Argentina	1	1	100.00	1	**0.00**
Scotland	1	1	100.00	1	**0.00**
Netherlands	4	2	50.00	2	**50.00**
Greece	5	1	20.00	1	**80.00**
Portugal	5	1	20.00	1	**80.00**
Italy	12	5	41.67	2	**83.33**
Turkey	11	5	45.45	1	**90.91**
Unknown origin	68	18	26.47	2	**97.06**
Belgium	5	1	20.00	0	**100.00**
Bermuda	1	0	0.00	0	**100.00**
Bulgaria	1	0	0.00	0	**100.00**
Canada	375	61	16.27	0	**100.00**
Chile	1	0	0.00	0	**100.00**
Dominican Republic	1	0	0.00	0	**100.00**
Ecuador	2	0	0.00	0	**100.00**
Egypt	8	3	37.50	0	**100.00**
France	3	0	0.00	0	**100.00**
Germany	3	0	0.00	0	**100.00**
Hong Kong	4	1	25.00	0	**100.00**
India	6	1	16.67	0	**100.00**
Iran	3	1	33.33	0	**100.00**
Israel	1	0	0.00	0	**100.00**
Ivory Coast	1	0	0.00	0	**100.00**
Jamaica	4	2	50.00	0	**100.00**
Japan	2	0	0.00	0	**100.00**
Kingdom of Saudi Arabia	4	1	25.00	0	**100.00**
Lebanon	11	0	0.00	0	**100.00**
Macau	1	0	0.00	0	**100.00**
Malaysia	4	0	0.00	0	**100.00**
Mexico	5	3	60.00	0	**100.00**
Morocco	1	0	0.00	0	**100.00**
Pakistan	1	0	0.00	0	**100.00**
People's Republic of China	41	10	24.39	0	**100.00**
Peru	5	0	0.00	0	**100.00**
Poland	5	1	20.00	0	**100.00**
Republic of Korea	4	1	25.00	0	**100.00**
Republic of the Philippines	6	2	33.33	0	**100.00**
Slovenia	3	0	0.00	0	**100.00**
South Africa	9	0	0.00	0	**100.00**

Sample origin	*Number samples	Number positive samples	Positive samples (% total)	Number violations	% Overall compliance
Spain	3	1	33.33	0	**100.00**
Swaziland	1	0	0.00	0	**100.00**
Syrian Arab Republic	1	1	100.00	0	**100.00**
Taiwan	15	1	6.67	0	**100.00**
Thailand	28	7	25.00	0	**100.00**
Trinidad and Tobago	1	1	100.00	0	**100.00**
Tunisia	1	0	0.00	0	**100.00**
United Arab Emirates	1	0	0.00	0	**100.00**
United Kingdom	6	2	33.33	0	**100.00**
United States of America	115	25	21.74	0	**100.00**
Vietnam	3	0	0.00	0	**100.00**

* No statistical significance can be assigned to the % overall compliance rate or the overall safety of foods from a corresponding sample origin when the number of samples is low.

The results indicate that the compliance rates for domestic and imported children's food samples are similar (100% for domestic products, 97.5% for imported products).

3.1.3 Distribution of multiple residues

Approximately 7.1% of all samples had more than one detected pesticide residue. Of the 160 samples with detected pesticide residues, 31 of the samples had two different residues, 16 samples had three different pesticide residues, eight samples had four different pesticide residues and two samples had five different pesticide residues. The distribution of detected pesticide residues is illustrated in Figure 3-2.

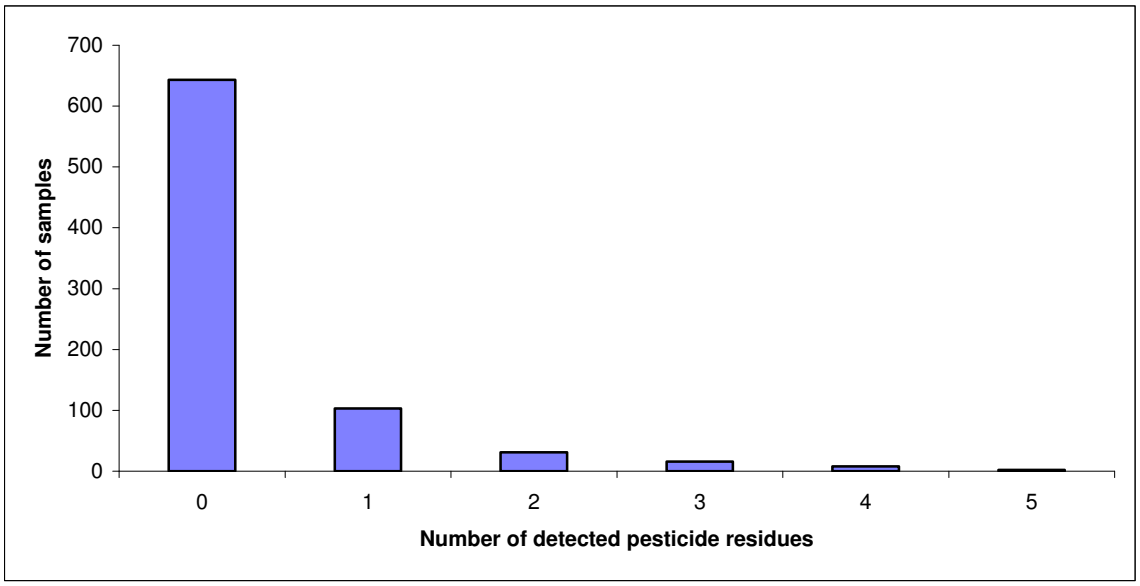

Figure 3-2 Distribution of detected pesticide residues

Table E-1 in Appendix E lists the details of the samples that contain more than one distinct pesticide residue result by sample origin.

3.1.4 Results by product type and food category

The distribution of pesticide residues observed in the different product types is presented in Table 3-3. The data in Table 3-3 indicate that the majority of the samples with positive results were processed fruit and vegetable products. Fish and seafood products had the highest positive rate.

Table 3-3 Pesticide residues by product type

Product type	Number samples	Number positive samples	% positive samples	Number violations	% compliance
Cereals and grains	252	58	23.02	11	**95.63**
Confectionery	8	0	0.00	0	**100.00**
Dairy	57	2	3.51	0	**100.00**
Fish and seafood	2	1	50.00	0	**100.00**
Legumes	16	0	0.00	0	**100.00**
Meat	10	2	20.00	0	**100.00**
Nuts and seeds	7	1	14.29	0	**100.00**
Processed fruits and vegetables	451	96	21.29	0	**100.00**

The following food categories had no samples with detected pesticide residues:

Boxed vegetables	Candy	Canned beans
Canned juices	Canned pasta	Canned peas
Condiments	Donuts	Ice cream cups
Milk products	Misc. snacks	Non-dairy beverages
Peanut products	Pizza	Puddings
Rice	Salad dressings	Snack seeds
Soy products		

The distribution of pesticide residues observed in the different food categories is presented in Table 3-4. In total, 47 different pesticide residues were detected. Table 3-4 indicates that the majority of the positive pesticide results were found in fruit snacks, cookies and crackers. The most commonly detected pesticide residues were the following: ethylene diamine (40), captan (25), 2-phenylphenol (23), carbendazim (18) and pirimiphos-methyl (17).

Table 3-4 Detected pesticide residues by food category

Food Category	Number samples	Number positive samples	*Number residues detected	Detected residues, (Number of samples with detected residue)
All samples	803	160	**255**	2-phenylphenol (23), azoxystrobin (3), bifenthrin, biphenyl (5), bromopropylate, buprofezin, captan (25), carbaryl (7), carbendazim (18), chlorpropham (12), chlorpyrifos (12), cyprodinil (4), dacthal (2), dicofol, diethofencarb, diphenylamine (14), dithiocarbamate (2), endosulfan, ethion (2), ethylene diamine (40), ethylene thiourea (2), fludioxonil (2), imazalil (3), imidacloprid, iprobenfos, iprodione (3), isoprothiolane, malathion (8), metalaxyl, methoxyfenozide, myclobutanil (2), p,p'-DDE (3), penconazole, pentachloro-aniline, permethrin, phosalone (2), piperonyl butoxide (7), pirimiphos-methyl (17), procymidone (2), profenofos, pyrimethanil (2), terbutylazine, thiabendazole (12), triadimenol, tricyclazole, trifloxystrobin (2), trifluralin
Fruit snacks	62	31	**68**	2-phenylphenol (3), captan (18), carbendazim (10), chlorpyrifos, diphenylamine (12), endosulfan, ethylene diamine (9), ethylene thiourea (2), fludioxonil, imazalil, iprodione, phosalone, pyrimethanil (2), thiabendazole (6)
Cookies	67	20	**24**	2-phenylphenol (2), biphenyl, chlorpropham, chlorpyrifos (2), ethylene diamine (7), malathion (4), p,p'-DDE, piperonyl butoxide, pirimiphos-methyl (5)
Crackers	28	13	**19**	2-phenylphenol, biphenyl, chlorpyrifos (2), ethylene diamine (5), malathion (4), piperonyl butoxide, pirimiphos-methyl (4), terbutylazine

Food Category	Number samples	Number positive samples	*Number residues detected	Detected residues, (Number of samples with detected residue)
Canned vegetables	79	9	**16**	2-phenylphenol (6), azoxystrobin (2), chlorpyrifos, diethofencarb, imidacloprid, myclobutanil, penconazole, permethrin, triadimenol, trifloxystrobin
Fruit juice	93	10	**12**	Carbaryl (2), carbendazim (3), ethylene diamine, imazalil, iprobenfos, thiabendazole (4)
Applesauce	8	2	**8**	Captan (2), diphenylamine (2), ethylene diamine (2), phosalone, thiabendazole
Canned fruit	38	6	**8**	2-phenylphenol (2), captan, carbaryl (2), carbendazim (2), ethylene diamine
Dried fruit	15	4	**8**	2-phenylphenol, captan, dithiocarbamate, ethylene diamine, iprodione, piperonyl butoxide, procymidone, trifloxystrobin
Potato snacks	9	6	**7**	Chlorpropham (4), ethylene diamine (2), p,p'-DDE
Sauce	23	3	**7**	Azoxystrobin, bifenthrin, captan, cyprodinil, ethylene diamine, fludioxonil, myclobutanil
Chips	14	4	**6**	2-phenylphenol, biphenyl (3), chlorpropham, ethylene diamine
Pasta	26	3	**6**	2-phenylphenol, ethion, piperonyl butoxide (2), pirimiphos-methyl (2)
Salsa	9	3	**6**	Buprofezin, carbaryl, chlorpyrifos (2), ethylene diamine, metalaxyl
Snack bars	16	4	**6**	Captan, chlorpyrifos, ethylene diamine (2), imazalil, piperonyl butoxide
Soup	19	5	**5**	2-phenylphenol, chlorpropham (4)
Baked goods	16	3	**4**	Bromopropylate, pirimiphos-methyl (2), procymidone
Baking goods	20	4	**4**	2-phenylphenol, chlorpropham, ethylene diamine, pirimiphos-methyl

Food Category	Number samples	Number positive samples	*Number residues detected	Detected residues, (Number of samples with detected residue)
Rice snacks	14	3	**4**	Ethylene diamine, isoprothiolane, pirimiphos-methyl, tricyclazole
Frozen fruit juice	5	2	**3**	Carbaryl (2), carbendazim
Fruit nectar	19	3	**3**	Carbendazim (2), thiabendazole
Jams	12	2	**3**	Captan, cyprodinil, ethion
Pancake mix	7	1	**3**	2-phenylphenol, piperonyl butoxide, pirimiphos-methyl
Salad	1	1	**3**	Chlorpyrifos, dacthal, ethylene diamine
Spread	12	1	**3**	Chlorpyrifos, dacthal, dicofol
Cereals	21	1	**2**	Ethylene diamine, pirimiphos-methyl
Dried fruit and nuts	2	1	**2**	Cyprodinil, iprodione
Dried vegetables	2	2	**2**	2-phenylphenol, dithiocarbamate
Pickled products	7	2	**2**	Chlorpyrifos, profenofos
Bottled vegetables	6	1	**1**	Trifluralin
Bottled fruit	2	1	**1**	Methoxyfenozide
Bread	5	1	**1**	Ethylene diamine
Canned fish	1	1	**1**	2-phenylphenol
Canned soup	11	1	**1**	Chlorpropham
Cheese	7	1	**1**	p,p'-DDE
Couscous	2	1	**1**	Pentachloro-aniline
Frozen vegetables	1	1	**1**	2-phenylphenol
Snack nuts	1	1	**1**	Ethylene diamine
Vegetable juice	5	1	**1**	Ethylene diamine
Yogurt	31	1	**1**	Cyprodinil
Boxed vegetables	1	0	**0**	-
Candy	7	0	**0**	-
Canned beans	2	0	**0**	-
Canned juice	6	0	**0**	-
Canned pasta	5	0	**0**	-

Food Category	Number samples	Number positive samples	*Number residues detected	Detected residues, (Number of samples with detected residue)
Canned peas	2	0	**0**	-
Condiments	7	0	**0**	-
Donuts	6	0	**0**	-
Ice cream cups	2	0	**0**	-
Milk products	7	0	**0**	-
Misc. snacks	1	0	**0**	-
Non-dairy beverage	3	0	**0**	-
Peanut products	5	0	**0**	-
Pizza	1	0	**0**	-
Pudding	15	0	**0**	-
Rice	7	0	**0**	-
Salad dressing	1	0	**0**	-
Snack seeds	2	0	**0**	-
Soy product	7	0	**0**	-

*Note 1: As a food item may contain more than one type of pesticide residue, the number of analytes detected could exceed the number of positive samples.

3.1.5 Comparison of results with 2007 – 2008 CFP results

The 2009 – 2010 CFP was in many ways similar to the 2007 – 2008 CFP. With the exception of a few additional analytical methods in 2009 – 2010, the same analytical methods and third party laboratory were used to analyze samples in both project years. Furthermore, similar food products were sampled as the targeted age groups were almost identical for both project years. Table 3-5 summarizes the main project parameters for both sampling years.

Table 3-5 Summary of the 2007-2008 and 2009-2010 CFP

2007-2008	CFP sampling year	2009-2010
836	Number samples	803
240 345	Number analyses	212 014
293	Number domestic samples	375
4	Number product types	8
3 - 15 years	Age group investigated	2 - 15 years
98.6	Overall compliance rate	**98.6**
25.7	Positive rate	19.9
43	Number residues detected	47
10	Number violative countries	7
2-phenylphenol (48)	Top 5 detected pesticide residues	Ethylene diamine (40)
Pirimiphos-methyl (37)		Captan (25)
Malathion (31)		2-phenylphenol (23)
Captan (25)		Carbendazim (18)
Chlorpropham (12)		Pirimiphos-methyl (17)

The overall compliance rate of 98.6% was unchanged in 2009 – 2010, in comparison to 2007 – 2008. The positive rate is roughly 6% lower in 2009 – 2010; likely explained by the increase in domestic products tested in 2009 – 2010. Domestic products generally have fewer detectable pesticide residues in the CFP in comparison to imported manufactured products. There was a small increase in pesticide residues detected in 2009 – 2010 (47 versus 43). This can be explained by the increase in analytical scope. The LC/ESI-MS-MS pesticide MRM method and four single residue methods are now part of the scope of the CFP whereas these methods were not included in the 2007 – 2008 CFP. Collectively, these methods increased the analytical capacity of the CFP by approximately 130 analytes. The most prevalent pesticides detected in 2009 – 2010 vary from those detected in 2007 – 2008. Ethylene diamine, a breakdown product of EBDC fungicides, was the most commonly detected pesticide residue in 2009 – 2010. It was not tested for in 2007 – 2008. Carbendazim was detected in 18 samples in 2009 – 2010. This residue, a commonly used fungicide in nuts, fruits, vegetables and field crops, was not tested for in 2007 – 2008. Pirimiphos-methyl, 2-phenylphenol, and captan were commonly found in both project years. Malathion was detected in 37 samples in 2007 – 2008 and only eight samples in 2009 – 2010. In both years malathion was detected in cookies and cracker products. The increase in malathion residues in 2007 – 2008 can be attributed to its prevalence in domestic and US origin fruit juice products. Malathion is an organophosphate insecticide commonly used to combat fruit fly and mosquito infestations.

3.1.6 Conclusions

The overall sample compliance rate for pesticide residues in domestic and imported children's foods is high (100% for domestic products and 97.5% for imported products). No pesticide residues were detected in boxed vegetables, candy, canned beans, canned juice, canned pasta, canned peas, condiments, donuts, ice cream cups, milk products,

misc. snacks, non-dairy beverages, peanut products, pizza, puddings, rice, salad dressings, snack seeds and soy products. Most of the detected but compliant levels of pesticide residues were found in processed fruit and vegetable and cereal and grain products. However, collectively, these two product types represent the majority of the CFP samples (87.5%). There were a total of 11 violations detected in the 2009 – 2010 CFP; all products were derived from cereals and grains. All products are in violation of paragraph 4(d) of the *Food and Drugs Act* (*FDA*) as the levels of each violative pesticide residue detected exceeded the 0.1 ppm general MRL specified in *Division 15* of the *FDR*. The products, however, are unlikely to pose a significant risk to human health.

A direct comparison between the results of this survey and those obtained in the NCRMP is limited by the nature of the sampling strategy used (i.e. analytical scope, smaller overall sample size, different distributions of domestic and imported products, etc.). However, the following general conclusions can be made:

- the sample compliance rate for pesticide residues observed in this study is similar to the sample compliance rates observed in the NCRMP and CFP for the past five years;
- the detected residues in both domestic and imported samples are very similar;
- the more commonly detected pesticide residues in the 2009 – 2010 CFP, including ethylene diamine, diphenylamine, carbendazim, captan and chlorpropham, were detected in both the NRCMP and in previous Children's Food Projects;
- the results from the 2009 – 2010 CFP were compared to the results of a similar project conducted in 2007 – 2008; many similarities, including an identical overall compliance rate, were observed.

3.2 Results and discussion for metals

3.2.1 Metal distribution by product type

The foods monitored by the NCRMP generally include those that are minimally processed and as a result are not directly comparable to the highly processed foods sampled in the current CFP. Several examples of detected metals that can be deliberately added to food include:

(1) Aluminium – used as a processing aid for baking and is often added to flour and other baking reagents or can also be a component of pesticides;
(2) Chromium – used to fortify foods;
(3) Copper – registered and used as a natural fungicide (including for pest control in organic agriculture) and is used to fortify foods;
(4) Iron – used to fortify foods (i.e. fruit-flavoured drinks) or as a component of food additives (i.e. food colours);
(5) Selenium – used to fortify foods;
(6) Zinc – used to fortify foods.

Table 3-6 summarizes metal results by product type in children's food.

Table 3-6 Metal results summary by product type

Metal Analyte Product type	**Total # samples**	**Total # negative**	**Total # positive**	**Min (ppm)**	**Max (ppm)**	***Mean (ppm)**
Aluminium						
Cereals and grains	252	21	231	0.048	1 451	35.565
Confectionery	26	3	23	0.234	71.690	13.942
Dairy	57	6	51	0.031	3.600	0.408
Fish and seafood	2	0	2	0.338	0.416	0.377
Legumes	16	0	16	0.036	8.700	1.607
Meat	10	0	10	0.140	3.598	1.151
Nuts and seeds	7	0	7	0.482	8.351	2.950
Processed fruits and vegetables	282	41	241	0.100	71.930	1.984
Antimony						
Cereals and grains	252	252	0	-	-	-
Confectionery	26	26	0	-	-	-
Dairy	57	57	0	-	-	-
Fish and seafood	2	2	0	-	-	-
Legumes	16	16	0	-	-	-
Meat	10	10	0	-	-	-
Nuts and seeds	7	7	0	-	-	-
Processed fruits and vegetables	282	281	1	0.054	0.054	0.054
Arsenic						
Cereals and grains	252	52	200	0.011	0.505	0.057
Confectionery	26	1	25	0.005	0.316	0.058
Dairy	57	16	41	0.005	0.045	0.013
Fish and seafood	2	0	2	0.080	0.658	0.369
Legumes	16	9	7	0.006	0.126	0.028
Meat	10	4	6	0.005	0.011	0.007
Nuts and seeds	7	2	5	0.008	0.038	0.021
Processed fruits and vegetables	282	140	142	0.005	0.130	0.022
Beryllium						
Cereals and grains	252	252	0	-	-	-
Confectionery	26	26	0	-	-	-
Dairy	57	57	0	-	-	-
Fish and seafood	2	2	0	-	-	-
Legumes	16	16	0	-	-	-
Meat	10	10	0	-	-	-
Nuts and seeds	7	7	0	-	-	-
Processed fruits and vegetables	282	282	0	-	-	-
Boron						
Cereals and grains	252	107	145	0.197	7.992	1.658
Confectionery	26	6	20	0.355	13.980	4.728
Dairy	57	12	45	0.117	2.208	0.346
Fish and seafood	2	0	2	0.410	0.596	0.503
Legumes	16	0	16	0.171	21.430	4.864
Meat	10	0	10	0.218	1.316	0.629
Nuts and seeds	7	0	7	0.372	12.580	6.982
Processed fruits and vegetables	282	22	260	0.109	29.510	2.505

Metal Analyte Product type	**Total # samples**	**Total # negative**	**Total # positive**	**Min (ppm)**	**Max (ppm)**	***Mean (ppm)**
Cadmium						
Cereals and grains	252	20	232	0.003	0.126	0.025
Confectionery	26	7	19	0.006	0.435	0.074
Dairy	57	50	7	0.002	0.073	0.014
Fish and seafood	2	0	2	0.007	0.024	0.015
Legumes	16	5	11	0.003	0.124	0.025
Meat	10	0	10	0.003	0.014	0.007
Nuts and seeds	7	3	4	0.004	0.023	0.009
Processed fruits and vegetables	282	156	126	0.002	0.130	0.019
Chromium						
Cereals and grains	252	25	227	0.010	0.553	0.056
Confectionery	26	2	24	0.010	1.212	0.267
Dairy	57	36	21	0.010	0.436	0.082
Fish and seafood	2	0	2	0.012	0.027	0.020
Legumes	16	11	5	0.010	0.042	0.024
Meat	10	6	4	0.010	0.014	0.012
Nuts and seeds	7	3	4	0.017	0.166	0.096
Processed fruits and vegetables	282	98	184	0.010	0.422	0.041
Copper						
Cereals and grains	252	2	250	0.071	8.947	1.787
Confectionery	26	0	26	0.091	21.860	5.976
Dairy	57	8	49	0.034	1.931	0.195
Fish and seafood	2	0	2	0.273	0.346	0.310
Legumes	16	0	16	0.074	7.334	2.379
Meat	10	0	10	0.186	1.205	0.528
Nuts and seeds	7	0	7	0.179	16.280	8.341
Processed fruits and vegetables	282	24	258	0.030	14.310	0.844
Iron						
Cereals and grains	252	1	251	0.862	225	31.819
Confectionery	26	2	24	0.632	153	44.919
Dairy	57	19	38	0.303	19.830	1.650
Fish and seafood	2	0	2	2.100	24.010	13.055
Legumes	16	0	16	1.112	31.640	10.249
Meat	10	0	10	1.940	9.458	5.161
Nuts and seeds	7	0	7	1.166	87.240	35.421
Processed fruits and vegetables	282	23	259	0.310	104	6.688
Lead						
Cereals and grains	252	136	116	0.002	0.538	0.017
Confectionery	26	5	21	0.003	0.074	0.024
Dairy	57	44	13	0.002	0.019	0.007
Fish and seafood	2	0	2	0.003	0.004	0.004
Legumes	16	10	6	0.002	0.012	0.007
Meat	10	3	7	0.002	0.018	0.007
Nuts and seeds	7	4	3	0.005	0.014	0.010
Processed fruits and vegetables	282	128	154	0.002	0.185	0.014

Metal Analyte Product type	**Total # samples**	**Total # negative**	**Total # positive**	**Min (ppm)**	**Max (ppm)**	***Mean (ppm)**
Manganese						
Cereals and grains	252	1	251	0.023	36.060	7.208
Confectionery	26	3	23	0.100	29.240	7.245
Dairy	57	4	53	0.021	1.456	0.229
Fish and seafood	2	0	2	0.275	0.481	0.378
Legumes	16	0	16	0.116	32.800	6.912
Meat	10	0	10	0.309	2.089	0.956
Nuts and seeds	7	0	7	0.243	38.670	17.863
Processed fruits and vegetables	282	4	278	0.026	17.200	1.511
Mercury						
Cereals and grains	252	252	0	-	-	-
Confectionery	26	26	0	-	-	-
Dairy	57	57	0	-	-	-
Fish and seafood	2	1	1	0.042	0.042	0.042
Legumes	16	16	0	-	-	-
Meat	10	10	0	-	-	-
Nuts and seeds	7	7	0	-	-	-
Processed fruits and vegetables	282	280	2	0.010	0.060	0.035
Molybdenum						
Cereals and grains	252	4	248	0.034	1.609	0.332
Confectionery	26	5	21	0.028	0.271	0.116
Dairy	57	7	50	0.026	0.241	0.063
Fish and seafood	2	1	1	0.234	0.234	0.234
Legumes	16	0	16	0.022	3.122	0.525
Meat	10	0	10	0.022	0.307	0.092
Nuts and seeds	7	2	5	0.027	2.178	0.643
Processed fruits and vegetables	282	148	134	0.020	0.980	0.115
Nickel						
Cereals and grains	252	4	248	0.014	2.387	0.221
Confectionery	26	4	22	0.018	5.805	1.671
Dairy	57	38	19	0.010	0.372	0.078
Fish and seafood	2	0	2	0.026	0.101	0.064
Legumes	16	0	16	0.033	8.715	0.938
Meat	10	0	10	0.016	0.526	0.101
Nuts and seeds	7	0	7	0.028	3.728	1.277
Processed fruits and vegetables	282	55	227	0.010	2.851	0.129
Selenium						
Cereals and grains	252	16	236	0.020	1.483	0.164
Confectionery	26	5	21	0.023	0.109	0.049
Dairy	57	17	40	0.020	0.272	0.060
Fish and seafood	2	1	1	0.616	0.616	0.616
Legumes	16	9	7	0.024	0.257	0.095
Meat	10	4	6	0.020	0.090	0.055
Nuts and seeds	7	4	3	0.082	0.275	0.194
Processed fruits and vegetables	282	237	45	0.021	0.942	0.117

Metal Analyte Product type	Total # samples	Total # negative	Total # positive	Min (ppm)	Max (ppm)	*Mean (ppm)
Tin						
Cereals and grains	252	228	24	0.021	0.964	0.262
Confectionery	26	20	6	0.022	0.182	0.094
Dairy	57	43	14	0.021	2.244	0.229
Fish and seafood	2	1	1	0.034	0.034	0.034
Legumes	16	15	1	0.413	0.413	0.413
Meat	10	1	9	0.024	0.100	0.056
Nuts and seeds	7	4	3	0.022	0.567	0.204
Processed fruit and vegetables	282	89	193	0.020	131	6.151
Titanium						
Cereals and grains	252	201	51	0.104	5.217	0.831
Confectionery	26	10	16	0.121	10.960	1.075
Dairy	57	47	10	0.146	4.178	1.348
Fish and seafood	2	1	1	1.997	1.997	1.997
Legumes	16	13	3	0.294	1.990	0.865
Meat	10	10	0	-	-	-
Nuts and seeds	7	5	2	0.106	0.174	0.140
Processed fruits and vegetables	282	250	32	0.108	10.620	1.014
Zinc						
Cereals and grains	252	1	251	0.182	71.190	10.296
Confectionery	26	2	24	0.196	38.560	13.759
Dairy	57	0	57	0.313	38.590	6.572
Fish and seafood	2	0	2	1.153	3.482	2.318
Legumes	16	0	16	0.843	27.150	9.681
Meat	10	0	10	1.442	5.284	2.937
Nuts and seeds	7	0	7	0.361	67.530	30.205
Processed fruits and vegetables	282	21	261	0.110	25.210	2.005

* Note that the mean refers to the mean of the positive results.

3.2.2 Discussion of metals results

All samples had detected levels of metals in the 2009 – 2010 CFP. As mentioned in section 1.3.3, metals are anticipated in most food products. The results presented in Table 3-6 are a measure of total metal concentration present in food and do not distinguish between organic and inorganic forms, or ionic species. Generally, organic species have a greater potential to bioaccumulate in the human body whereas inorganic species are often soluble in water and are quickly eliminated. The ionic form of a metal is important as some ionic species are required for good health while others can be detrimental to human health. The CFIA continues to develop and validate methods to enable quantitation of metal species to complement the current approach, which is limited to total metal concentrations.

The following discussion focuses on copper and the four detected metals that pose the greatest inherent risk to human health (arsenic, cadmium, mercury and lead). These inherently toxic metals are historically not present in food at elevated levels. Figures 3-3 to 3-7 represent the mean of the positive metal results by product type for copper, arsenic, cadmium, mercury and lead.

Copper

Copper and copper compounds are used as natural fungicides. An MRL of 50 ppm is specified under the PCPA for fruit and vegetable products. No results of concern were identified in the 2009 – 2010 study. Figure 3-3 illustrates the level of copper detected in the eight product types. Nut and seed products had the highest average amount of copper amongst the eight product types. Nuts and legumes are naturally rich in copper.

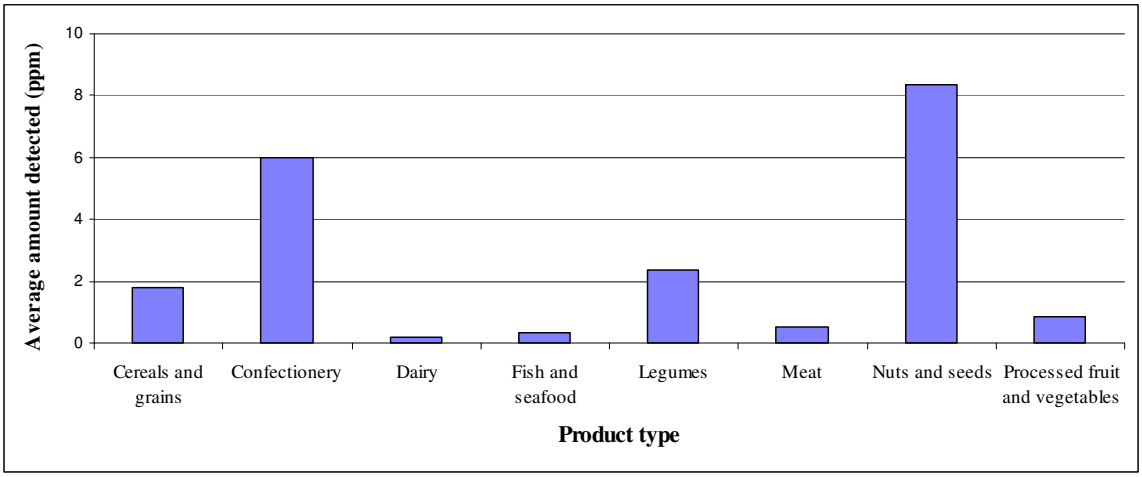

Figure 3-3 Average level of copper detected by product type

Arsenic

Arsenic is a natural element that is incorporated into foods such as fish and seafood, cereals, apples and pears. It can also result from the use of arsenic-containing fungicides[1]. The levels of arsenic allowed in certain foods are specified in Table I of *Division 15* of the *FDR*. This includes a 0.1 ppm arsenic tolerance in fruit juice, fruit nectar, beverages when ready-to-serve and water in sealed containers other than spring or mineral water. In addition, a 3 ppm arsenic tolerance exists for food colours (*Division 6* of the *FDR*). There are no Canadian standards or tolerances established for other foods. It should be noted that the results discussed below are reported as total arsenic only. The arsenic tolerance was not exceeded in any of the fruit juice and nectar products (100% compliance). Figure 3-4 illustrates the level of arsenic detected in the eight product types. Meat-based products had the lowest average amount of arsenic amongst the eight product types.

[1] It should be noted however that North America now has restrictions on arsenic-based pesticides. Also, other countries worldwide have also discontinued the use of arsenic containing pesticides.

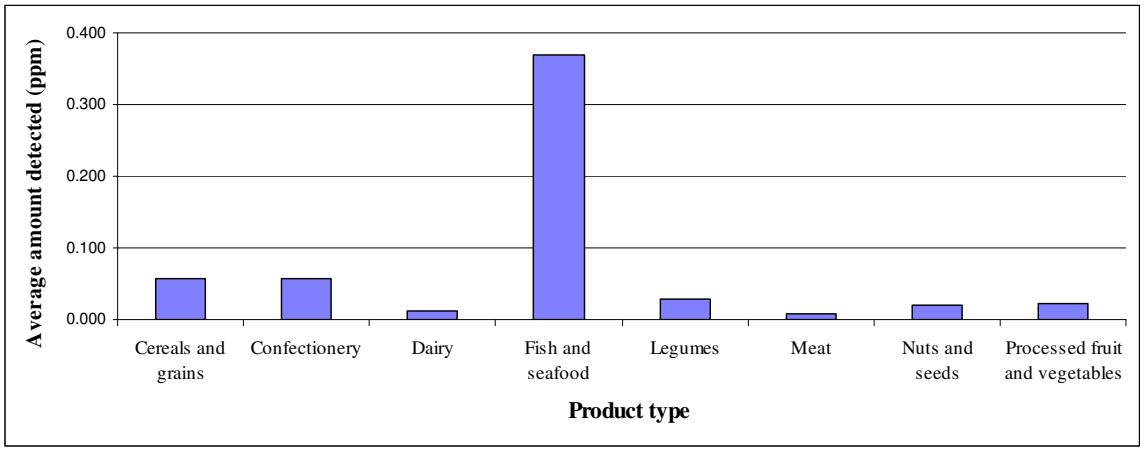

Figure 3-4 Average level of arsenic detected by product type

A study conducted by the European Food Safety Authority (EFSA) in 2009 identified fish and seafood and cereal products as having the highest levels of total arsenic.[4] Arsenic levels detected in the CFP were all within the ranges observed in the EFSA study. The highest levels of arsenic (> 0.200 ppm) were detected in rice products, chocolate-based products, a raspberry-based donut product and two seafood products. The arsenic levels in these samples and in all food samples tested in the 2009 – 2010 CFP were within the typical range of background concentrations observed in similar types of foods.

Arsenic occurs naturally in soils and irrigation water. The continual presence of arsenic in soil and water may explain the levels observed in these products. Arsenic is often detected in rice as a result from the use of arsenic-contaminated irrigation water. Fish and seafood products likely incorporated arsenic from water. The source of arsenic in chocolate products is likely from cocoa shells and cocoa beans that incorporated arsenic from contaminated water sources.[5] The possible use of arsenic-containing fungicides in foreign countries may also explain the levels detected in chocolate products.

Cadmium

There are no Canadian tolerances or standards established for cadmium levels in food. Cadmium can be present in water and soils. Soil may become contaminated with cadmium by the use of phosphate fertilizers or sewage sludge. Food grown in cadmium-contaminated soils is the primary source of cadmium exposure in the general population.[6] Figure 3-5 illustrates the average level of cadmium detected in the eight product types. Confectionery products had the highest level of cadmium amongst the eight product types. The presence of cadmium in chocolate products is not unexpected. The European Commission (EC) assessed the presence of cadmium in foodstuffs from 2003 to 2007. Chocolate was among the different foods tested with the highest cadmium concentrations. In 2006 the EC set maximum levels between 0.05 – 0.2 ppm (wet weight) for cadmium in various foods.[7] The levels detected in the 2009 – 2010 CFP fell within this range.

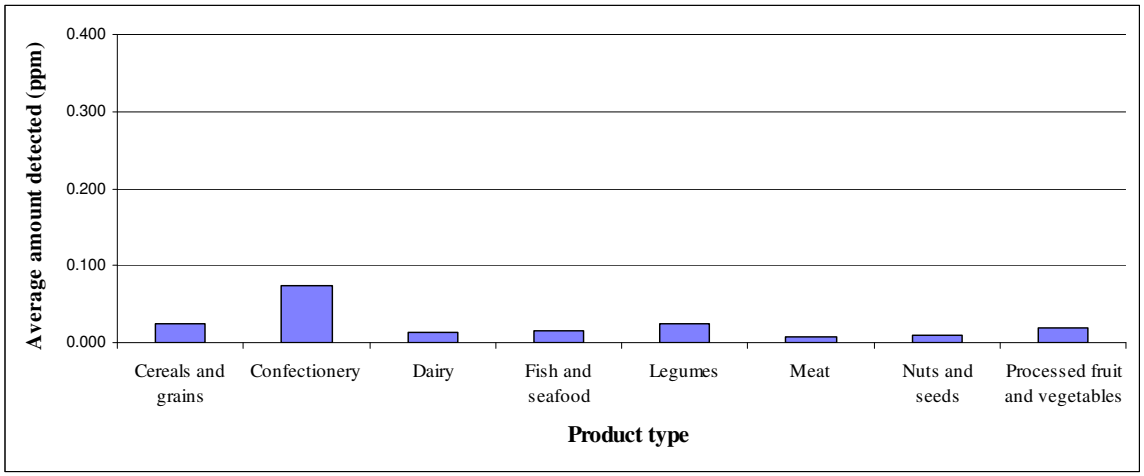

Figure 3-5 Average level of cadmium detected by product type

Lead

Lead exposure may occur from a number of environmental and food sources. There are several tolerances for lead in food that are specified in *Division 15* of the *FDR*. Included are limits of 1.5 ppm lead in tomato paste and tomato sauce, 0.5 ppm in fish protein and whole tomatoes, and 0.2 ppm in fruit juice, fruit nectar, beverages when ready-to-serve and water in sealed containers other than spring or mineral water. Evaporated milk, condensed milk and concentrated infant formula have a lead tolerance of 0.15 ppm and ready-to-serve infant formula has a lead tolerance of 0.08 ppm.

Figure 3-6 illustrates the average level of lead detected in the eight product types. There were no violations of the Canadian tolerances.

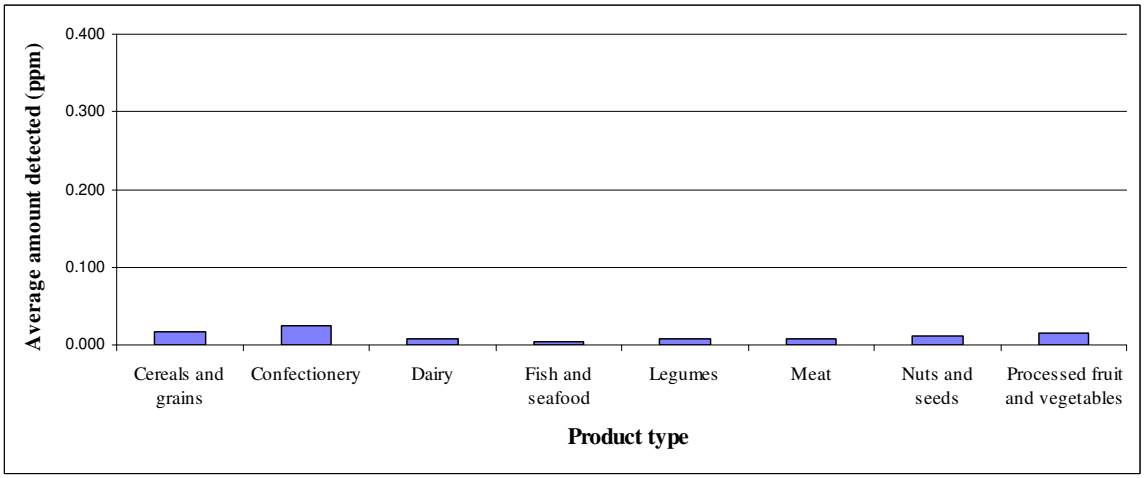

Figure 3-6 Average level of lead detected by product type

Mercury

Health Canada has established a maximum level of 1 ppm total mercury in the edible portion of escolar, orange roughy, marlin, fresh and frozen tuna, shark, and swordfish. The maximum level of mercury permitted in other types of retail fish is 0.5 ppm. Figure 3-7 illustrates the average level of mercury detected in the eight product types. There were three samples that had detected levels of mercury; one canned tuna product and two processed vegetable products. The mercury level detected in canned tuna was below the 0.5 ppm metal tolerance for mercury in edible portion of fish. Two of the three products were imported; the other is of unknown origin.

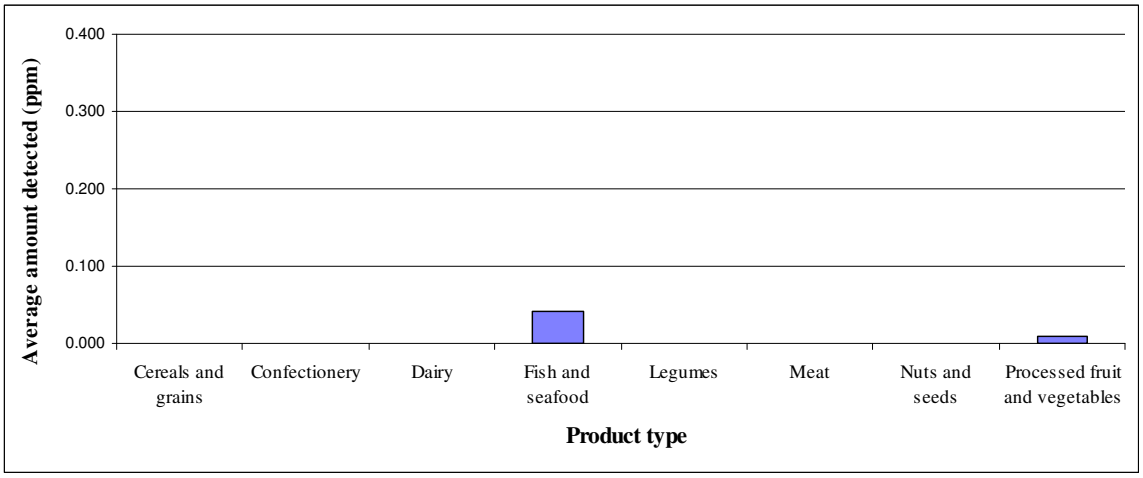

Figure 3-7 Average level of mercury detected by product type

3.2.3 Conclusions

The overall compliance rate for metals in domestic and imported children's foods is 100% for both domestic and imported products. All samples were found to contain metals. None of the 451 processed fruit and vegetable food samples was found to have copper in excess of the 50 ppm MRL for copper compounds. All food samples that tested positive for metals in the 2009 – 2010 CFP were consistent with the results from previous years in similar foods.

4 Report conclusions

The results of the 2009 – 2010 Children's Food Project indicate that the majority of samples analyzed for pesticide residues (80.1% of 803 samples) contained no detected pesticide residues. There were 160 (19.9%) samples with detected pesticide residues; 11 (6.7%) violating Canadian pesticide regulations. The overall sample compliance rate for pesticide residues was 98.6%. This sample compliance rate is similar to the compliance rates of previous CFPs and also to those determined for the much larger number and scope of samples tested under the NCRMP.

There were no violations of the 50 ppm copper MRL in fruit and vegetable products. There were also no violations of the specific metal tolerances. Consistent with previous

year’s results higher levels of arsenic were found in some rice, fish and seafood, and chocolate products. The levels of metals detected in samples from the 2009-2010 CFP were within the range of typical background concentrations of metals that are observed in similar foods.

Due to the limited scope and number of samples collected in the project, no clear relationships can be made between sample compliance rate and product type or country of origin. The data obtained from studies like the Children's Food Project are, however, instrumental in the assessment of the dietary exposure to pesticide residues and metals in foods consumed by Canadian children. The data obtained from the Children’s Food Project represents a typical overview of the nature of pesticide residues and metals in the Canadian food supply.

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Appendix A

Table A-1 List of analytes (142) included in CFIA LC/ESI-MS-MS pesticide method (PMR-006-V1.0)

3-Hydroxycarbofuran	Diniconazole	Isocarbamide	Pyrifenox
Acetochlor	Dioxacarb	Isoprocarb	Pyrimethanil
Aclonifen	Dipropetryn	Isoxathion	Pyriproxyfen
Aldicarb	Diuron	Mepanipyrim	Quinoxyfen
Aldicarb sulfone	Dodemorph	Mephosfolan	Quizalofop
Aldicarb sulfoxide	Emamectin	Methabenzthiazuron	Quizalofop-ethyl
Azaconazole	Epoxiconazole	Methiocarb	Schradan
Benomyl	Ethiofencarb	Methiocarb sulfone	Spinosad
Benoxacor	Ethiofencarb sulfone	Methiocarb sulfoxyde	Spirodiclofen
Bitertanol	Ethiofencarb sulfoxyde	Methomyl	Spiromesifen
Bromuconazole	Ethirimol	Methoxyfenozide	Spiroxamine
Butafenacil	Ethoprop	Metolcarb	Sulfentrazone
Butocarboxim sulfoxide	Etofenprox	Metoxuron	Tebufenozide
Cadusafos	Etoxazole	Molinate	Tebufenpyrad
Carbaryl	Fenamidone	Napropamide	Tebupirimfos
Carbendazim	Fenazaquin	Naptalam	Tepraloxydim
Carbofuran	Fenhexamid	Neburon	Tetraconazole
Carbosulfan	Fenoxanil	Ofurace	Thiabendazole
Carfentrazone-ethyl	Fenpropidine	Oxamyl	Thiacloprid
Chlorimuron-ethyl	Fenpropimorph	Oxamyl oxime	Thiamethoxam
Chloroxuron	Fenpyroximate	Paclobutrazol	Thiazopyr
Chlortoluron	Fentrazamide	Pencycuron	Thiodicarb
Clodinafop-propargyl	Fluazifop-butyl	Penoxsulam	Thiofanox
Cloquintocet-mexyl	Flucarbazone-sodium	Picolinafen	Thiofanox sulfone
Clothianidin	Flutolanil	Picoxystrobin	Thiofanox sulfoxyde
Cyanofenphos	Flutriafol	Piperophos	Thiophanate methyl
Cycloxydim	Forchlorfenuron	Pretilachlor	Tralkoxydim
Cycluron	Formetanate	Primisulfuron-methyl	Trichlorfon
Demeton-s-methyl sulfone	Fosthiazate	Prodiamine	Trietazine
Demeton-s-methyl sulfoxyde	Fuberidazole	Propoxur	Trifloxysulfuron
Desmedipham	Furathiocarb	Pymetrozine	Triforine
Diclocymet	Haloxyfop	Pyraclostrobin	Trimethacarb
Diethofencarb	Imazamethabenz-methyl	Pyraflufen-ethyl	Zinophos
Difenoconazole	Imidacloprid	Pyridalyl	Zoxamide
Dimethametryn	Indoxacarb	Pyridaphenthion	
Dimethomorph	Iprovalicarb	Pyridate	

Appendix B

Table B-1 List of analytes (299) included in third party lab method for pesticide analysis in processed products

2-phenylphenol	Cyfluthrin	Flucythrinate	Parathion-methyl
3-hydroxyCarbofuran	Lambda-cyfluthrin	Fludioxinil	Pebulate
Acephate	Cypermethrin	Flumetralin	Penconazole
Acibenzolar-s-methyl	Cyprazine	Fluorochloridone	Pendimethalin
Alachlor	Cyproconazole	Fluorodifen	Pentachloroaniline
Aldicarb	Cyprodinil	Flusilazole	Cis-Permethrin 1
Aldicarb Sulfone	Cyromazine	Fluvalinate	Trans-Permethrin 2
Aldicarb Sulfoxyde	Dacthal (chlorthal-dimethyl)	Folpet	Phenthoate
Aldrin	Delta HCH	Fonofos	Phorate
Allidochlor	Deltamethrin	Heptachlor	Phorate sulfone
Ametryn	delta-trans-allethrin	Heptachlor epoxide endo	Phosalone
Aminocarb	Demeton-O	Heptanophos	Phosmet
Aramite	Demeton-S	Hexachlorobenzene	Phosphamidon
Aspon	Demeton-S-methyl	Hexaconazole	Piperonyl butoxide
Atrazine	Des-ethyl Atrazine	Hexazinone	Pirimicarb
Azinphos-ethyl	Desmetryn	Imazalil	Pirimiphos-ethyl
Azinphos-methyl	Di-allate	Iodofenphos	Pirimiphos-methyl
Azoxystrobin	Dialofos	Iprobenfos	Prochloraz
Benalaxyl	Diazinon	Iprodione	Procymidone
Bendiocarb	Diazinon o analogue	Iprodione metabolite	Prodiamine
Benfluralin	Dichlobenil	Isazophos	Profenophos
Benodanil	Dichlofluanid	Isofenphos	Profluralin
Benzoylprop-ethyl	Dichloran	Isopropalin	Prometon
ALPHA-BHC	Dichlormid	Isoprothiolane	Prometryne
BETA-BHC	Dichlorovos	Kresoxim-methyl	Pronamide
Bifenox	Diclobutrazole	Leptophos	Propachlor
Bifenthrin	Diclofenthion	Lindane	Propanil
Biphenyl	Diclofop-methyl	Linuron	Propargite
Bromacil	Dicofol	Malaoxon	Propazine
Bromophos	Dicrotophos	Malathion	Propetamphos
Bromophos-ethyl	Dieldrin	Mecarbam	Propham
Bromopropylate	Diethatyl-ethyl	Metalaxyl	Propiconazole
Bufencarb	Dimethachlor	Metazachlor	Propoxur
Bupirimate	Dimethoate	Methamidophos	Prothiophos
Buprofezin	Dinitramine	Methidathion	Pyracarbolid
Butachlor	Dioxacarb	Methiocarb	Pyrazophos
Butralin	Dioxathion	Methiocarb Sulfoxyde	Pyridaben
Butylate	Diphenamid	Methomyl	Quinalphos
Captafol	Diphenylamine	Methoprotryne	Quinomethionate
Captan	Disulfoton	Methoxychlor	Quintozene
CAPmet	Disulfoton sulfone	Methyl - trithion	Schradan

Carbaryl	Edifenphos	Methyl Pentachlorophenyl sulphide	Secbumeton
Carbetamide	Alpha-Endosulfan	Metobromuron	Simazine
Carbofenthion	Beta-Endosulfan	Metolachlor	Simetryn
Carbofuran	Endosulfan sulphate	Metribuzin	Sulfallate
Carboxin	Endrin	c-Mevinophos	Sulfotep
Chlorbenside	EPN	t-Mevinophos	Sulprophos
Chlorbenzilate	EPTC	Mexacarbate	TCMTB
Chlorbromuron	Erbon	Mirex	Tebuconazole
Chlorbufam	Esfenvalerate	Monocrotophos	Tecnazene
Cis Chlordane	Etaconazole	Monolinuron	Terbacil
Trans Chlordane	Ethalfluralin	Myclobutanil	Terbufos
Chlordimeform	Ethion	Naled	Terbumeton
Chlorfenson	Ethofumesate	Nitralin	Terbutryne
Chlorfenvinphos	Ethoprophos	Nitrapyrin	Terbutylazine
Chlorflurenol-methyl	Ethylan	Nitrofen	Tetrachlorvinphos
Chloridazon	Etridiazole	Nitrothal-isopropyl	Tetradifon
Chlormephos	Etrimfos	Norflurazon	Tetraiodoethylene
Chloroneb	Fenamiphos	Nuarimol	Tetramethrin
Chloropropylate	Fenamiphos sulfone	o,p-DDD	Tetrasul
Chlorothalonil	Fenamiphos Sulfoxyde	o,p-DDE	Thiobencarb
Chlorpropham	Fenarimol	o,p-DDT	Tolclofos-methyl
Chlorpyrifos	Fenbuconazole	Octhilinone	Tolyfluanid
Chlorpyrifos-methyl	Fenchlorophos	Omethoate	Triadimefon
Chlorthiamid	Fenfuram	Oxadiazon	Triadimenol
Chlorthion	Fenitrothion	Oxadixyl	Tri-allate
Chlorthiophos	Fenpropathrin	Oxamyl	Triazophos
Chlozolinate	Fenpropimorph	Oxycarboxin	Tribufos
Clomazone	Fenson	Oxychlordane	Tricyclazole
Coumaphos	Fensulfothion	Oxyfluorfen	Trifloxystrobin
Crotoxyphos	Fenthion	p,p-DDD	Triflumizole
Crufomate	Fenvalerate	p,p-DDE	Trifluralin
Cyanazine	Flamprop-isopropyl	p,p-DDT	Vernolate
Cyanophos	Flamprop-methyl	Paraoxon	Vinclozolin
Cycloate	Fluchloralin	Parathion	

Table B-2 List of analytes (32) included in third party method for pesticide analysis in dairy products

Alachlor	Beta-Endosulfan	o,p-DDE
Aldrin	Endosulfan sulphate	o,p-DDT
Alpha-BHC	Endrin	Oxychlordane
Beta-BHC	Fenchlorophos	p,p-DDD
Cis Chlordane	Heptachlor	p,p-DDE
Trans Chlordane	Heptachlor epoxide endo	p,p-DDT
Chlorpyrifos	Hexachlorobenzene	Cis-Permethrin 1
Cyfluthrin	Lindane	Trans-Permethrin 2
Dicofol	Methoxychlor	Quizalofop-ethyl
Dieldrin	Mirex	Tefluthrin
Alpha-Endosulfan	o,p-DDD	

Appendix C

Table C-1 Third party lab Method Detection Limits (MDLs) for metal analytes

Residue	MDL (ppm) Dairy	MDL (ppm) Processed
Aluminum	0.02	0.1
Antimony	0.02	0.02
Arsenic	0.005	0.005
Beryllium	0.02	0.02
Boron	0.1	0.1
Cadmium	0.002	0.002
Chromium	0.01	0.01
Copper	0.03	0.03
Iron	0.3	0.3
Lead	0.002	0.002
Manganese	0.02	0.02
Mercury	0.01	0.005
Molybdenum	0.02	0.02
Nickel	0.01	0.01
Selenium	0.02	0.02
Tin	0.02	0.02
Titanium	0.1	0.1
Zinc	0.1	0.1

Appendix D

Table D-1 Method Detection Limits (MDLs) for third party lab single residue methods

Program	Analyte	MDL (ppm)
Benomyl	Carbendazim	0.005
EBDC (DC)	CS_2	0.1
EBDC (EBDC)	Ethylene diamine	0.04
EBDC (ETU)	Ethylene thiourea	0.01
Formetanate	Formetanate	0.005
Thiabendazole	Thiabendazole	0.005

Appendix E

Table E-1 Samples containing more than one detected pesticide residue

Sample ID	Food category	Origin	# Residues
CF-09-CR-0318B	Canned vegetables	Turkey	**5**
CF-09-CR-0347B	Dried fruits	Unknown	**5**
CF-09-CR-0139A/B	Applesauce	Canada	**4**
CF-09-CR-0140A/B	Applesauce	Canada	**4**
CF-09-CR-0779A/B	Fruit snacks	Canada	**4**
CF-09-CR-0432B	Fruit snacks	China	**4**
CF-09-CR-0569B	Sauce	United States	**4**
CF-09-CR-0174A/B	Fruit snacks	Unknown	**4**
CF-09-CR-0176A/B	Fruit snacks	Unknown	**4**
CF-09-CR-0472A/B	Fruit snacks	Unknown	**4**
CF-09-CR-0086A	Fruit snacks	Canada	**3**
CF-09-CR-0047B	Fruit snacks	Canada	**3**
CF-09-CR-0751A/B	Fruit snacks	Canada	**3**
CF-09-CR-0755A/B	Fruit snacks	Canada	**3**
CF-09-CR-0776A/B	Fruit snacks	Canada	**3**
CF-09-CR-0639B	Salad	Canada	**3**
CF-09-CR-0640B	Spread	Canada	**3**
CF-09-CR-0341B	Pancake mix	Greece	**3**
CF-09-CR-0343B	Pasta	Italy	**3**
CF-09-CR-0219A/B	Canned fruit	Thailand	**3**
CF-09-CR-0717A/B	Canned vegetables	United States	**3**
CF-09-CR-0365B	Crackers	United States	**3**
CF-09-CR-0471A/B	Fruit snacks	Unknown	**3**
CF-09-CR-0799A/B	Fruit snacks	Unknown	**3**
CF-09-CR-0068B	Crackers	United States	**3**
CF-09-CR-0025B	Salsa	United States	**3**
CF-09-CR-0175B	Canned vegetables	Canada	**2**
CF-09-CR-0280A/B	Fruit snacks	Canada	**2**
CF-09-CR-0313A	Fruit snacks	Canada	**2**
CF-09-CR-0380A/B	Fruit snacks	Canada	**2**
CF-09-CR-0485A/B	Fruit snacks	Canada	**2**
CF-09-CR-0754A/B	Fruit snacks	Canada	**2**
CF-09-CR-0759A/B	Fruit snacks	Canada	**2**
CF-09-CR-0663B	Pie	Canada	**2**
CF-09-CR-0811B	Sauce	Canada	**2**
CF-09-CR-0116B	Snack bars	Canada	**2**

CF-09-CR-0372B	Snack bars	Canada	**2**
CF-09-CR-0613B	Cookies	China	**2**
CF-09-CR-0771A/B	Fruit snacks	China	**2**
CF-09-CR-0307B	Cookies	Egypt	**2**
CF-09-CR-0337B	Cookies	Holland	**2**
CF-09-CR-0335B	Cookies	Italy	**2**
CF-09-CR-0342B	Crackers	Italy	**2**
CF-09-CR-0558A/B	Fruit juice	Jamaica	**2**
CF-09-CR-0088B	Salsa	Mexico	**2**
CF-09-CR-0780B	Cereals	Portugal	**2**
CF-09-CR-0610B	Rice snacks	Taiwan	**2**
CF-09-CR-0279B	Crackers	United States	**2**
CF-09-CR-0712A/B	Fruit juice	United States	**2**
CF-09-CR-0844B	Jams	United States	**2**
CF-09-CR-0424B	Processed vegetable	United States	**2**
CF-09-CR-0292B	Corn chips	Unknown	**2**
CF-09-CR-0017B	Dried fruits & nuts	Unknown	**2**
CF-09-CR-0631A/B	Frozen fruit juice	Unknown	**2**
CF-09-CR-0760A/B	Fruit snacks	Unknown	**2**
CF-09-CR-0242B	Pasta	Unknown	**2**
CF-09-CR-0001B	Potato snacks	United States	**2**