



Canadian Food
Inspection Agency

Agence canadienne
d'inspection des aliments

Science Branch Food Laboratories And Chemical Testing

Food Safety Science Directorate
Food Safety Science Services Division



Canada 

Outline

- Overview of CFIA Science Branch Key Functions
- CFIA and 3rd Party Food Testing Laboratories
- Chemical Hazards and Maximum Residue Limits:
 - Veterinary Drugs
 - Therapeutants
 - Pesticides
 - Contaminants (e.g. dioxins, metals)
- Undeclared Allergens
- Food Authenticity

Science Branch Key Functions

- Science Advice and Risk Assessment - provide science advice and risk assessment as a basis for decision making
- Laboratory Services – CFIA has a network of 13 laboratories. 9 are accredited food testing laboratories
- Regulatory Research and Method Development - conducts research targeted at development of new tools, knowledge and test methods
- Surveys and Surveillance - coordinate design and implementation of surveys and surveillance programs
- Laboratory Oversight - Quality Management and Accreditation

Surveillance and Monitoring Activities

- National Chemical Residue Monitoring Program (NCRMP).
- Children's Food Project (CFP).
- Food Safety Oversight (FSO).
- Targeted Surveys – both short and long term.

These differ in scope and detail of how they are performed but work together to ensure a safe food supply for all Canadians

Purpose of Surveillance and Monitoring Activities

- Routine monitoring programs verify compliance with Canadian maximum residue limits (MRL) and maximum levels (MLs) for chemical residues and contaminants
- Targeted surveys complement routine monitoring by:
 - Testing for contaminants with non-numerical standards that may pose risk to human health
 - Detecting undeclared allergens to prevent allergen-related illness and death
 - Ensuring that Canadians get what they paid for
 - Identify trends, gauge effectiveness of policies/programs
 - Facilitating trade by demonstrating equivalence of our residue control system to trading partners

General Procedure for Surveillance

- Samples are collected by CFIA staff or contract samplers from:
 - Abattoirs/slaughterhouses
 - Grading stations
 - Farms
 - Distribution centres
 - Importer warehouses
 - Retail outlets
- CFIA laboratories, and third party labs under contract to CFIA, test samples
- CFIA staff evaluate and report the results
- Follow-up actions are taken depending on the level of health risk; ranging from more testing to recall/removal of the product

Examples of Chemical Hazards

- Pesticide Residues
- Veterinary Drug Residues
- Food Colours
- Environmental Contaminants
- Processing induced contaminants, e.g. BPA, MCPD
- Natural toxins (e.g. PSP, Ochratoxin A)
- Allergens – Canada's list of priority allergens
 - Eggs
 - Mustard
 - Crustaceans and molluscs
 - Sesame seeds
 - Wheat or triticale (a hybrid of wheat and rye grains)
 - Milk
 - Peanuts
 - Fish
 - Soy
 - tree nuts
- Adulteration of products (e.g. sugars that do not occur in product type)

CFIA and 3rd Party Food Testing Laboratories

Preventative Control Strategies - Food Testing

CFIA uses Government labs as well as contract private labs as a cost effective means of delivering our sampling and testing activities:

- CFIA Laboratories mostly specialized testing and method development
- Contract laboratories are used for most routine work but rarely do enforcement and compliance testing

CFIA Food Testing Laboratories

Role :

- Support inspection related sampling
 - Monitoring (random) and directed (**biased**)
- Provide analytical support for investigations
 - Follow-up testing for monitoring positives
 - Testing related to trade and illness complaints
- Conduct method development research
 - New methodologies used by third party laboratories
 - Methodology expansion, pilot surveys
- Diagnostic testing for monitoring not currently done by contract laboratories
 - New testing, or no contract in place for the work
 - Lack of capability in the contract labs

CFIA Food Chemistry Testing Laboratories

CFIA Chemistry laboratories have undergone a specialization process:

- Gain efficiencies from higher sample volume / test
- Allows labs to become “Experts in their Field”
- Lower equipment costs
 - Fewer labs need certain specialized equipment for testing
- Based on Analysis Classes and Commodities
 - Separate specialist labs for Veterinary Drug Residues
- Allows research work to be shared amongst labs
- Labs do not need to compete for research work

CFIA Food Chemistry Testing Laboratories -Specialty Areas

- **Dartmouth, NS**
marine biotoxins, veterinary drug residues (aquacultured products), trace elemental analysis
- **Longueuil, QC**
marine biotoxins, food allergens, nutritional analyses, food colours and dyes
- **Ottawa (Carling), ON**
food authenticity, food additives, organic and inorganic analysis of feeds and fertilizers
- **Saskatoon, SK**
veterinary drug residues (meat products and foods of animal origin), proficiency testing provider
- **Calgary, AB**
pesticide residues, organic environmental contaminants, meat authenticity
- **Burnaby, BC**
marine biotoxins, food allergens, natural toxins

Contracted Third Party Laboratories -Role

Testing under direct contract to CFIA

- CFIA pays for the testing and get results directly

Testing under contract to a regulated party

- Regulated party pays for testing
- Regulated party sends results to CFIA
- Examples: mandated listeria testing, fish QMPI licensees

For follow-up to non-compliances, or residues of concern where CFIA expects to take regulatory actions, samples are directed to CFIA Labs

Contracted Third Party Laboratories

Must be accredited and use accredited methods

- To qualify as a Contract Lab they must be accredited to ISO/IEC 17025
- Valid scope of accreditation from Standards Council of Canada (SCC) or Canadian Association of Laboratory Accreditation (CALA)

Must meet the conditions of the contract

- Testing must occur in Canada
- Perform methods as outlined via reference (regulatory) methods
- Are accountable to provide all validation, quality assurance, or other supporting data to demonstrate expertise
- Contracts are performance driven, with contract specific audits.

CFIA audits contract laboratories annually to ensure compliance to contract conditions

CFIA Laboratory Accreditation

CFIA laboratories must be ISO/IEC 17025 Accredited

- Accreditation administered by the Standards Council of Canada (SCC)
- SCC audits CFIA laboratories at least every 2 years
- The CFIA has oversight, via an MOU with Standards Council of Canada (SCC) and Canadian Association of Laboratory Accreditation (CALA)
- CFIA provides Technical Assessors for laboratory audits conducted by the above accrediting bodies

CFIA Food Chemistry Testing Laboratories

Summary:

- CFIA laboratories do some routine work to maintain proficiency, accreditation
- CFIA laboratories do all enforcement and compliance testing and the Crown assumes all liabilities
- CFIA laboratories develop and validate methods that can be used as reference for internal and contract testing
- Contract laboratories are used for most routine work
- Contract laboratories rarely do enforcement and compliance testing and the Crown may or may not assume liabilities

Chemical Testing: Regulations and Maximum Residue Limits (MRLs)

Surveillance: Testing, Regulations and Guidelines

- Verify compliance with Food and Drug Act (FDA), Food and Drug Regulations (FDR), and Canadian maximum residue limits (MRLs) and maximum levels (MLs) for chemical residues and contaminants
- Identify trends, gauge effectiveness of policies/programs
- Demonstrate equivalence of our residue control system to trading partners

Based on Codex principles:

- Assumes foods will be largely compliant with MRLs

Act and Regulations

Food and Drug Act Section 4(1) and 5(1)

4 (1) No person shall sell an article of food that

- (a) **has in or on it any poisonous or harmful substance;**
- (b) is unfit for human consumption;
- (c) consists in whole or in part of any filthy, putrid, disgusting, rotten, decomposed or diseased animal or vegetable substance;
- (d) **is adulterated;** or
- (e) was manufactured, prepared, preserved, packaged or stored under unsanitary conditions

5 (1) No person shall label, package, treat, process, sell or advertise any food in a manner that is false, misleading or deceptive or is likely to create an erroneous impression regarding its character, value, quantity, composition, merit or safety (**Allergens**)

Act and Regulations

Allergens - Food and Drug regulations B.01.010.1 (1):

“food allergen” means any protein from any of the following foods, or any modified protein, including any protein fraction, that is derived from any of the following foods:

- (a) almonds, Brazil nuts, cashews, hazelnuts, macadamia nuts, pecans, pine nuts, pistachios or walnuts;
- (b) peanuts;
- (c) sesame seeds;
- (d) wheat or triticale;
- (e) eggs;
- (f) milk;
- (g) soybeans;
- (h) crustaceans;
- (i) shellfish;
- (j) fish;
- (k) mustard seeds.

Act and Regulations

Food and Drug regulations - B.01.010.1 (1)

Continued:

“gluten” means

(a) any gluten protein from the grain of any of the following cereals or from the grain of a hybridized strain that is created from at least one of the following cereals:

(i) barley,

(ii) oats,

(iii) rye,

(iv) triticale,

(v) wheat; or

(b) any modified gluten protein, including any gluten protein fraction, that is derived from the grain of any of the cereals referred to in paragraph (a) or from the grain of a hybridized strain referred to in that paragraph. (gluten)

Canadian Standards for Chemical Residues and Contaminants

- Pesticides - MRLs established by Health Canada under the Pest Control Products Act are listed in the MRL Database. Where no MRL is specified, the general MRL of 0.1 ppm applies
- Veterinary Drugs - MRLs established by Health Canada are listed in the List of Maximum Residue Limits for Veterinary Drugs in Foods
- Contaminants - List of Contaminants and Other Adulterating Substances in Foods
- List of Maximum Levels for Various Chemical Contaminants in Foods

Where to find the MRL's

Health Canada – Pest Management Regulatory Agency

- Maximum Residue Limits (MRL) database, search for the following:

Maximum residue limits for pesticides - Health
Canada

or

<http://pr-rp.hc-sc.gc.ca/mrl-lrm/index-eng.php>

- Search by commodity or pesticide

Examples of Commodity/Pesticides

Permitted Chemicals in Foods:

- Examples of Maximum Residue Limits:
 - Blackberries
 - Cymoxanil: 4 ppm
 - Boscalid: 6 ppm
 - Cyprodinil: 10 ppm
 - Mango
 - Metalaxyl: 0.4 ppm
 - Fenpropathrin: 1 ppm
 - Azoxystrobin: 2 ppm
- Can use MRL Database to look up what is permitted for any food commodity.

Veterinary Drug MRL's

Health Canada – Veterinary Drug Directorate

- Table of Maximum Residue Limits (MRL), search for the following:
 - List of maximum residue limits (MRLs) for veterinary drugs in foods
 - or
 - <https://www.canada.ca/en/health-canada/services/drugs-health-products/veterinary-drugs/maximum-residue-limits-mrls/list-maximum-residue-limits-mrls-veterinary-drugs-foods.html>
- Listed by veterinary drug and food
- In cases where no MRL exists, there is a zero tolerance, **ie. no amount of residue is allowed**

Other Action Levels (Contaminants)

- Health Canada Limits,
<https://www.canada.ca/en/health-canada/services/food-nutrition/food-safety/chemical-contaminants/maximum-levels-chemical-contaminants-foods.html>

List of contaminants and other adulterating substances in foods,

https://www.canada.ca/en/health-canada/services/food-nutrition/food-safety/chemical-contaminants/contaminants-adulterating-substances-foods.html#fn_t1b1

Surveillance Activities for Chemicals in Food

Food Chemistry Testing

Testing in CFIA Chemistry Labs

- ~25,000 samples analyzed per year
- ~50,000 tests performed per year
- Analysis of monitoring, directed, follow-up and food safety investigation samples

Testing in Third-Party Chemistry Labs

- ~32,000 samples analyzed per year
- ~170,000 tests performed per year
- Primarily analysis of monitoring and baseline survey samples, e.g. National Chemical Residue Monitoring Program (NCRMP)

CFIA Food Chemistry Testing Laboratories

Commodity Testing in CFIA Chemistry Labs:

- Dairy – 15 plans, 1300 samples
- Egg – 5 plans, 250 samples
- Fish – 59 plans, 16600 samples
- Honey & Maple – 16 plans, 500 samples
- Meat – 16 plans, 1500 samples
- Processed Fruit and Veg – 16 plans, 450 samples
- Fresh Fruit and Veg – 8 plans, 2125 samples
- Imported & Manufactured – 67 plans, 1050 samples
- Targeted Surveys – 13 plans, 2550 samples
- Animal Feed – 29 plans, 2200 samples
- Fertilizer – 10 plans, 800 samples
- Investigations and complaints – 12 plans, ~600 samples

National Chemical Residue Monitoring Program (NCRMP)

- Monitoring - Tests imported and domestic products to ensure food safety and verify industry compliance
 - Shell Egg and Egg Products
 - Red Meat and Poultry Products
 - Dairy Products
 - Fresh Fruits & Vegetables
 - Processed Fruit & Vegetable Products
 - Honey
 - Fish and shellfish
- Sampling: Product sampling at registered establishments
~17,000 samples/ year
- Testing: CFIA and private contract laboratories

Targeted Surveys Program

- Monitoring - Tests imported and domestic products to ensure food safety and verify industry compliance
 - Manufactured Foods
 - Bakery or Prepared Products
- Broader range of chemical hazards tested than under NCRMP
- Hazards without numerical standards are evaluated for risk to human health by Health Canada
- Sampling: Retail by contract samplers
~14,850 samples/ year
- Testing: CFIA and Private Contract labs

Children's Food Survey

- CFIA-Health Canada horizontal initiative as part of their Total Diet Study
- Monitoring - Strengthens food safety oversight of foods marketed to Children.
- Sampling: Retail
~ 550 samples/year for chemicals
- Testing: Private Contract labs

Summary

Chemicals - What Are we looking for

Testing using both multi-residue methods as well as methods for a single compound

- Monitor for up to 530 different pesticides
 - Depends on commodity
- Monitor for up to 185 veterinary drugs
- Monitor for up to 100 contaminants
- Monitor for 9 priority allergens
- Monitor food authenticity - indicators of adulteration and/or species identification
- Products tested as sold
 - Do not dilute, cook, or prepare products

How do we evaluate the results

- Evaluate against tolerances established by Health Canada (PMRA, VDD, BCS) or CFIA
- If no MRLs are set in pesticides apply a general MRL of 0.1 ppm
- Organic products are evaluated for:
 - Compliance with regulatory limits set for pesticides, veterinary drugs, and other contaminants
 - If deliberately added, evaluated against the Permitted Substances Lists by the Office for Organic Products
- Any detection of allergens, banned substances or food non-authenticity is considered adulteration

What we do with the results

- ID non-compliant products on the market
 - Increased inspections
- Identify potential food hazards
 - Recall if FS hazard
- Determine overall commodity compliance rate
 - ID poor performing commodities or market sectors

CFIA Food Chemistry Testing Laboratories

In Summary:

- Combination of:
 - Baseline Surveillance Testing
 - Comprehensive Monitoring programs
 - Targeted, inspection related testing
- Utilization of:
 - CFIA specialized, expert laboratories
 - Contracted, accredited third-party laboratories



Ensure compliance of food products to Canadian regulations, guidelines and standards as they apply to chemical hazards and contaminants.

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