



REFERENCE DATABASE

FOR

HAZARD IDENTIFICATION



Canadian Food
Inspection Agency

Agence canadienne
d'inspection des aliments



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INTRODUCTION

The Reference Database for Hazard Identification is a tool designed for use by food processors, HACCP coordinators and HACCP consultants to assist in identifying food and food-borne hazards in production and processing when planning and implementing food safety procedures, GMPs or HACCP plans.

The manufacturer / importer is responsible for the safety of food sold. The *Food and Drugs Act* states that:

4. 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.

(2) An article of food that is not labelled or packaged as required by, or is labelled or packaged contrary to, the regulations shall be deemed to be labelled or packaged contrary to subsection (1).

7. No person shall manufacture, prepare, preserve, package or store for sale any food under unsanitary conditions.

In designing a Hazard Analysis and Critical Control Points (HACCP) program, it is recommended that food enterprises follow the steps of the Logic Sequence for Application of HACCP as identified by the Codex Alimentarius. The first 5 steps include:

1. assemble HACCP team;
2. describe your product and identify its intended use
3. list product ingredients and incoming material
4. construct a process flow diagram and, plant schematic
5. verify on-site , your process flow diagram and plant schmatic



Then, after having completed these 5 steps, the sixth step requires listing all of the potential hazards associated with each product for each processing step. A hazard is a condition or circumstance having the potential to cause illness or harm to a consumer. Hazards can be biological, chemical or physical. Only after identifying all of the potential hazards will the HACCP team then proceed with the steps of conducting hazard analyses and considering measures to control any of the identified hazards. For many establishments working on implementing HACCP, the sixth step – listing all of the potential hazards associated with each product for each processing step - can be a challenging and limiting step. It can be quite difficult to insure that ALL of the potential risks and sources of exposures to hazards are considered within a food production or processing environment.

The user can access this database to find a list of known hazard(s) related to incoming materials, processing steps and plant layout (e.g.: cross-contamination zones) that should be considered. The database includes biological, chemical and physical hazards. It is felt that the consultation and use of this database will facilitate the hazard identification exercise and will result in more accurate, effective and uniform HACCP plans.

Every effort has been taken to create a complete listing of known hazards. It must be understood that this reference database is a guide to hazard identification and that the HACCP team is responsible to ensure that any additional hazards specific to a food premise will be considered and evaluated. In addition to this database, reference texts, Health Canada reports on food safety related illness, recalls and complaints, your company's complaints file and other review papers should be consulted.

The database is manually organized and overseen, and is continually updated. It is recognized that further revisions will be necessary to ensure that the database reflects changing conditions. Users can submit information or proposed changes or additions to existing data that will be reviewed and verified prior to acceptance. Individuals with expertise on a substance are invited to review information submitted for inclusion in the database system.

If the user finds missing, inaccurate or incomplete information, it would be appreciated if comments be sent to:

Manager, Inspection Strategies Section
Food Policy Coordination Division
Food Safety Directorate

Telephone: (613) 221-1340 Fax: (613) 228-1384
E-mail: mfirth@inspection.gc.ca

DISCLAIMER: Please note that every effort has been made to ensure that the information found within this database is current and accurate. We accept no responsibility for the accuracy, adequacy, or reliability of the information, or for any loss or injury resulting from the use of the information. We would suggest consulting the applicable legislation or appropriate authority for confirmation of all data prior to application.

While many aspects related to food safety hazards as found in the data base may be regulatory based, the document itself is meant for use as a general reference tool. Please consult the applicable legislation or appropriate authority for confirmation or discussion regarding specific regulatory requirements.



PART I PRODUCT INGREDIENTS AND INCOMING MATERIALS



PRODUCT INGREDIENTS AND INCOMING MATERIALS

Part I Product Ingredients and Incoming Materials

With respect to the evaluation of food safety in a food processing environment, one of the initial steps is the identification of hazards as they relate to food ingredients and other incoming materials. There are three broad categories of hazards associated with foods: biological, chemical and physical. This section of the Reference Database for Hazard Identification aims to provide general information on the different hazards that are potentially associated with common product ingredients and incoming materials.

Table 1 lists the most common product ingredients and incoming materials that are used in or on food products. On the right side of the table, there are three columns headed by the letters “B”, “C” and “P”. These letters stand for biological, chemical and physical hazards respectively.

Table 2 lists hazard information of the most common product ingredients and incoming materials. Additional information such as references to relevant sections in the Regulations, allergen and nutrition information are also included. For more information on specific hazards, please refer to Part IV for biological hazards, Part V for Chemical hazards including allergen and nutrition hazards, and Part VI for physical hazards.

It is understood that food additives should not be considered as a threat to consumers' health and safety when used in accordance with the *Food and Drug Regulations* (FDR). Table 3 is a list of food additives permitted for use in Canada as per Division 16 of the FDR. The table has eight columns with the additive names, FDR references, Dairy, Egg, Meat, Fruits & Vegetables (includes Fresh and Processed Fruits and Vegetables, Maple and Honey), Fish and Unstandardized Food/Others. The “X” or “X*” appears where the food additive is permitted for use. When only an “X” appears, it means that the food additive should be used in accordance with good manufacturing practices. When an asterisk appears beside the “X”, i.e. “X*”, this indicates a standard exists for the use of the additive in some specific products. Users are recommended to consult the FDR for information on exactly which additives are allowed in which foods and the maximum levels of usage permitted. <http://laws.justice.ca/en/F-27/C.R.C.-c.870/124280.html#rid-124284>

Please be aware that certain substances and ingredients are not permitted (eg toxic herbs) for use in foods. There are also substances that may be permitted only in natural health products (NHP) or drugs. Novel foods are substances that do not have a history of safe use in foods, and would require a safety assessment from Health Canada before they can be used in foods. Please note that it is the responsibility of the dealer or legal agent to ensure the safety of their products.

Note: This section does not contain a complete listing of all possible ingredients and incoming materials and their associated hazards. Users are recommended to conduct a product hazard assessment for each individual ingredient and incoming material used in food production to ensure all hazards specific to their food products are identified and subsequently controlled by implementing appropriate measures.

**TABLE 1**

PRODUCT INGREDIENTS AND INCOMING MATERIAL	B	C	P
Air (e.g.: compressed air)	X	X	X
Alcoholic Beverages		X	X
Amino Acids – see Vitamins/Minerals/amino acids			
Animal – Fats and Oils (Lard, Shortening,...)	X	X	X
Animals Live – see Live Animals			
Antibiotics (Hatchery)	X	X	
Anticaking Agents (FDR, Div. 16, Table I) see Food Additives- TABLE 3		X	X
Antifoaming Agent		X	X
Antimicrobial Agent		X	
Bacterial Cultures/Starter Cultures	X	X	X
Bactericidal Agent – Hatchery		X	
Bakery Products and Grain [flour/starch/crumbs/meal/bread including semolina (wheat)]	X	X	X
Baking Powder		X	X
Bleaching, Maturing and Dough conditioning agents (FDR, Div. 16, Table II) see Food Additives- TABLE 3		X	X
Boiler additives		X	
Bread and Bread Crumbs –see Bakery products and grains	X		
Brood Supplies -Hatchery	X		
Butter (Unsalted – Salted)	X	X	X
Carbon Dioxide (CO ₂)		X	X
Carrier or Extraction Solvents (FDR, Div. 16, Table XV) see Food Additives- TABLE 3		X	X
Cheese	X	X	X
Chick – Day Old Chick domestic or imported (Hatchery)	X	X	
Chocolate Enrobing/Moulding/Coating/Syrup/Liquor	X	X	X
Coatings / Waxes see also: Miscellaneous Food Additives		X	
Cocoa Butter / Cocoa Powder	X	X	X
Coconut	X	X	X
Coffee		X	X
Colouring Agents (FDR, Div. 16, Table III) see Food Additives- TABLE 3		X	X
Confectionery	X	X	X
Cornmeal		X	X
Corn Starch		X	X
Cream Pasteurized -see Milk Pasteurized			
Cream (Raw)	X	X	X
Dairy Food Neutralizer –see Neutralizer –Dairy Food			
Dairy Products /Ingredients	X	X	X
Dextrose - see Sweetening Agents (liquid or dry))			
Diluents (Hatchery)	X	X	X
Disinfecting Chemicals (Hatchery) Egg/Chick	X	X	
Dressing (e.g.: Mayonnaise, Dressing, salad Dressing, French Dressing, etc.)	X	X	X
Dried Milk Products	X	X	X
Dry Ice			X
Egg (Ready to Use) “graded shell egg”	X	X	
Egg-Breaking from Hatchery	X	X	
Egg – Incubation (Hatchery)	X	X	
Egg Product Pasteurised - Frozen, Dried and Liquid	X	X	X
Egg Products Unpasteurised - Frozen, Dried and Liquid	X	X	X
Egg – Returned Graded Shell Eggs	X	X	
Egg (Shell Egg) – Ungraded	X	X	
Egg (Shell egg) -Wash Detergent, Foamicide, Sanitizer		X	
Electrolytes - Hatchery	X		
Emulsifying, Gelling, Stabilizing and Thickening Agents (FDR, Div. 16, Table IV) see Food Additives- TABLE 3		X	X
Evaporated / Condensed Milk and Milk Products	X	X	X
Fat and Oils – see Animal fats and oils or Vegetable oil			
Fermentation Products (e.g.: Xanthan gum, enzymes, starter cultures, others)	X		X
Firming Agent (FDR, Div. 16, Table VI) see Food Additives- TABLE 3		X	X
Fish /Marine mammals- Raw (wild or Aquaculture (farm raised) (see also Marine & Fresh Water Animal Products))	X	X	
Fish Gelatin	X	X	X



PRODUCT INGREDIENTS AND INCOMING MATERIAL	B	C	P
Flavoured Oil (e.g.: garlic, herbs,...)	X		
Flavouring Preparation / Flavour		X	X
Flour –see Bakery products and grains			
Flour/ Starch/ Rice/Meal /Crumbs /Wheat/Bread /Semolina- see Bakery Products and Grain			
Food Additives (FDR, Div.16) see Food Additives- TABLE 3	X	X	X
Food Colours - see Colouring agents			
Food Enzymes (FDR, Div. 16, Table V) see Food Additives- TABLE 3	X	X	X
Fructose – see sweetening agents (liquid or dry)	X	X	X
Fruit (Canned)	X	X	X
Fruit (Dried or Candied)		X	X
Fruit (Drink / Nectar / Juice / Cocktail – Canned)		X	X
Fruit Fresh / Fresh Cuts	X	X	X
Fruits Fresh – Sulphited (Grapes)		X	X
Fruit (Frozen)	X	X	X
Fruit Juice (Concentrated)		X	X
Fruit Juice (Fresh)	X	X	X
Fruit Juice (Pasteurised / Refrigerated)		X	X
Fruit-Preserves (Jams, Jellies, Marmalades)		X	X
Fruit (Sauce, Pulp/Puree, Compote-Canned)	X	X	X
Fruits (Sulphited)		X	X
Fumigants - Hatchery		X	
Glazing and Polishing Agents (FDR, Div. 16, Table VII)		X	X
Glucose –see Sweetening Agent (liquid or dry)			
Grain and Bakery Products (see Bakery products)			
Hatching Eggs - Hatchery	X	X	
Honey and Honey Products	X	X	X
Hydrogen Peroxide See also: Miscellaneous Food Additives		X	X
Ice	X	X	X
Ichtyocolla	X	X	X
Ink (Edible)		X	
Jams/Jellies / Marmalades – see Fruit- preserves – Jams, Jellies, Marmalades			
Labels / Packaging		X	
Lactic Cultures	X	X	X
Lactose (milk)	X	X	X
Lard – see animal fats and oils			
Live Animals (Red species, Poultry)	X	X	X
Marmalades – see Fruit – preserves – Jams, Jellies, Marmalades			
Maple Products (Maple syrup, sugar, butter, taffy, flakes)	X	X	X
Marine and Fresh Water Animal Products (fish, crustacea, molluscs, other invertebrates and marine Mammals) including (e.g.: Prepared or preserved or canned))	X	X	X
Marshmallow Base	X	X	X
Meal – see Bakery Products and grains			
Meat (Prepared or Preserved)	X	X	X
Meat/Poultry and Meat Products/ Poultry (Raw and Semi-Cooked)	X	X	X
Meat/Poultry and Meat Products / Poultry (Ready to Eat)	X	X	X
Microbial Flora for Use in Mould-Ripened Cheese	X	X	X
Milk / Cream (Pasteurized)	X	X	X
Milk (Powders)	X	X	X
Milk Products (Dried see Dried milk products)			
Milk (Raw)	X	X	X
Mineral oil		X	X
Minerals (see Vitamins/ Minerals /Amino acids)			
Miscellaneous Food Additives (FDR, Div. 16, Table VIII) see Food Additives- TABLE 3	X	X	X
Molasses – see also sweetening	X		X
Neutralizer (Dairy Food)		X	X
Nitrogen		X	X
Nuts / Peanuts and their Product	X	X	X
Oil - See also Animals fats and oils /Vegetable oils			



PRODUCT INGREDIENTS AND INCOMING MATERIAL	B	C	P
Oil for Oiling Eggs		X	
Packaging Material	X	X	X
Packaging Material (Shell Eggs)	X	X	
Packaging Material – (Hatchery)	X	X	X
Pasta (Dry)		X	X
Pasta (Fresh)	X	X	X
pH Adjusting Agents, Acid-Reacting Materials and Water Correcting Agents (FDR, Div. 16, Table X) see Food Additives- TABLE 3		X	X
Pickles Fermented vegetables - see Vegetables Fermented Pickles			
Pork – see Meat (prepared or preserved) , Meat /poultry and meat products/ poultry (raw and semi- cooked), Meat/ Poultry and meat products/poultry products (ready to eat)			
Potassium nitrite/Nitrate - see Prague Powder			
Poultry and Poultry Products (ready to eat)	X	X	X
Prague Powder	X	X	
Pre Dust, Batters Breading, Frying Batters		X	X
Preservatives (FDR, Div. 16, Table XI) see Food Additives- TABLE 3		X	X
Processing Aid (e.g.: hydrogen for hydrogenation purposes, clarifying and filtering agents for wine)		X	X
Processed Flakes (e.g.: apple, cinnamon)		X	X
Returned Product	X	X	X
Rework	X	X	X
Rice	X	X	X
Salts (NaCl)		X	X
Sauces (e.g.: Soya sauce)		X	X
Scalding Aids		X	
Seeds such as flax seed, sunflower and poppy	X	X	X
Seeds - for Sprouting (e.g.: alfalfa, mung bean, broccoli)	X	X	X
Seed Honey	X	X	X
Semolina Flour – see Bakery Products and Grains			
Sequestering Agents (FDR, Div. 16, Table XII) see Food Additives- TABLE 3		X	X
Shellfish /Crustacean / Other Marine Invertebrates Live or Raw [Wild or from Aquaculture (farm raised)]	X	X	
Shortening - See also Animals fats and oils /Vegetable oils		X	X
Sodium Caseinate	X	X	X
Sodium Nitrite /Nitrate - see Prague Powder			
Soft Drink Carbonated		X	X
Soy Protein concentrate, Soy Protein Isolate		X	X
Spices / Seasoning / Seasoning Premix	X	X	X
Spray & Injectables (Hatchery)	X	X	
Starch – see Bakery products and Grains			
Starch Modifying Agents (FDR, Div. 16, Table XIII) see Food Additives- TABLE 3		X	X
Starter Cultures - see Bacterial Cultures			
Starter Medium	X	X	X
Steam (Food Grade/Culinary)		X	
Sugar, Glucose, Dextrose, Fructose - see Sweetening agents /Sweeteners (liquid or dry)			
Sugar Confectionery (e.g.: soft candy, hard candy, tahini, halva)	X	X	X
Sweeteners (food Additives that may be used as sweeteners) (FDR, Div. 16, Table IX) see Food Additives- TABLE 3		X	X
Sweetening Agents (Dry- Liquid)	X	X	X
Syrups (e.g.: Brown rice syrup)		X	X
Tea (includes herbal)		X	X
Vaccines (Hatchery)	X	X	
Vegetable Oil see also Shortening		X	X
Vegetables (Acidified – Canned)	X	X	X
Vegetables (Canned)	X	X	X
Vegetables (Concentrated)		X	X
Vegetables (Dried)	X	X	X
Vegetables (Frozen)	X	X	X
Vegetables (Juice/ Drink/Cocktail- Canned)	X	X	X
Vegetables (Fermented Pickles)	X	X	X
Vegetables (Fresh /Fresh Cut)	X	X	X



PRODUCT INGREDIENTS AND INCOMING MATERIAL	B	C	P
Vegetables (Pickles in Oil)	X	X	X
Vegetables (Preserved in Brine)	X	X	X
Vegetables (Relishes)		X	X
Vinegar		X	X
Vitamins /Minerals /Amino Acids		X	X
Water	X	X	X
Wheat Flour – see Bakery Products and Grains			
Whey and Whey Protein Concentrate (milk)	X	X	X
Yeast (Dry)	X		
Yeast Foods (FDR, Div. 16, Table XIV) see Food Additives- TABLE 3		X	X

X : this additive can be used in some specific foods

* : a standard could exist for the use of this additive



PRODUCT INGREDIENTS AND INCOMING MATERIALS-DETAILS

TABLE 2

AIR (e.g.: compressed air)

Data:

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogenic bacteria (e.g.: <i>Listeria monocytogenes</i>)
B	Presence of mould spores
C	Contamination from non-food chemical vapours (e.g.: oil, formaldehyde (hatcheries))
C	Contamination if air is non-food grade
P	Presence of hazardous extraneous material

ALCOHOLIC BEVERAGES

Data: May contain ALLERGENS e.g.: Sulphites. FDR, Division 2 may not be allowed in some alcoholic beverages or maximum limits may apply. See FDR Division 2-Standards for Alcoholic Beverages and FDR, Division 16. B.01.008 2(f). . Where unknown herbs and other substances that may be novel foods or Natural Health Products are added, contact CIFA or Health Canada

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers, lubricants)
C	Presence of toxic herbs, unapproved substances/novel foods or substances with other physiological effects/properties poses a potential hazard
P	Presence of hazardous extraneous material

AMINO ACIDS – SEE VITAMINS/MINERALS/AMINO ACIDS

ANIMAL - FATS AND OILS (Lard, Shortening,)

Data: FDR, Division 9

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of sporulating and non sporulating bacteria
C	Presence of environmental contaminants (pesticide residues)
C	Inaccurate nutrition information (e.g.: due to mislabelling) could impact on individuals with certain medical conditions.
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
P	Presence of hazardous extraneous material

ANIMALS LIVE – SEE LIVE ANIMALS



ANTIBIOTICS (HATCHERY)

Data:

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Improper use (e.g.: expiry date violation)
C	Contamination by non-food chemicals

ANTICAKING AGENTS

Calcium Aluminum Silicate, Calcium Phosphate Tribasic, Calcium Silicate, Calcium Stearate, Cellulose, Magnesium Carbonate, Magnesium Oxide, Magnesium Silicate, Magnesium Stearate, Microcrystalline Cellulose, Propylene Glycol, Silicon Dioxide, Sodium Aluminum Silicate, Sodium Ferro-cyanide decahydrate

Data: FDR, Division 16, Table I, May not be allowed for use in certain food products or maximum application limits may apply.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Presence of non-food chemicals
P	Presence of hazardous extraneous material

ANTIFOAMING AGENT

Data: FDR. Division 16, Table VIII Formulations. May not be allowed for use in certain food products or maximum application limits may apply.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Presence of undeclared allergens could impact on sensitive individuals
C	Unapproved anti-foaming agents or wrong product
C	Contamination by non-food chemicals
P	Presence of hazardous extraneous material

ANTIMICROBIAL AGENT

Data: For Sprouting Seeds: CFIA Code of Practice for Hygienic Production of Sprouted Seeds

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Unapproved antimicrobial agents, non-food grade, or wrong product

BACTERIAL CULTURES/ STARTER CULTURES

Data:

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogenic bacteria (e.g.: <i>Salmonella spp</i>)
B	Pathogen growth due to failure of culture/inactive cultures
B	Growth of pathogens due to improper time/temperature applications
C	Contamination by non-food chemicals
P	Presence of hazardous extraneous material



BACTERIOCIDAL AGENT- (HATCHERY)

Data:

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Contamination by bactericidal agents contaminated, toxic or non-bactericidal

BAKERY PRODUCTS AND GRAIN [flour/starch/meal/crumbs/bread including semolina (wheat)]

Data: POTENTIAL HIDDEN ALLERGENS (e.g.: wheat, soy, eggs, milk). FDR, Division 13

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of bacteria from insect contamination
C	Presence of mycotoxins (e.g.: vomitoxin in product made with wheat)
C	Presence of environmental contaminants (pesticides residues)
C	Presence of undeclared allergens could impact on sensitive individuals
C	Use of non food grade product
C	Lack or decreased amount of food nutrient (e.g.: folic acid in flour)
C	Improper or inaccurate addition (e.g.: type, concentration) of nutrients (vitamins / minerals / amino acids) could impact on certain individuals
C	Excess of food additive (e.g.: bromate in flour)
P	Presence of hazardous extraneous material

BAKING POWDER

Data: FDR, Division 3

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Presence of non-food chemicals
P	Presence of hazardous extraneous material

BLEACHING, MATURING AND DOUGH CONDITIONING AGENTS

Acetone Peroxide, Ammonium Persulphate, Ascorbic Acid, Azodicarbonamide, Benzoyl Peroxide, Calcium Iodate, Calcium Peroxide, Calcium Stearoyl-2-Lactylate, Chlorine, Chlorine Dioxide, L-Cysteine Hydrochloride, Potassium Iodate, Potassium Persulphate, Sodium Stearoyl-2-Lactylate, Sodium Stearyl Fumarate, Sodium Sulphite

Data: FDR, Division 16, Table II. May not be allowed for use in certain food products or maximum application limits may apply.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Contamination by non-food chemicals
P	Presence of hazardous extraneous material



BOILER ADDITIVES

Data:

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Presence of chemicals not approved / not permitted for use where there is possible food contact
C	Excess of additive

BREAD AND BREAD CRUMBS – SEE BAKERY PRODUCTS AND GRAINS

BROODER SUPPLIES – HATCHERY

Data:

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogens /virus in or on eggs due to contamination at source

BUTTER (UNSALTED - SALTED)

Data: POTENTIAL HIDDEN ALLERGENS (e.g.: milk, soy). FDR, Division 8. Dairy Products Regulations sections 6(1) and 46 to 49 for standards

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogenic bacteria (e.g.: <i>Staphylococcus aureus</i> and /or Enterotoxin, <i>Escherichia coli</i> , <i>Salmonella spp</i>)
C	Presence of environmental contaminants (e.g.: pesticides)
C	Presence of antibiotics
C	Presence of undeclared allergens could impact on sensitive individuals
C	Inaccurate nutrition information (e.g.: due to mislabelling) could impact on individuals with certain medical conditions
P	Presence of hazardous extraneous material

CARBON DIOXIDE (CO₂)

Data: FDR Division 16, Table VIII, X and XV. May not be allowed for use in certain food products or maximum application limits may apply.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Use of non-food grade gas
C	Contamination by non-food chemicals
P	Presence of hazardous extraneous material

CARRIER OR EXTRACTION SOLVENTS

Acetone, Benzyl Alcohol, 1,3-Butylene Glycol, Castor Oil, Ethyl Acetate, Ethyl Alcohol (Ethanol), Ethyl alcohol denatured with methanol, Glycerol (Glycerin), Glyceryl diacetate, Glyceryl triacetate (Triacetin), Glyceryl tributyrates (Tributyrim), Hexane, Isopropyl alcohol (Isopropanol), Methyl Alcohol (methanol), Methyl ethyl ketone, Methylene Chloride (Dichloro-methane) (2-Butanone), Monoglycerides and diglycerides, Monoglyceride citrate, 2-Nitropropane, 1,2-Propylene glycol (1,2-propanediol), Propylene glycol mono-esters and diesters of fat-forming fatty acids, Triethyl-citrate



Carbon Dioxide is described as a specific incoming material previously

Data: FDR, Division 16, Table XV. May not be allowed for use in certain food products or maximum application limits may apply.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Presence of non-food chemicals
P	Presence of hazardous extraneous material

CHEESE

Data: FOOD ALLERGENS. FDR, Division 8. Dairy Products Regulations, sections 6(3) and sections 27 to 45 for standards.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogenic bacteria (e.g.: <i>Staphylococcus aureus</i> and/or <i>Staphylococcal</i> enterotoxin, <i>Salmonella spp.</i> , <i>Escherichia coli</i> , <i>Listeria monocytogenes</i>)
B	Presence of <i>Campylobacter jejuni</i> applicable only in unpasteurized cheese
C	Presence of mycotoxins (e.g.: Aflatoxin M1)
C	Inaccurate nutrition information (e.g.: due to mislabelling) could impact on individuals with certain medical conditions
C	Presence of undeclared allergens could impact sensitive individuals
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
P	Presence of hazardous extraneous material

CHICK – DAY OLD CHICK -HATCHERY (domestic or imported)

Data:

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogens in or chick's due to the contamination at source (e.g.: <i>Salmonella sp, sg, se, st</i>)
B	Presence of pathogens in or on chicks during transport due to unsanitary conditions of the carrier or incompatible use (e.g.: <i>Salmonella sp, sg, se, st</i>)
C	Presence of antibiotic residues with withdrawal periods greater than 21 days

CHOCOLATE e.g.: all kind including ENROBING/ MOLDING /COATING / SYRUP /LIQUOR

Data: POTENTIAL HIDDEN ALLERGENS (e.g.: nuts, peanuts, milk). FDR, Division 4.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogenic bacteria (e.g.: <i>Salmonella spp.</i>)
C	Presence of undeclared allergens could impact on sensitive individuals
C	Presence of non-food chemicals
C	Presence of environmental contaminants e.g.: pesticides (fumigants)
P	Presence of hazardous extraneous material



COATINGS / WAXES – see also: MISCELLANEOUS FOOD ADDITIVES

Data: FDR Div. 16, Table VIII, FDR Div. 1, B.01.047.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Use of non-food grade or unapproved coatings/waxes
C	Chemical residues due to excessive concentrations used
C	Presence of allergens which could impact on sensitive individuals

COCOA BUTTER

Data: POTENTIAL HIDDEN ALLERGENS (e.g.: wheat, egg, soy). FDR, Division 9.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogenic bacteria (e.g.: <i>Salmonella spp</i>)
C	Presence of undeclared allergens could impact on sensitive individuals
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
P	Presence of hazardous extraneous material

COCOA POWDER

Data: POTENTIAL HIDDEN ALLERGENS (e.g.: wheat, egg, soy). FDR, Division 4.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogenic bacteria (e.g.: <i>Salmonella spp</i>)
C	Presence of undeclared allergens could impact on sensitive individuals
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
P	Presence of hazardous extraneous material

COCONUT

Data: POTENTIAL HIDDEN ALLERGENS (e.g.: sulphites)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogenic bacteria (e.g.: <i>Salmonella spp</i>)
C	Contamination by non-chemicals
C	Presence of undeclared allergens could impact on sensitive individuals
C	Contamination by non-food chemicals
P	Presence of hazardous extraneous material

COFFEE

Data: FDR, Division 5

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Presence of environmental contaminants (pesticides)
C	Presence of undeclared allergens could impact on sensitive individuals
C	Contamination by non-food chemicals
P	Presence of hazardous extraneous material



COLOURING AGENTS (FOOD COLOUR)

Alkanet, Allura Red, Aluminum Metal, Amaranth, Annatto, Anthocyanins, β -apo-8'-carotenal, Beet Red, Brilliant Blue FCF, Canthaxanthin, Caramel, Carbon Black, Carotene, Charcoal, Chlorophyll, Citrus Red No. 2, Cochineal, Erythrosine (FD&C Red #3), Ethyl β -apo-8'-carotenoate, Fast Green FCF, Gold, Indigotine (FD&C Blue #2) , Iron Oxide, Orchil, Paprika, Ponceux SX (FD&C Red #4), Riboflavin, Saffron, Saunderswood, Silver Metal, Sunset Yellow FCF(FD&C Yellow #6), Tartrazine (FD&C Yellow #5), Titanium Dioxide, Turmeric, Xanthophyll

Data: POTENTIAL HIDDEN ALLERGENS (e.g.: soy). FDR, Division 6 and Division 16, Table III. May not be allowed for use in certain food products or maximum application limits may apply.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Presence of undeclared allergens could impact on sensitive individuals
C	Contamination by non-food chemicals
P	Presence of hazardous extraneous material

CONFECTIONERY

Data: POTENTIAL HIDDEN ALLERGENS (e.g.: milk, soy, nuts, peanuts, sesame seeds).

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogenic bacteria (e.g.: <i>Salmonella spp</i>)
C	Presence of undeclared allergens could impact on sensitive individuals
C	Presence of non- permitted /toxic colours
C	Inaccurate nutrition information (e.g.: due to mislabelling) could impact on individuals with certain medical conditions
P	Presence of hazardous extraneous material

CORNMEAL

Data:

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Presence of mycotoxins (e.g.: aflatoxin)
P	Presence of hazardous extraneous material

CORN STARCH

Data: FOOD ALLERGENS (e.g.: corn) and/or Potential Hidden Allergens (e.g.: corn and wheat). If starch(es) or modified starch (es) is being declared on the label without identifying the Sources. FDR B.13.011

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Presence of undeclared allergens could impact on sensitive individuals
P	Presence of hazardous extraneous material

CREAM PASTEURIZED (SEE MILK PASTEURIZED)



CREAM – RAW

Data: FOOD ALLERGENS (e.g.: milk), POTENTIAL HIDDEN ALLERGENS (e.g.: soy).
FDR, Division 8 (B.08.006, milk fat and cream B.08.075).

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogenic bacteria (e.g.: <i>Salmonella spp.</i> , <i>Escherichia coli</i> , <i>Listeria monocytogenes</i> , <i>Staphylococcus aureus</i> and/or <i>Staphylococcal enterotoxin</i> , <i>Clostridium perfringens</i> , <i>Campylobacter jejuni</i> , <i>Bacillus cereus</i> , <i>Yersinia spp.</i> , <i>Brucella spp.</i>)
B	Growth of Pathogens due to time/temperature abuse at farm/dairy or during transportation
C	Presence of environmental contaminants (pesticides)
C	Presence of antibiotics/sulphonamides
C	Presence of undeclared allergens could impact on sensitive individuals
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
P	Presence of hazardous extraneous material

DAIRY FOOD NEUTRALIZER – SEE – NEUTRALIZER – DAIRY FOOD

DAIRY PRODUCTS / INGREDIENTS

Data: FOOD ALLERGENS (e.g. milk), POTENTIAL HIDDEN ALLERGENS (e.g.: soy, wheat).
FDR Division 8 and Dairy Products Regulations

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogenic bacteria (e.g.: <i>Salmonella spp.</i> , <i>Staphylococcus aureus</i> and/or <i>Staphylococcal enterotoxin</i> , <i>Yersinia spp.</i> , <i>Escherichia coli</i> , <i>Listeria monocytogenes</i>)
C	Presence of antibiotics/sulphonamides
C	Improper or inaccurate addition (e.g.: type, concentration) of nutrients (vitamins / minerals / amino acids) could impact on certain individuals
C	Presence of undeclared allergens could impact on sensitive individuals
P	Presence of hazardous extraneous material

DEXTROSE (SEE SWEETENING AGENTS (Liquid or dry))

DILUENTS (HATCHERY)

Data:

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogenic bacteria
C	Contamination by non-food chemicals
P	Presence of hazardous extraneous material



DISINFECTING CHEMICALS (HATCHERY) Egg/ chick

Data:

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogens/virus
C	Use of non-approved chemicals

DRESSINGS (e.g.: Mayonnaise Dressing, Salad Dressing, French Dressing etc.)

Data: POTENTIAL HIDDEN ALLERGENS (e.g.: egg, sulphites, soy). FDR, Division 7

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogenic bacteria
C	Presence of undeclared allergens could impact on sensitive individuals
P	Presence of hazardous extraneous material

DRIED MILK PRODUCTS

Data: FOOD ALLERGENS (e.g.: milk), POTENTIAL HIDDEN ALLERGENS (e.g.: egg, soy). FDR, Division 8 and Dairy Products Regulations

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogenic bacteria (e.g.: <i>Salmonella spp.</i>)
C	Presence of environmental contaminants (e.g.: pesticides)
C	Presence of antibiotics/sulphonamides
C	Presence of undeclared allergens could impact on sensitive individuals
P	Presence of hazardous extraneous material

DRY ICE

Data:

<u>Type of Hazard</u>	<u>Name of Hazard</u>
P	Presence of hazardous extraneous material

EGG-BREAKING from HATCHERY

Data: Surplus of egg sent for egg breaking process

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogens (e.g.: <i>Salmonella spp.</i> , <i>Staphylococcus aureus</i> and/or <i>Staphylococcal enterotoxin</i> , <i>Campylobacter jejuni</i> , <i>Escherichia coli</i> , <i>Listeria monocytogenes</i>) / virus /parasites
C	Presence of environmental contaminants (pesticides)
C	Presence of antibiotics/sulphonamides
C	Contamination by non-food chemical
C	Presence of insecticide or residue from disinfection of egg surface



EGG (READY TO USE) “GRADED SHELL EGG”

Data: FOOD ALLERGENS. FDR, Division 22 and Egg Regulations

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogenic bacteria (e.g.: <i>Salmonella spp.</i>)
B	Pathogen contamination in/on the egg for imported graded shell egg from an approved egg grading station
C	Presence of mycotoxins
C	Presence of environmental contaminants (e.g.: pesticides)
C	Presence of antibiotics (e.g.: sulphonamides)

EGG – FOR HATCHERY INCUBATION

Data:

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogenic bacteria due to faecal contamination (e.g.: <i>Salmonella spp.</i> (<i>Salmonella enteritidis</i> , <i>Salmonella typhimurium</i> DT104, <i>Salmonella pullorum</i> , <i>Salmonella gallinarum</i>))
C	Presence of antibiotic residue, insecticide, or residue from disinfection of egg surface

EGG PRODUCT PASTEURISED (FROZEN, DRIED AND LIQUID)

Data: FOOD ALLERGENS. FDR, B.22.032 to B.22.037

Processed Egg Regulations

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Growth of pathogens from inappropriate storage temperatures/humidity
B	Presence of pathogenic bacteria (e.g.: <i>Listeria monocytogenes</i> , <i>Salmonella spp.</i>)
B	Pathogen contamination for imported egg product coming from a non-approved egg processing station
C	Presence of environmental contaminants (e.g.: pesticides)
C	Presence of antibiotics
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
C	Presence of mycotoxins
P	Presence of hazardous extraneous material



EGG PRODUCT UNPASTEURISED (FROZEN, DRIED AND LIQUID)

Data: FOOD ALLERGENS. FDR, Division 22 and Processed Egg Regulations.

Unpasteurised egg products sent to registered egg processing plant

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Growth of pathogens up to an unacceptable level from inappropriate storage temperature/humidity
B	Presence of pathogenic bacteria (e.g.: <i>Listeria monocytogenes</i> , <i>Salmonella spp.</i>)
B	Presence of mycotoxins
C	Presence of environmental contaminants (e.g.: pesticides)
C	Presence of antibiotics
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
P	Presence of hazardous extraneous material

EGG – RETURNED GRADED SHELL EGGS

Data: FOOD ALLERGENS.

Returned graded shell eggs have to be sent to the egg processing station for further processing.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogenic bacteria (e.g.: <i>Salmonella spp.</i>)
B	Presence of Pathogens on/in the shell egg due to uncontrolled storage conditions outside the grading station
C	Presence of mycotoxins
C	Presence of environmental contaminants (e.g.: pesticides)
C	Presence of antibiotics
C	Presence of chemical residues

EGG (SHELL EGG) –UNGRADED

Data: FOOD ALLERGENS. FDR, Division 22 and Egg regulations. Imported ungraded shell egg use only in registered egg processing station. Domestic ungraded shell egg used in both registered egg processing station and egg grading station.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogenic bacteria (e.g.: <i>Salmonella spp.</i>)
B	Presence of Pathogens on the shell or in the egg, due to excessively dirty or leaking eggs
C	Presence of mycotoxins
C	Presence of environmental contaminants (e.g.: chemical residues in the eggs such as insecticides and other pesticides)
C	Presence of Antibiotics in the eggs



EGG (shell egg) WASH DETERGENT, DEFOAMER, SANITIZER

Data: Use in recirculating egg washer, and in the disinfection step at the egg processing plant

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Use of unapproved defoaming agents or wrong product
C	Contamination by non-food chemicals

ELECTROLYTES - HATCHERY

Data:

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogens / virus due to contamination at source such as visible organic material (e.g.: <i>Salmonella sp, sg, se, st</i>)

EMULSIFYING, GELLING, STABILIZING AND THICKENING AGENTS

Acacia Gum, Acetylated Monoglycerides, Acetylated Tartaric Acid Esters of Mono- and Diglycerides, Agar, Algin, Alginic Acid, Ammonium Alginate, Ammonium Carrageenan, Ammonium Furcelleran, Ammonium Salt of Phosphorylated Glyceride, Arabino-galactan, Baker's yeast Glycan, Calcium Alginate, Calcium Carbonate, Calcium Carrageenan, Calcium Citrate, Calcium Furcelleran, Calcium Gluconate, Calcium Glycerophosphate, Calcium Hypophosphite, Calcium Phosphate dibasic, Calcium Phosphate tribasic, Calcium Sulphate, Calcium Tartrate, Carboxymethyl Cellulose, Carob Bean Gum, Carrageenan, Cellulose Gum, Furcelleran, Gelatin, Gellan Gum, Guar Gum, Gum Arabic, Hydroxylated Lecithin, Hydroxypropyl Cellulose, Hydroxypropyl Methylcellulose, Irish Moss Gelose, Karaya Gum, Lactylated Mono- and Diglycerides, Lactylic Esters of Fatty Acids, Lecithin, Locust Bean Gum, Magnesium Chloride, Methyl Cellulose, Methyl Ethyl Cellulose, Mono- and Di-glycerides, Mono-glycerides, Monosodium Salts of Phosphorylated Mono- and Diglycerides, Oat Gum, Pectin, Polyglycerol Esters of Fatty Acids, Polyglycerol Esters of Interesterified Castor Oil Fatty Acids, Polyoxyethylene (20) Sorbitan Monooleate; Polysorbate 80, Polyoxyethylene (20) Sorbitan Monostearate; Polysorbate 60, Polyoxyethylene (20) Sorbitan Tristearate; Polysorbate 65, Polyoxyethylene (8) Stearate, Potassium Alginate, Potassium Carrageenan, Potassium Chloride, Potassium Citrate, Potassium Furcelleran, Potassium Phosphate dibasic, Propylene Glycol Alginate, Propylene Glycol Ether of Methylcellulose, Propylene Glycol Mono Fatty Acid Esters, Sodium Acid Pyrophosphate, Sodium Alginate, Sodium Aluminum Phosphate, Sodium Carboxymethyl Cellulose, Sodium Carrageenan, Sodium Cellulose, Glycolate, Sodium Citrate, Sodium Furcelleran, Sodium Gluconate, Sodium Hexametaphosphate, Sodium Phosphate dibasic, Sodium Phosphate monobasic, Sodium Phosphate tribasic, Sodium Potassium Tartrate, Sodium Pyrophosphate Tetrabasic, Sodium Stearoyl-2-Lactylate, Sodium Tartrate, Sodium Tripolyphosphate, Sorbitan Monostearate, Sorbitan trioleate, Sorbitan Tristearate, Stearyl Monoglyceridyl Citrate, Sucrose esters of fatty acids, Tannic Acid, Tragacanth Gum, Xanthan Gum

Data: POTENTIAL HIDDEN ALLERGENS (e.g.: wheat, soy). FDR, Division 16, Table IV, May not be allowed for use in certain food products or maximum application limits may apply.



<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Contamination by non-food chemicals
C	Presence of undeclared allergens could impact on sensitive individuals
P	Presence of hazardous extraneous material

EVAPORATED / CONDENSED MILK AND MILK PRODUCTS

Data: FOOD ALLERGENS (e.g.: milk), POTENTIAL HIDDEN ALLERGENS (e.g.: soy, egg). FDR, Division 8 and Dairy Products Regulations, sections 58 to 61.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogenic bacteria (e.g.: <i>Staphylococcus aureus</i> and enterotoxin, <i>Salmonella</i> , <i>Escherichia coli</i>)
C	Presence of undeclared allergens could impact on sensitive individuals
C	Presence of antibiotics/ sulphonamides
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
P	Presence of hazardous extraneous material

FATS and OILS – SEE ANIMAL FATS AND OILS or VEGETABLE OIL

FERMENTATION PRODUCTS (e.g.: Xanthan gum, enzymes, starter cultures, others)

Data:

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogenic bacteria
B	Growth of pathogens due to time/temperature abuse at processor (starter cultures)
P	Presence of hazardous extraneous material

FIRMING AGENTS

Aluminum Sulphate, Ammonium Aluminum Sulphate, Calcium Chloride, Calcium Citrate, Calcium Gluconate, Calcium Lactate, Calcium Phosphate dibasic, Calcium Phosphate monobasic, Calcium Sulphate, Potassium Aluminum Sulphate, Sodium Aluminum Sulphate.

Data: FDR, Division 16, Table VI. May not be allowed for use in certain food products or maximum application limits may apply.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Use of non-food grade product
P	Presence of hazardous extraneous material



FISH /Marine mammals- RAW (wild or AQUACULTURE (farm raised)) (see also Marine and Fresh Water Animal Products)

Data: FOOD ALLERGENS FDR, Division 21. The hazard identified per category of species or species in brackets must be taken into consideration, without necessarily excluding other categories or species, further to additional information.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogens (e.g.: <i>Salmonella</i> spp., <i>Shigella</i> spp, <i>Escherichia coli</i> , <i>Listeria monocytogenes</i> (marine mammals))
B	Presence of parasites (e.g.: <i>Anisakis simplex</i> (Octopus, Squid) <i>Pseudoterranova decipiens</i> , <i>Diphyllobothrium latum</i> (<i>Trichinella nativa</i>) specific to marine mammals)
C	Presence of histamine (Anchovies, Big Eye, Herring, Jack Crevalle, Mackerel, Mahi Mahi, Marlin, Blue Fish, Scad, Tuna, Wahoo)
C	Presence of Ciguatera Toxin (in carnivorous tropical or reef fish (e.g.: Barracuda, Amberjack, Moray Eel, Spanish Mackerel, Snapper, Grouper))
C	Presence of drugs residues (Farm raised species (e.g.: Tilapia, Trout, Sturgeon, Sole, Salmon, Snapper, Paddlefish, Oscar, Milkfish, Mahi-Mahi, Halibut, Flounder, Eel, Red Drum, Char, Catfish, Carp and Bass))
C	Presence of environmental contaminants (e.g.: pesticides in fresh water fish)
C	Presence of environmental contaminants (e.g.: heavy metals in fresh water fish, Marine mammals)
C	Presence of tetrodotoxin from puffer fish and related species

FISH GELATIN

Data: FOOD ALLERGENS (e.g.: fish); POTENTIAL HIDDEN ALLERGENS (e.g.: fish)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogenic bacteria (e.g.: Staphylococcus aureus, Salmonella, spp, Enterococcus, Streptococcus, pseudomonas, Yersinia)
C	Presence of undeclared allergens could impact on sensitive individuals
P	Presence of hazardous extraneous material

FLAVORED OIL (e.g.: garlic, herbs, etc.)

Data:

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Growth of <i>Clostridium botulinum</i> spores due to improper acidification or Aw adjustment prior to packaging



FLAVORING PREPARATION/FLAVOUR / FLAVOUR ENHANCERS

Data: POTENTIAL HIDDEN ALLERGEN (e.g.: wheat, egg, nuts). FDR, Division 10. Where unknown herbs and other substances that may be novel foods or Natural Health Products are added, contact CIFA or Health Canada.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Contamination by non-food chemicals
C	Presence of undeclared allergens could impact on sensitive individuals
C	Presence of toxic herbs, unapproved substances/novel foods or substances with other physiological effects/properties poses a potential hazard
P	Presence of hazardous extraneous material

FLOUR – SEE BAKERY PRODUCTS AND GRAINS

FLOUR / STARCH / RICE / MEAL / CRUMBS / WHEAT / BREAD / SEMOLINA – SEE BAKERY PRODUCTS AND GRAIN

FOOD ADDITIVES (Refer to the following food additive categories under their specific names (See also: Table 3 - Food Additives))

Anticaking Agents / Bleaching, Maturing and Dough Conditioning Agents, Colouring Agents, Emulsifying, Gelling, Stabilizing and Thickening Agents, Food Enzymes, Firming Agents, Glazing And Polishing Agents, Miscellaneous Food Additives, Sweeteners, pH Adjusting Agents, Acid-Reacting Materials and Water Correcting Agents, Preservatives, Sequestering Agents, Starch Modifying Agents, Yeast Foods, Carrier or Extraction Solvents

FOOD COLOURS – SEE COLOURING AGENTS

FOOD ENZYMES

α-Acetolactate decarboxylase, Aminopeptidase, Amylase, Amylase (maltogenic), Bovine Rennet, Bromelain, Catalase, Cellulase, Chymosin (Chymosin A, Chymosin B), Ficin, Glucanase, Glucoamylase (Amyloglucosidase; Maltase), Glucose Isomerase, Glucose Oxidase, Hemicellulase, Inulinase, Invertase, Lactase, Lipase, Lipoxidase, Lysozyme, Milk coagulating enzyme, Pancreatin, Papain, Pectinase, Pentosanase, Pepsin, Protease, Pullulanase, Rennet, Transglutaminase, Trypsin, Xylanase.

Data: POTENTIAL HIDDEN ALLERGENS OR FOOD ALLERGEN (e.g.milk). FDR, Division 16, Table V. May not be allowed for use in certain food products or maximum application limits may apply.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogens
C	Use of non-food grade product
C	Presence of undeclared allergens could impact on sensitive individuals
P	Presence of hazardous extraneous material

FRUCTOSE - SEE SWEETENING AGENTS (Liquid or dry)



FRUIT – CANNED

Data: FDR, Division 27 and Processed Products Regulations for standards

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Growth of <i>Clostridium botulinum</i> in foods with a pH greater than 4.6 may result in under processing and in some high pH fruits e.g.: melons, cantaloupes, papayas, bananas
C	Presence of environmental contaminants (e.g.: pesticides/ herbicides)
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
C	Metal ions contamination (e.g.: tin, lead)
C	Presence of undeclared food additives
C	Presence of non-permitted food additives or food additives exceeding the authorized level
P	Presence of hazardous extraneous material

FRUIT – DRIED OR CANDIED

Data:

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Presence of environmental contaminants (e.g.: pesticides/ herbicides)
C	Contamination from cleaners/sanitizers/lubricants
C	Presence of undeclared allergens could impact on sensitive individuals (e.g.: nuts, peanut, sulphites...)
C	Presence of undeclared/non-permitted/exceeding food additives (e.g.: sulphites)
C	Presence of mycotoxins
P	Presence of hazardous extraneous material

FRUIT - DRINK / NECTAR / JUICE/ COCKTAIL – CANNED

Data: FDR, Division 11 and Processed Products Regulations for standards.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Presence of environmental contaminants (pesticides/ herbicides)
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
C	Metal ions contamination (e.g.: tin, lead)
C	Presence of undeclared allergens could impact on sensitive individuals (e.g.: soy, milk)
C	Presence of undeclared/non-permitted/exceeding food additives (e.g.: sulphiting agents)
C	Presence of mycotoxin – patulin (e.g.: apple, peach, pear, berry)
C	Inadequate level of added vitamins/ minerals leading to overdose or to nutrition deficiencies
P	Presence of hazardous extraneous material



FRUIT FRESH / FRESH CUTS

Data: FDR, Division 11, Fresh Fruit and Vegetable Regulations

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogens (e.g.: <i>Escherichia coli</i> O157:H7, <i>Listeria monocytogenes</i> , <i>Salmonella spp</i> , <i>Shigella spp</i> , <i>Clostridium Botulinum</i>)
B	Presence of protozoans (e.g.: <i>Cyclospora spp</i> , <i>Cryptosporidium spp</i>)
B	Presence of virus (e.g.: Norwalk virus, Hepatitis A virus, Rotavirus)
B	Growth of pathogens from inappropriate storage temperatures / humidity
C	Contamination from environmental contaminants (e.g.: pesticides/herbicides)
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
C	Presence of undeclared/ non-permitted/ exceeding allowable limits for food additives
C	Presence of undeclared allergens which could impact on sensitive individuals
C	Presence of mycotoxin – patulin (e.g.: apple, peach, pear, berry)
P	Presence of hazardous extraneous material

FRUITS FRESH – SULPHITED (Grapes)

Data: FDR, Division 11 and Fresh Fruits and Vegetables Regulations.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Contamination from environmental contaminants (pesticides/ herbicides)
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
C	Presence of undeclared/ non-permitted/ exceeding allowable levels of food additives
P	Presence of hazardous extraneous material

FRUIT – FROZEN

Data: FDR, Division 11 and Processed Products Regulations for standards.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of virus (e.g.: Norwalk virus, Hepatitis A virus, Rotavirus)
C	Contamination from environmental contaminants (pesticides/ herbicides)
C	Contamination from non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
C	Presence of undeclared allergens could impact on sensitive individuals
C	Presence of mycotoxin – patulin (e.g.: apple, peach, pear, berry)
P	Presence of hazardous extraneous material



FRUIT JUICE – CONCENTRATED

Data: FDR, Division 11 and Processed Products Regulations for standards.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Contamination from environmental contaminants (e.g.: pesticides/ herbicides)
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
C	Metal ions contamination e.g.: tin, lead
C	Presence of undeclared allergens could impact on sensitive individuals
C	Presence of mycotoxin - patulin (e.g.: apple, peach, pear, berry)
C	Inadequate level of added vitamins/ minerals leading to overdose or to nutrition deficiencies
P	Presence of hazardous extraneous material

FRUIT - JUICE (FRESH)

Data: FDR, Division 11 and Processed Products Regulations

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Contamination from <i>Escherichia coli</i> O157:H7, <i>Escherichia coli</i> , <i>Salmonella spp.</i>
B	Contamination from protozoans e.g.: <i>Cyclospora spp.</i> , <i>Cryptosporidium spp.</i>
B	Contamination from Virus: (e.g.: Norwalk virus, Hepatitis A virus, Rotavirus)
C	Contamination from environmental contaminants (pesticides/ herbicides)
C	Contamination by non-food chemicals (e.g.: cleaner, sanitizers and lubricants)
C	Metal ions contamination (e.g.: tin, lead)
C	Presence of undeclared allergens could impact on sensitive individuals
C	Presence of undeclared/non-permitted/exceeding allowable levels of food additives
C	Presence of mycotoxin – patulin (e.g.: apple, peach, pear, berry)
P	Presence of hazardous extraneous material

FRUIT – JUICE (Pasteurised/ Refrigerated)

Data: FDR, Division 11 and Processed Products Regulations for standards

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Contamination from environmental contaminants (pesticides/ herbicides)
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
C	Metal ions contamination (e.g.: tin, lead)
C	Presence of undeclared allergens could impact on sensitive individuals (e.g.: soy, milk)
C	Presence of undeclared/non-permitted/exceeding allowable levels of food additives
C	Presence of mycotoxin - patulin (apple, peach, pear, berry)
P	Presence of hazardous extraneous material



FRUIT-PRESERVES – JAMS, JELLIES, MARMALADES

Data: FDR, Division 11 and Processed Products Regulations for standards

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Contamination from environmental contaminants (e.g.: pesticides/herbicides)
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
C	Metal ions contamination (e.g.: tin, lead)
C	Presence of undeclared allergens could impact on sensitive individuals
C	Presence of undeclared/non-permitted/exceeding allowable levels of food additives
C	Presence of mycotoxin – patulin (e.g.: apple, peach, pear, berry)
P	Presence of hazardous extraneous material

FRUIT – SAUCE, PULP/PUREE, COMPOTE –CANNED

Data: FDR, Division 11 and Processed Products Regulations for standards.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	pH greater than 4.6 may result in under processing and growth of <i>Clostridium botulinum</i> in some high pH fruits (e.g.: melons, cantaloupes, papayas, bananas)
C	Contamination from environmental contaminants (pesticides/ herbicides)
C	Contamination from cleaners/sanitizers/lubricants
C	Metal ions contamination (e.g.: tin, lead)
C	Presence of mycotoxin – patulin (e.g.: apple, peach, pear, berry)
P	Presence of hazardous extraneous material

FRUITS – SULPHITED

Data: FDR, Division 11 and Fresh Fruits and Vegetables Regulations

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Contamination from environmental contaminants (e.g.: pesticides/herbicides)
C	Contamination from cleaners/sanitizers/lubricants
C	Presence of undeclared/non-permitted/exceeding allowable limits of food additives
C	Presence of mycotoxin – patulin (e.g.: apple, peach, pear, berry)
P	Presence of hazardous extraneous material

FUMIGANTS- HATCHERY

Data:

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Wrong type (not approved)



GLAZING AND POLISHING AGENTS

Acetylated Monoglycerides, Beeswax, Candelilla Wax, Carnauba Wax, Gum Arabic, Gum Benzoin, Magnesium Silicate, Mineral Oil, Petrolatum, Shellac, Spermaceti Wax, Zein

Data: FDR, Division 16, Table VII, May not be allowed for use in certain food products or maximum application limits may apply.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Use of non-food grade product
P	Presence of hazardous extraneous material

GLUCOSE - SEE SWEETENING AGENTS (Liquid or dry)

GRAIN AND BAKERY PRODUCTS (SEE BAKERY PRODUCTS)

HATCHING EGGS - Hatchery

Data:

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogens in or on eggs due to contamination at source (e.g.: <i>Salmonella sp, sg, se, st</i>)
B	Presence of pathogens in or on egg's during transport due to unsanitary of carrier or incompatible use (e.g.: <i>Salmonella sp, sg, se, st</i>)
C	Contamination by chemical residues (e.g.: sanitizer or sanitation residues) in or hatching egg's being shipped directly to the table market
C	Chemical contamination due to the use of non- food grade marking dye at source

HONEY AND HONEY PRODUCTS

Data: FDR, Division 18 and Honey Product Regulations.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogenic bacteria (e.g.: Clostridium Botulinum and their spores), especially for infants
C	Presence of antibiotic residues/ sulphonamides
C	Presence of phenol
C	Presence of environmental contaminants (e.g.: pesticides)
C	Presence of chemical residues, from inner coating and liner of barrels
C	Metal ion contamination (e.g.: lead)
P	Presence of hazardous extraneous material

HYDROGEN PEROXIDE See also: MISCELLANEOUS FOOD ADDITIVES

Data: See Miscellaneous Food Additives. FDR, Division 16, Table VIII.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Contamination by non-food chemicals
C	Wrong type of product (e.g.: non- food grade, unapproved) and wrong concentration
P	Presence of hazardous extraneous material



ICE

Data: FDR, Division 12.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Not meeting the drinking water criteria established by Health Canada
B	Presence of pathogenic bacteria (e.g.: <i>Salmonella spp.</i> , <i>Campylobacter jejuni</i> , <i>Shigella spp.</i> , <i>Yersinia spp.</i> , <i>Escherichia coli</i> , <i>Listeria monocytogenes</i> , <i>Streptococcus suis</i> (pork))
B	Presence of toxins from cyanobacteria (Blue-Green Algae) Water from wells
B	Presence of viruses (e.g.: Enterovirus (includes <i>Ecoviruses</i> , <i>Coxsackie</i> , <i>Poliovirus</i> , <i>Hepatitis A & Hepatitis E</i>), <i>Norwalk viruses</i> , <i>Rotaviruses</i>)
B	Presence of parasites (e.g.: <i>Toxoplasma gondii</i> , <i>Cryptosporidium</i> , <i>Giardia spp</i>)
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
C	Contamination due to use of non-food grade water treatment chemicals
C	Presence of chemical residues due to excess levels of water treatment chemicals used (e.g.: chlorine)
C	Improper or inaccurate addition (e.g.: type, concentration) of nutrients (flourin) could impact on certain individuals
C	Presence of excess chlorine
C	Presence of environmental contaminants (heavy metals, pesticides),
P	Presence of hazardous extraneous material

ICHTYOCOLLA

Data: FOOD ALLERGENS (E.G. FISH); HIDDEN POTENTIAL ALLERGENS (e.g. fish)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogenic bacteria (<i>Staphylococcus aureus</i> , <i>Salmonella spp</i> , <i>Enterococcus</i> , <i>Streptococcus</i> , <i>pseudomonas</i> , <i>Yersinia</i>)
C	Presence of undeclared allergens, which could impact on sensitive individuals
P	Presence of hazardous extraneous materials

INK – EDIBLE

Data: To mark meat carcasses and cuts, eggs

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Contamination from inks/solvents
C	Use of unapproved ink for food use or wrong type

JAMS / JELLIES / MARMALADES – See FRUIT-PRESERVES – JAMS, JELLIES, MARMALADES



LABELS/PACKAGING

Data: FDR, Division 23 and Consumer Packaging and Labelling Regulations for identification of product and ingredients.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Presence of allergen non-declared due to allergens ingredients not being printed on labels and cartons (e.g.: pre-printed label)

LACTIC ACID CULTURES

Data: FDR, Division 16, Table VIII (Miscellaneous Food Additives)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Growth of pathogen due to inaccurate marking of expiration date
C	Contamination by non-food chemicals
P	Presence of hazardous extraneous material

LACTOSE (MILK)

Data: POTENTIAL HIDDEN ALLERGENS (e.g.: milk).

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogenic bacteria (e.g.: <i>Listeria monocytogenes</i>)
C	Contamination by non-food chemicals
P	Presence of hazardous extraneous material

LARD – SEE ANIMAL FATS AND OILS

LIVE ANIMALS

Data: Meat Inspection Act and Regulations

<u>Type of Hazard</u>	<u>Name of Hazard</u>
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RED SPECIES (LIVE)

B	Increased bacterial load on the hide of soiled animal increasing the risk of cross-contamination during dressing procedures
B	Presence of parasites <i>Cysticercus bovis</i> in bovine, <i>Trichinella spiralis</i> in pork, <i>Toxoplasma gondii</i> , <i>Sarcosystis spp</i> , <i>Cysticercus cellulosae</i> in pork which can be spread to humans
B	Presence of SRM (Specified Risk Material) in Bovine and bovine hybrids
B	Presence and (or) spread of pathogenic bacteria (e.g.: <i>Escherichia coli</i> , <i>Escherichia coli O157:H7</i> in bovine products, <i>Salmonella spp.</i> , <i>Staphylococcus aureus</i> , <i>Listeria monocytogenes</i> , <i>Campylobacter spp.</i>) on skin, mouth, intestine and in products
B	Pathological organisms in animals showing abnormal behaviour /signs consistent with diseases including central nervous systems diseases which can be spread to other animals and humans (e.g.: Erysipelas, <i>Streptococcus suis</i> meningitis, Botulism, Tuberculosis)
B	Pathological organisms in carrier or asymptomatic animals harbouring



- diseases which can be spread to other animals and humans (e.g.: Erysipelas, Leptospirosis, Mycoplasmosis, *Streptococcus suis* meningitis, Botulism, Tuberculosis)
- B Contamination with pathogens during the evisceration process due to inadequate feed withdrawal
- B Contamination or cross-contamination during dressing procedures (Hide Removal operations only) due to dirty/soiled animals (faecal material)
- C Unacceptable levels of drug (e.g.: antibiotics, coccidiostats, and vaccine components in live animals)
- C Unacceptable levels of environmental contaminants (e.g.: heavy metal, pesticide residues or contaminants such as dioxins)
- P Presence of hazardous extraneous material (e.g.: broken needles, leadshot, wires in tongue/mouth...)

POULTRY (LIVE)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Bacterial contamination due to digestive system full of food contents
B	Presence of pathogenic bacteria (e.g.: <i>Salmonella sp.</i> , <i>Campylobacter sp.</i> , <i>Listeria monocytogenes</i> , <i>Staphylococcus aureus</i> , <i>Yersinia enterocolitica</i> , <i>Clostridium perfringens</i>) on feathers, on skin and in the gastro-intestinal tract
C	Presence of chemical Residues (e.g.: antibacterial, antibiotics)
C	Unacceptable levels of drug (e.g.: antibiotics, coccidiostats, anthelmintics, vaccine components)
C	Presence of environmental contaminants (e.g.: pesticides, heavy metal, PCP)

MARMALADES – See FRUIT-PRESERVES – JAMS, JELLIES, MARMALADES

MAPLE PRODUCTS (MAPLE SYRUP, SUGAR, BUTTER, TAFFY, FLAKES)

Data: POTENTIAL HIDDEN ALLERGENS (e.g.: milk, soy). Maple Products Regulations.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Contamination by yeasts and moulds
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
C	Metal ions contamination (e.g.: lead)
C	Presence of undeclared allergens could impact on sensitive individuals (e.g.: antifoaming agents)
C	Contamination by non food chemicals- (e.g.: formaldehyde, naphthalene, paradichlorobenzene, ethylene glycol, hydrogen peroxide, iodine, sorbate)
C	Contamination of chemical residues from inner coating and liner of barrels and other equipment
P	Presence of hazardous extraneous material



MARINE AND FRESH WATER ANIMAL PRODUCTS (Fish, Crustacea, Molluscs, other invertebrates and Marine Mammals) (e.g.: PREPARED OR PRESERVED OR CANNED)

Data: FOOD ALLERGENS. FDR, Division 21 and Fish Inspection Regulations. The hazard identified per category of species or species in brackets must be taken into consideration, without necessarily excluding other categories or species, further to additional information.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogenic bacteria (e.g.: <i>Salmonella spp.</i> , <i>Shigella spp.</i> , <i>Vibrio parahaemolyticus</i> , <i>Escherichia coli</i> , <i>Listeria monocytogenes</i> , <i>Staphylococcus aureus</i> , <i>Clostridium botulinum</i> , Hepatitis A Virus (HAV), Norwalk virus and Norovirus
B	Presence of parasites (e.g.: Anisakis simplex, Pseudoterranova decipiens, Diphyllbothrium latum (Fish products, Marine mammals, Octopus and squid).
C	Presence of Histamine (Anchovies, Big Eye, Herring, Jack Crevalle, Mackerel, Mahi Mahi, Marlin, Blue Fish, Scad, Tuna, Wahoo)
C	Presence of Ciguatera Toxin (in carnivorous tropical or reef fish e.g.: Barracuda, Amberjack, Moray Eel, Spanish Mackerel, Snapper, Grouper)
C	Presence of Paralytic Shellfish Poisoning (PSP) (bivalve molluscs, whelk, dungeness crab, jonah crab)
C	Presence of Amnesic Shellfish Poisoning (ASP) (bivalve molluscs, dungeness crab, jonah crab)
C	Diarrhetic Shellfish Poisoning (DSP) (bivalve molluscs)
C	Contamination by drugs residues (Farm raised species)
C	Contamination due to environmental contaminants (e.g.: pesticides in products from crabs, crayfish, fresh water fish), heavy metals (e.g.: mercury) in shark and tuna)
C	Contamination due to environmental contaminants (e.g.: heavy metals in product from molluscs, crustacean, fresh water fish, Marine mammals)
C	Presence of tetrodotoxin from puffer fish and related species
P	Presence of hazardous extraneous material

MARSHMALLOW BASE

Data: POTENTIAL HIDDEN ALLERGENS (e.g.: egg, sulphites).

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogens due to contamination by employee handling
C	Presence of undeclared allergens could impact on sensitive individuals
C	Contamination by non-food chemicals
P	Presence of hazardous extraneous material

MEAL – SEE BAKERY PRODUCTS AND GRAINS

MEAT (PREPARED OR PRESERVED)

Data: POTENTIAL HIDDEN ALLERGENS (e.g.: soy). FDR, Division 14 and Meat Inspection Act, associated Regulations and Meat Hygiene Manual of Procedures for applicable standards.



<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogenic bacteria (e.g.: <i>Salmonella spp.</i> , <i>Clostridium perfringens</i> , <i>Staphylococcus aureus</i> and enterotoxin, <i>Campylobacter jejuni</i> , <i>Yersinia spp.</i> , <i>Clostridium botulinum</i> , <i>Escherichia coli</i> , <i>E. coli</i> 0157:H7 (in bovine), <i>Listeria monocytogenes</i>)
C	Contamination due to environmental contaminants (e.g.: pesticides)
C	Contamination from antibiotics/sulphonamides (e.g.: drug residues, hormones)
C	Presence of undeclared/non-permitted/exceeding allowable limits of food additives (e.g.: nitrates, nitrites, MSG)
C	Presence of undeclared allergens could impact on sensitive individuals (e.g.: soy)
P	Presence of hazardous extraneous material

MEAT/ POULTRY AND MEAT PRODUCTS/POULTRY (RAW AND SEMI-COOKED)

Data: POTENTIAL HIDDEN ALLERGENS (e.g.: soy, wheat). FDR, Division 14 and 22 and the Meat Inspection Regulations

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogenic bacteria (e.g.: <i>Salmonella spp.</i> , <i>Clostridium perfringens</i> , <i>Campylobacter jejuni</i> , <i>Yersinia spp.</i> , <i>Clostridium botulinum</i> , <i>Escherichia coli</i> , <i>Escherichia coli</i> 0157:H7 (bovine product), <i>Listeria monocytogenes</i> , <i>Staphylococcus aureus</i> and enterotoxin, <i>vibrio vulnificus</i> .)
B	Presence of parasites (<i>Toxoplasma gondii</i> , <i>Trichinella spiralis</i> (pork), <i>Taenia spp.</i> , <i>Cysticercus bovis</i> (bovine product), <i>Cysticercus cellulosae</i> (pork))
B	Presence of SRM (Specific risk material)
B	Contamination of quarters with pathogenic bacteria during slaughter process
B	Bacterial growth on incoming meat cuts due to inadequate refrigeration during transport
C	Presence of antibiotics
C	Presence of hormone growth promotants (Veal Hormones in raw meat)
C	Presence of environmental contaminants (e.g.: heavy metals, pesticides)
C	Presence of undeclared allergens could impact on sensitive (e.g.: soy) individuals
P	Presence of hazardous extraneous material

POULTRY AND MEAT PRODUCTS/POULTRY (READY TO EAT)

Data: POTENTIAL HIDDEN ALLERGENS. FDR, Division 14 and the Meat Inspection Regulations

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Contamination with pathogenic bacteria (e.g.: <i>Salmonella spp.</i> , <i>Clostridium perfringens</i> , <i>Staphylococcus aureus</i> and enterotoxin, <i>Campylobacter jejuni</i> , <i>Bacillus cereus</i> , <i>Yersinia spp.</i> , <i>Clostridium botulinum</i> , <i>Escherichia coli</i> , <i>Listeria monocytogenes</i>)



- C Presence of undeclared allergens could impact on sensitive individuals
- P Presence of hazardous extraneous material

MICROBIAL FLORA FOR USE IN MOULD-RIPENED CHEESE

Data: FDR, Division 8 [B.08.33]

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Contamination by Listeria
C	Presence of mycotoxins

MILK / CREAM - PASTEURIZED

Data: FOOD ALLERGENS (e.g.: milk) POTENTIAL HIDDEN ALLERGENS (e.g.: soy).
FDR, Division 8.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Survival of pathogens due to improper time/temperature applications
B	Survival of Staphylococcus toxins
B	Contamination due to damaged or soiled containers/packaging material
C	Contamination from antibiotics/sulphonamides
C	Presence of undeclared allergens due to cross contamination by allergen products
C	Contamination from environmental contaminants (e.g: pesticides)
P	Presence of hazardous extraneous material

MILK POWDER

Data: FOOD ALLERGENS. FDR, Division 8 and the Dairy Product Regulations.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Contamination by pathogens due to faulty containers /damaged containers
B	Pathogenic bacteria (e.g.: <i>Salmonella spp.</i> , <i>Listeria monocytogenes</i>)
C	Contamination from antibiotics, sulphonamides
C	Contamination from environmental contaminants (e.g.: pesticides)
P	Presence of hazardous extraneous material

MILK PRODUCTS – DRIED SEE DRIED MILK PRODUCTS

MILK – RAW

Data: FOOD ALLERGENS. FDR, Division 8.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Excessive count of pathogenic bacteria (e.g.: <i>Salmonella spp.</i> , <i>Escherichia coli</i> , <i>Listeria monocytogenes</i> , <i>Staphylococcus aureus</i> and enterotoxin, <i>Campylobacter jejuni</i> ...)
C	Contamination from antibiotics
C	Contamination by non food chemicals (e.g.: cleaners, sanitizers and lubricants)
C	Contamination from environmental contaminants (e.g.: pesticides)



P Presence of hazardous extraneous material

MINERAL OIL

Data: (used on bakery equipment as a processing aid).

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Contamination by non-food grade chemicals
P	Presence of hazardous extraneous material

MINERALS – SEE VITAMINS/MINERALS/AMINO ACIDS

MISCELLANEOUS FOOD ADDITIVES

Acetylated Monoglycerides, Aluminum Sulphate, Ammonium Persulphate, Beeswax, Benzoyl Peroxide, Brominated vegetable oil, n-Butane, Caffeine, Caffeine Citrate, Calcium Carbonate, Calcium Lactate, Calcium Oxide, Calcium Phosphate dibasic, Calcium Phosphate Tribasic, Calcium Silicate, Calcium Stearate, Calcium Stearoyl-2-Lactylate, Calcium Sulphate, Castor Oil, Carbon Dioxide, Cellulose Microcrystalline, Chloropentafluoroethane, Citric Acid, Copper Gluconate, Dimethylpolysiloxane Formulations, Dioctyl Sodium Sulphosuccinate, Ethoxyquin, Ethylene Oxide, Ferrous Gluconate, Glucono Delta Lactone, Glycerol, Glycerol Ester of Wood Rosin, Hydrogen Peroxide, Isobutane, Lactic Esters of Fatty Acids, Lanolin, Lecithin, L-Leucine, Magnesium Aluminum Silicate, Magnesium Carbonate, Magnesium Chloride, Magnesium Silicate, Magnesium Stearate, Magnesium Sulphate, Methyl Ethyl Cellulose, Microcrystalline Cellulose, Mineral Oil, Monoacetin, Mono and diglycerides, Mono-glycerides, Nitrogen, Nitrous Oxide, Octafluorocyclobutane, Oxystearin, Ozone, Pancreas Extract, Paraffin Wax, Petrolatum, Polyethylene glycol (molecular weight 3000-9000), Polydextrose, Polyvinylpyrrolidone, Potassium Aluminum Sulphate, Potassium Stearate, Propane, Propylene Glycol, Quillaia Extract, Saponin, Silicon Dioxide, Sodium Acid Pyrophosphate, Sodium Aluminum Sulphate, Sodium Bicarbonate, Sodium Carbonate, Sodium Carboxymethyl Cellulose, Sodium Citrate, Sodium Ferrocyanide Decahydrate, Sodium Hexametaphosphate, Sodium Hydroxide, Sodium Lauryl Sulphate, Sodium Methylsulphate, Sodium Phosphate dibasic, Sodium Potassium Copper Chlorophyllin, Sodium Pyrophosphate tetrabasic, Sodium Silicate, Sodium Stearate, Sodium Stearoyl 2-Lactylate, Sodium Sulphate, Sodium Sulphite, SodiumThiosulphate, SodiumTripolyphosphate, Stannous Chloride, Stearic Acid, Sucrose Acetate Isobutyrate, Sulphuric Acid, Talc, Tannic Acid, Triacetin, Triethyl Citrate

Data: Carbon Dioxide is described as a specific incoming material in the “C” section. FDR, Division 16, Table VIII. Some may not be allowed for use in certain food products or maximum application limits may apply.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogenic bacteria (e.g.: <i>Salmonella</i> spp. in soy lecithin)
C	Contamination by non-food grade chemicals
C	Contamination due to use of incorrect concentrations
P	Presence of hazardous extraneous material



MOLASSES

Data:

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of microbial spores
P	Presence of hazardous extraneous material

NEUTRALIZER – DAIRY FOOD

Data: FDR, Division 16, Table X, (e.g.: SODIUM BICARBONATE, SODIUM CARBONATE, SODIUM HYDROXYDE). See pH adjusting agents, acid-reacting materials and water correcting agents

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Contamination by non-food chemicals
C	Use of non-food grade product
P	Presence of hazardous extraneous material

NITROGEN

Data: FDR, Division 16, Table VIII. See Miscellaneous Food Additives

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Contamination by non-food chemicals
C	Use of non-food grade gas
P	Presence of hazardous extraneous material

NUTS/ PEANUTS AND THEIR PRODUCTS

Data: FOOD ALLERGENS (e.g.: nuts, peanuts). POTENTIAL HIDDEN ALLERGENS (e.g.: soy, corn, wheat). Nuts are regulated by section B.01.046 n (aflatoxin) of Food and Drugs Regulations

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogenic bacteria (e.g.: <i>Salmonella spp.</i>)
C	Presence of mycotoxins
C	Presence of environmental contaminants (e.g.: pesticides)
C	Presence of undeclared allergens could impact on sensitive individuals
P	Presence of hazardous extraneous material

OIL – See also Animals fats and oils / Vegetable oils

OIL FOR OILING EGGS

Data:

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Use of unapproved oiling compounds

PACKAGING MATERIAL

Data: Reference; Listing of Accepted Construction Materials, Packaging Materials and Non-Food Chemical Products ([http:// www.inspection.gc.ca/english/ppc/reference/cone.shtml](http://www.inspection.gc.ca/english/ppc/reference/cone.shtml)) - See FDR, Division 23.



<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogenic bacteria from soiled/damaged packaging material/damaged containers/ends
B	Presence of visible contamination e.g.: pests, faecal matter from birds, rodents)
B	Contamination by pathogens due to punctures of packaging material by nails or wood pieces from pallets
B	Presence of pathogenic bacteria due to improper processing or improper employee handling at the source (e.g.: natural casing- meat product)
C	Contamination by non-food chemicals (e.g.: glues, ink, chemical residues, non listed interior coating, sealing compound)
C	Contamination by environmental contaminants (e.g.: heavy metals)
C	Migration of chemical components (e.g.: non-food grade material)
P	Presence of hazardous extraneous material

PACKAGING MATERIAL- SHELL EGGS

Data: Used cardboard boxes and fibre trays /plastics trays, dividers, baskets and pallets reused /wooden pallets for graded and ungraded eggs/wire baskets and store carts. Packaging material of imported ungraded shell eggs should be destroyed or return to the country of origin.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogenic bacteria on the surface
B	Presence of pathogenic bacteria and/ or growth of pathogenic bacteria due to damage/soiled reused packaging materials
C	Chemical contamination due to improper storage next to incompatible substances outside the grading station

PACKAGING MATERIAL- HATCHERY

Data: Used Buggy covers, Used chick pads, Key trays, Fiber boxes, etc.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogens in or on egg's due to contamination at source (e.g.: <i>Salmonella sp, sg, se, st</i>)
B	Chick boxes/paper contaminated with bacteria, viruses and/or parasites
C	Chick papers chemically contaminated on receiving

PASTA-DRY

Data: POTENTIAL HIDDEN ALLERGENS (e.g.: wheat, soy, egg). FDR, Division 13

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Presence of undeclared allergens could impact on sensitive individuals
C	Contamination by non- food chemicals (e.g: cleaners, sanitizers and lubricants)
P	Presence of hazardous extraneous material



PASTA-FRESH

Data: POTENTIAL HIDDEN ALLERGENS (e.g.: wheat, soy, egg). FDR, Division 13

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogenic bacteria
C	Presence of undeclared allergens could impact on sensitive individuals
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
P	Presence of hazardous extraneous material

pH ADJUSTING AGENTS, ACID-REACTING MATERIALS AND WATER CORRECTING AGENTS

Acetic Acid, Adipic Acid, Ammonium Aluminum Sulphate, Ammonium Sulphate Bicarbonate, Ammonium Carbonate, Ammonium Citrate dibasic, Ammonium Citrate monobasic, Ammonium Hydroxide, Ammonium Phosphate dibasic, Ammonium Phosphate Monobasic, Calcium Acetate, Calcium Carbonate, Calcium Chloride, Calcium Citrate, Calcium Fumarate, Calcium Gluconate, Calcium Hydroxide, Calcium Lactate, Calcium Oxide, Calcium Phosphate dibasic, Calcium Phosphate Monobasic, Calcium Phosphate Tribasic, Calcium Sulphate, Carbon Dioxide, Citric Acid, Cream of Tartar, Fumaric Acid, Gluconic Acid, Glucono-delta-lactone, Hydrochloric Acid, Lactic Acid, Magnesium Carbonate, Magnesium Citrate, Magnesium Fumarate, Magnesium Hydroxide, Magnesium Oxide, Magnesium Phosphate, Magnesium Sulphate, Malic Acid, Manganese Sulphate, Phosphoric Acid, Potassium Acid Tartrate, Potassium Aluminum Sulphate, Potassium Bicarbonate, Potassium Carbonate, Potassium Chloride, Potassium Citrate, Potassium Fumarate, Potassium Hydroxide, Potassium Lactate, Potassium Phosphate Dibasic, Potassium Sulphate, Potassium Tartrate, Sodium Acetate, Sodium Acid Pyrophosphate, Sodium Acid Tartrate, Sodium Aluminum Phosphate, Sodium Aluminum Sulphate, Sodium Bicarbonate, Sodium Bisulphate, Sodium Carbonate, Sodium Citrate, Sodium Fumarate, Sodium Gluconate, Sodium Hexametaphosphate, Sodium Hydroxide, Sodium Lactate, Sodium Phosphate Dibasic, Sodium Phosphate monobasic, Sodium Phosphate Tribasic, Sodium Potassium Tartrate, Sodium Pyrophosphate Tetrabasic, Sodium Tripolyphosphate, Sulphuric Acid, Sulphurous Acid, Tartaric Acid

Data: Carbon Dioxide is described as a specific incoming material in the “C” section. FDR, Division 16, Table X. May not be allowed for use in certain food products or maximum application limits may apply.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Contamination by non-food chemicals
P	Presence of hazardous extraneous material

PICKLES FERMENTED VEGETABLES (see Vegetables Fermented Pickles)

PORK – SEE – MEAT (PREPARED OR PRESERVED)

- SEE - MEAT/ POULTRY AND MEAT PRODUCTS/POULTRY (RAW AND SEMI-COOKED)
- SEE – MEAT/POULTRY AND MEAT PRODUCTS/POULTRY PRODUCTS (READY TO EAT)



POTASSIUM NITRITE/NITRATE (SEE PRAGUE POWDER)

POULTRY - SEE – MEAT (PREPARED OR PRESERVED)

SEE - MEAT/ POULTRY AND MEAT PRODUCTS/POULTRY (RAW AND SEMI-COOKED)

SEE – MEAT/POULTRY AND MEAT PRODUCTS/POULTRY PRODUCTS (READY TO EAT)

POULTRY AND POULTRY PRODUCTS (READY TO EAT)

Data: POTENTIAL HIDDEN ALLERGENS (e.g.: soy). FDR, Division 14 and 22 and the Meat Inspection Regulations.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogenic bacteria (e.g.: <i>Salmonella spp.</i> , <i>Clostridium perfringens</i> , <i>Staphylococcus aureus</i> and enterotoxin, <i>Yersinia spp.</i> , <i>Clostridium botulinum</i> , <i>Escherichia coli</i> , <i>Listeria monocytogenes</i>)
C	Contamination from antibiotics
C	Presence of undeclared allergens (e.g.: soy) could impact on sensitive individuals
P	Presence of hazardous extraneous material

PRAGUE POWDER

Data: POTENTIAL HIDDEN ALLERGEN (e.g.: wheat, soy)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Insufficient sodium or potassium nitrite/nitrate
C	Excess of sodium or potassium nitrite/nitrate
C	Presence of undeclared allergens could impact on sensitive individuals

PRE DUST, BATTERS, BREADING, FRYING BATTERS

Data: POTENTIAL HIDDEN ALLERGENS (e.g.: wheat, soy). In some cases, could meet the bakery products category criteria

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Presence of undeclared allergens could impact on sensitive individuals
P	Presence of hazardous extraneous material

PRESERVATIVES

Class I: Acetic Acid, Ascorbic Acid, Calcium Ascorbate, Erythorbic Acid, Iso-Ascorbic Acid, Potassium Nitrate, Potassium Nitrite, Sodium Ascorbate, Sodium Erythorbate, Sodium Iso-Ascorbate, Sodium Nitrate, Sodium Nitrite, Wood Smoke

Class II: Benzoic Acid, Calcium Sorbate, 4-Hexylresorcinol, Methyl-p-hydroxy Benzoate, Methyl Paraben, Potassium Benzoate, Potassium Bisulphite, Potassium Metabisulphite, Potassium Sorbate, Propyl-p-hydroxy Benzoate, Propyl Paraben, Sodium Benzoate, Sodium Bisulphite, Sodium Metabisulphite, Sodium Salt of Methyl-p-hydroxy Benzoic Acid, Sodium Salt of Propyl-p-hydroxy



Benzoic Acid, Sodium Sorbate, Sodium Sulphite, Sodium Dithionite, Sorbic Acid, Sulphurous Acid,

Class III: Calcium Propionate, Calcium Sorbate, Natamycin, Potassium Sorbate, Propionic Acid, Sodium Diacetate, Sodium Propionate, Sodium Sorbate, Sorbic Acid,

Class IV: Ascorbic Acid, Ascorbyl Palmitate, Ascorbyl Stearate, Butylated Hydro-xyanisole (a mixture of 2-tertiarybutyl-4-hydroxyanisole and 3-tertiarybutyl-4-hydroxyanisole), Butylated Hydroxytoluene (3,5-ditertiary-butyl-4-hydroxytoluene), Citric Acid, L-Cysteine, L-Cysteine Hydrochloride, Gum Guaiacum, Lecithin, Lecithin Citrate, Monoglyceride Citrate, Monoisopropyl Citrate, Propyl Gallate, Tartaric Acid, Tertiary Butyl Hydroquinone, Tocopherols (alpha-tocopherol; tocopherols concentrate, mixed)

Data: FDR, Division 16, Table XI, Class I, II, III, IV. May not be allowed for use in certain food products or maximum application limits may apply.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Contamination by non-food grade or unapproved chemicals
C	Contamination due to use of incorrect /excessive concentrations of additives
P	Presence of hazardous extraneous material

PROCESSED FLAKES (e.g.: apple, cinnamon)

Data: POTENTIAL HIDDEN ALLERGENS (e.g.: soy)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Presence of undeclared allergens could impact on sensitive individuals
P	Presence of hazardous extraneous material

PROCESSING AID

Data: POTENTIAL HIDDEN ALLERGENS (e.g.: soy lecithin, wheat, antifoaming agent wheat, soy). Refer to section 2.8.3 of the Guide to Food Labelling and Advertising for details and examples of processing aids.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Presence of undeclared allergens could impact on sensitive individuals
C	Contamination by non-food chemicals
C	Contains substances /ingredients (e.g.: sweeteners) not permitted for use in food
P	Presence of hazardous extraneous material

RETURNED PRODUCT

Data:

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogenic bacteria due to mishandling of product
B	Growth of pathogenic bacteria due to time/temperature abuse
B	Presence of pathogenic bacteria in incoming product
C	Presence of undeclared allergens could impact on sensitive individuals
C	Contamination by non-food chemicals
P	Presence of hazardous extraneous material



REWORK

Data: POTENTIAL HIDDEN ALLERGENS (e.g.: milk, peanuts, nuts, sulphites, egg, sesame seeds)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogenic bacteria due to mishandling of product
B	Growth of pathogenic bacteria due to time/temperature abuse
B	Presence of pathogenic bacteria in incoming product
C	Presence of undeclared allergens could impact on sensitive individuals
C	Contamination by non food chemical (e.g.: cleaners, sanitizers and lubricants)
P	Presence of hazardous extraneous material

RICE

Data: FDR, Division 13, Division D.003.002 (pre-cooked rice)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogenic bacteria (e.g.: <i>Clostridium perfringens</i> , <i>Bacillus cereus</i>)
B	Growth of pathogenic bacteria due to time/temperature abuse (for cooked or pre-cooked rice)
C	Presence of non-permitted vitamins
C	Contamination by non-food chemicals
C	Inadequate level of added vitamins/minerals leading to overdose or to nutrition deficiencies (pre-cooked rice)
P	Presence of hazardous extraneous material

SALT (NaCl)

Data: FDR, Division 17

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Contamination by non-food chemicals (e.g.: non-food grade)
C	Contamination by excess of food additive
P	Presence of hazardous extraneous material

SAUCES (e.g.: SOYA SAUCE)

Data: POTENTIAL HIDDEN ALLERGENS (e.g.: soy, wheat, nuts, peanuts, egg, sulphites, fish, milk, sesame seeds)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Presence of 3-monochloropropane-1, 2-diol (3-MCPD) and 1, 3-dichloropropanol (1, 3-DCP) in Soya and Oyster-Flavoured Sauces
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
C	Presence of undeclared allergens could impact on sensitive individuals
P	Presence of hazardous extraneous material

SCALDING AIDS



<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Use of unapproved scalding aids or wrong product

SEEDS

Data: POTENTIAL HIDDEN ALLERGENS (e.g.: sesame seed). FDR, Division 7

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogenic bacteria (e.g.: <i>Salmonella spp.</i>)
C	Presence of mycotoxins
C	Contamination from fumigants
C	Presence of undeclared allergens could impact on sensitive individuals
P	Presence of hazardous extraneous material

SEEDS (FOR SPROUTING)

Data: Code of Practice for the Hygienic Production of Sprouted Seeds

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogenic bacteria (e.g.: <i>Salmonella spp.</i> , <i>E.coli</i> O157:H7)
B	Presence of visible contamination (e.g.: pests, insects, rodent droppings)
C	Contamination from environmental contaminants (e.g.: heavy metals, pesticides, hazardous wastes)
C	Usage of wrong type of seeds (e.g.: non-food grade, seeds not intended for sprouting)
P	Presence of hazardous extraneous material

SEED HONEY

Data: FDR, Division 18 and Honey Regulations

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogenic bacteria (e.g.: <i>Clostridium botulinum</i>)
C	Unapproved coatings on pail container of seed honey
C	Metal ion contamination (e.g.: lead)
P	Presence of hazardous extraneous material

SEMOLINA FLOUR – SEE BAKERY PRODUCTS AND GRAINS

SEQUESTERING AGENTS

Ammonium Citrate dibasic, Ammonium Citrate monobasic, Calcium Citrate, Calcium Disodium Ethylenediamine-tetraacetate, Calcium Disodium EDTA, Calcium Phosphate Monobasic, Calcium Phosphate Tribasic, Calcium Phytate, Citric Acid, Disodium Ethylenediaminetetra-acetate, Disodium EDTA, Glycine, Phosphoric Acid, Potassium Phosphate dibasic, Potassium phosphate monobasic, Potassium Pyrophosphate tetrabasic, Sodium Acid Pyrophosphate, Sodium Citrate, Sodium Hexametaphosphate, Sodium Phosphate dibasic, Sodium Phosphate monobasic, Sodium Pyrophosphate tetrabasic, Sodium Tripolyphosphate, Stearyl Citrate

Data: FDR, Division 16, Table XII. May not be allowed for use in certain food products or maximum application limits may apply.



<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Contamination by non-food chemicals
P	Presence of hazardous extraneous material

SHELLFISH/ CRUSTACEAN/ OTHER MARINE INVERTEBRATES LIVE OR RAW [Wild or from AQUACULTURE (Farm raised)]

Data: FOOD ALLERGENS. FDR, Division 21 and Fish Inspection Regulations. The hazard identified per category of species or species in brackets must be taken into consideration, without necessarily excluding other categories or species, further to additional information.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	High level of <i>Vibrio parahaemolyticus</i> : indigenous in environment (bivalve molluscs)
B	Presence of pathogenic bacteria (e.g.: <i>Salmonella</i> spp., <i>Shigella</i> spp.) in bivalve molluscs harvested from contaminated/unapproved area)
B	Presence of viruses (e.g.: <i>Hepatitis A Virus</i> (HAV), <i>Norwalk virus</i> and <i>Norovirus</i> in bivalve molluscs)
B	Presence of parasites (e.g.: <i>Anisakis simplex</i> in Octopus, Squid)
C	Presence of Paralytic Shellfish Poisoning (PSP) in bivalve molluscs, whelk, dungeness crab, jonah crab
C	Presence of Amnesic Shellfish Poisoning (ASP) in bivalve molluscs, dungeness crab, jonah Crab
C	Presence of Diarrhetic Shellfish Poisoning (DSP) in bivalve molluscs
C	Contamination by drugs residues (Shrimp and Crayfish farming, Lobster from holding cages)
C	Contamination due to environmental contaminants (e.g.: pesticides in Crayfish)
C	Contamination due to heavy metals (molluscs, crustacea)

SHORTENING see also ANIMAL FATS AND OILS/ VEGETABLE OILS

Data: FDR, Division 9

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Contamination by non-food chemicals (e.g.: preservatives, antioxidants)
P	Presence of hazardous extraneous material

SODIUM CASEINATE

Data: FOOD ALLERGENS (e.g.: milk)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogenic bacteria
C	Contamination by non-food chemicals
P	Presence of hazardous extraneous material

SODIUM NITRITE/NITRATE (see Prague Powder)



SOFT DRINK CARBONATED

Data:

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Presence of non-permitted additives, (e.g.: artificial sweeteners like cyclamates and saccharin)
P	Presence of hazardous extraneous material

SOY PROTEIN CONCENTRATE, SOY PROTEIN ISOLATE

Data: FOOD ALLERGENS.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Presence of environmental contaminants (e.g.: pesticides)
C	Contamination by non-food chemicals
C	Presence of undeclared allergens could impact on sensitive individuals
P	Presence of hazardous extraneous material

SPICES/SEASONING/SEASONING PREMIX

Data: POTENTIAL HIDDEN ALLERGENS (e.g.: sesame seeds, soy, wheat, sulphites), FDR, Division 7. For herbs, Natural Health Products, novel food ingredients and ingredients with therapeutic properties contact Health Canada.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogenic bacteria (e.g.: <i>Salmonella spp.</i> , <i>Clostridium perfringens</i> , <i>Bacillus cereus</i>)
C	Contamination from Ethylene chlorohydrin (FDR, Division 16, Table VIII, Ethylene Oxide)
C	Contamination by environmental contaminants (e.g.: pesticide residues and other non-food chemicals)
C	Presence of by-products resulting from over/improper irradiation procedure
C	Presence of toxic herbs, unapproved substances/novel foods or substances with other physiological effects/properties poses a potential hazard.
C	Presence of undeclared allergens could impact on sensitive individuals
P	Presence of hazardous extraneous material

SPRAY & INJECTABLES (HATCHERY)

Data:

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogenic bacteria/virus
C	Contamination by non-food chemicals

STARCH – SEE BAKERY PRODUCTS AND GRAINS



STARCH MODIFYING AGENTS

Acetic Anhydride, Adipic Acid, Aluminum Sulphate, Epichlorhydrin, Hydrochloric Acid, Hydrogen Peroxide, Magnesium Sulphate, Nitric Acid, Octenyl Succinic Anhydride, Peracetic Acid, Phosphorus Oxychloride, Potassium Permanganate, Propylene Oxide, Sodium Acetate, Sodium Bicarbonate, Sodium Carbonate, Sodium Chlorite, Sodium Hydroxide, Sodium Hypochlorite, Sodium Trimetaphosphate, Sodium Tripolyphosphate, Succinic Anhydride, Sulphuric Acid

Data: FDR, Division 16, TABLE XIII. May not be allowed for use in certain food products or maximum application limits may apply.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Contamination by non-food chemicals
P	Presence of hazardous extraneous material

STARTER CULTURES see BACTERIAL CULTURES

STARTER MEDIUM

Data: POTENTIAL HIDDEN ALLERGENS (e.g.: milk).

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogenic bacteria (e.g.: <i>Salmonella spp.</i> , <i>Escherichia coli</i> , <i>Listeria monocytogenes</i> , <i>Staphylococcus aureus</i> and enterotoxin, <i>Campylobacter jejuni</i> , <i>Bacillus cereus</i> , <i>Yersinia spp.</i> , <i>Clostridium perfringens</i>)
B	Growth of pathogenic bacteria due to temperature/time abuse
C	Presence of undeclared allergens could impact on sensitive individuals
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
P	Presence of hazardous extraneous material

STEAM (FOOD GRADE/CULINARY)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Contamination of equipment and product from the presence of chemicals in the steam

SUGAR, GLUCOSE, DEXTOSE, FRUCTOSE- SEE SWEETENING AGENTS/ SWEETENERS (Liquid or dry)

SUGAR CONFECTIONERY (e.g.: soft candy, hard candy, tahini, halva)

Data: POTENTIAL HIDDEN ALLERGENS (e.g.: milk, soy, nuts, peanuts, sesame seeds).

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogenic bacteria (e.g.: <i>Salmonella spp.</i> in halva, tahini)
C	Presence of mycotoxins
C	Presence of undeclared allergens could impact on sensitive individuals
P	Presence of hazardous extraneous material



SWEETENERS (Food Additives that may be used as sweeteners)

Acesulfame-potassium, Aspartame, Aspartame encapsulated to prevent degradation during baking, Hydrogenated starch hydrolysates, Isomalt, Lactitol, Maltitol, Maltitol syrup, Mannitol, Sorbitol, Sorbitol syrup, Sucralose, Thaumatin, Xylitol

Data: POTENTIAL HIDDEN ALLERGENS (e.g.: corn, wheat). FDR, Division 16, Table IX.
May not be allowed for use in certain food products or maximum application limits may apply.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Presence of undeclared allergens could impact on sensitive individuals
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
C	Contains substances /ingredients (e.g.: sweeteners such as cyclamates and saccharin) not permitted for use in food
P	Presence of hazardous extraneous material

SWEETENING AGENTS (DRY – LIQUID)

Data: FDR, Division 18. For Honey, See Honey and Honey Products

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogenic bacteria especially for infants (e.g.: <i>Clostridium Botulinum</i> and their spores),
C	Contamination by non-food chemicals
P	Presence of hazardous extraneous material

SYRUPS (e.g.: Brown rice syrup)

Data:

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Presence of undeclared allergens could impact on sensitive individuals
P	Presence of hazardous extraneous material

TEA (INCLUDES HERBAL TEAS)

Data: FDR, Division 20

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Presence of toxic herbs, unapproved substances/novel foods or substances with other physiological effects/properties poses a potential hazard.
C	Contamination by non-food chemicals
C	Contamination by environmental contaminants (e.g.: pesticides)
P	Presence of hazardous extraneous material



VACCINES- (HATCHERY)

Data:

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Contamination by foreign bacteria and/or viruses
C	Contamination by chemicals, antibiotics

VEGETABLE OIL SEE ALSO SHORTENING

Data: POTENTIAL HIDDEN ALLERGENS (e.g.: nuts, sesame seeds, peanuts, soy, corn).
FDR, Division 9

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Presence of environmental contaminants (e.g.: pesticides/ herbicides)
C	Presence of Erucic acid in mustard oil/vegetable oils
C	Inaccurate nutrition information (e.g.: due to mislabelling, nutrient loss during manufacturing or storage) could impact on individuals with certain medical conditions
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizer and lubricants)
C	Presence of undeclared allergens could impact on sensitive individuals (e.g.: nuts, sesame seed, peanut, etc)
C	Presence of undeclared, not permitted or exceeding allowable limits of food additives
P	Presence of hazardous extraneous material

VEGETABLES – ACIDIFIED - CANNED

Data: FDR, Division 11, 27 and Processed Products Regulations for standards.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Improper acidification leading to presence and growth of <i>Clostridium botulinum</i>
B	Contamination and growth of pathogens due to post- process contamination or lack of container integrity
B	Presence of <i>Staphylococcal</i> enterotoxin
C	Presence of environmental contaminants (e.g.: pesticides/ herbicides)
C	Contamination by non-food grade chemicals (e.g.: cleaners, sanitizers and lubricants)
C	Presence of undeclared, not permitted or exceeding allowable limits of food additives
P	Presence of hazardous extraneous material

VEGETABLES – CANNED

Data: FDR, Division 11, 27 and Processed Products Regulations for standards.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence and growth of <i>Clostridium botulinum</i> due to underprocessing



- B Contamination and growth of pathogens due to post-process contamination or lack of container integrity
- B Presence of *Staphylococcal* enterotoxin
- C Presence of environmental contaminants (e.g.: pesticides/ herbicides)
- C Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
- C Presence of undeclared not permitted or exceeding allowable limits of food additives
- P Presence of hazardous extraneous material

VEGETABLES – CONCENTRATED

Data: FDR, Division 11, 27 and Processed Products Regulations for standards.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Presence of mycotoxins
C	Presence of environmental contaminants (e.g.: pesticides/ herbicides)
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
C	Presence of undeclared, not permitted or exceeding allowable limits of food additives
P	Presence of hazardous extraneous material

VEGETABLES – DRIED

Data: POTENTIAL HIDDEN ALLERGENS (e.g.: sulphites). FDR, Division 11

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of bacterial pathogen due to too high Aw
C	Presence of environmental contaminants (e.g.: pesticides/ herbicides)
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
C	Presence of undeclared, not permitted or exceeding allowable limits of food additives
C	Presence of undeclared allergens could impact on sensitive individuals (e.g.: sulphiting agents)
P	Presence of hazardous extraneous material

VEGETABLES – FROZEN

Data: POTENTIAL HIDDEN ALLERGENS (e.g.: sulphites). FDR, Division 11 and Processed Products Regulations for standards.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogenic bacteria (e.g.: <i>Clostridium perfringens</i> , <i>Bacillus cereus</i> , <i>Escherichia coli</i> , <i>Listeria monocytogenes</i>)
B	Presence of high level of microorganisms indicating processing in poor hygienic conditions
C	Presence of environmental contaminants (e.g.: pesticides/ herbicides)
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizer and lubricants)



- C Presence of undeclared, not permitted or exceeding allowable limits of food additives
- C Presence of undeclared allergens could impact on sensitive individuals (e.g.: sulphiting agents)
- P Presence of hazardous extraneous material

VEGETABLES – Juice /Drink/Cocktail – Canned

Data: POTENTIAL HIDDEN ALLERGENS (e.g.: sulphites). FDR, Division 11 and Processed Products Regulations for standards.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence and growth of <i>Clostridium botulinum</i> due to underprocessing
B	Contamination and growth of pathogens due to post-process contamination or lack of container integrity
B	Presence of <i>Staphylococcal</i> enterotoxin
C	Presence of environmental contaminants (e.g.: pesticides/ herbicides)
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
C	Presence of undeclared, not permitted or exceeding allowable limits of food additives
C	Presence of undeclared allergens could impact on sensitive individuals (e.g.: sulphiting agents)
C	Inadequate levels of added vitamins/minerals leading to overdose or to nutrition deficiencies
P	Presence of hazardous extraneous material

VEGETABLES – FERMENTED PICKLES

Data: POTENTIAL HIDDEN ALLERGENS (e.g.: sulphites). FDR, Division 11 and Processed Products Regulations for standards.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Inadequate fermentation leading to survival and growth of <i>Clostridium botulinum</i> and other pathogens
B	Presence of <i>Staphylococcal</i> enterotoxin
C	Presence of environmental contaminants (e.g.: pesticides/ herbicides)
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
C	Presence of undeclared, not permitted or exceeding allowable limits of food additives
C	Presence of undeclared allergens could impact on sensitive individuals (e.g.: sulphiting agents)
P	Presence of hazardous extraneous material

VEGETABLES – FRESH /FRESH CUT

Data: POTENTIAL HIDDEN ALLERGENS (e.g.: sulphites). FDR, Division 11, Fresh Fruit and Vegetable. Regulations for standards



<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogens (e.g.: <i>Salmonella spp</i> , <i>Yersinia spp</i> , <i>Escherichia coli</i> O157:H7, <i>Listeria monocytogenes</i> , <i>Shigella spp</i>)
B	Presence of protozoans (e.g.: <i>Cyclospora spp</i> , <i>Cryptosporidium spp</i>)
B	Presence of virus (e.g.: Norwalk virus, Hepatitis A virus, Rotavirus)
B	Growth of pathogens from inappropriate storage temperatures / humidity
B	Presence of heat stable toxins (e.g.: <i>Staphylococcus aureus</i> enterotoxin)
C	Presence of environmental contaminants (e.g.: pesticides/ herbicides)
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
C	Presence of undeclared, not permitted or exceeding allowable limits of food additives
C	Presence of undeclared allergens could impact on sensitive individuals (e.g.: sulphiting agents)
C	Contamination by toxic plant materials such as nightshade berries in peas
C	Presence of natural toxins (e.g.: glycoalkaloids such as solanine in potatoes, cyanogenic glycoside in cassava root and bamboo shoots)
P	Presence of hazardous extraneous material

VEGETABLES – PICKLES IN OIL

Data: FDR, Division 11 and Processed Products Regulations for standards.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Improper acidification or Aw adjustment of vegetables prior to packaging leading to condition favourable to the growth of <i>Clostridium botulinum</i> spores
B	Growth of pathogenic bacteria at normal temperature of storage and distribution due to lack of pasteurization
C	Presence of environmental contaminants (e.g.: pesticides/ herbicides)
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
C	Presence of undeclared / non-permitted or exceeding allowable limits of food additives
C	Contamination by toxic plant materials such as nightshade berries peas
P	Presence of hazardous extraneous material

VEGETABLES – PRESERVED IN BRINE

Data: POTENTIAL HIDDEN ALLERGENS (e.g.: sulphites). Processed Products Regulations for standards.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Growth of pathogens due to improper time/temperature storage
B	Presence of <i>Staphylococcal</i> enterotoxin
C	Presence of environmental contaminants (e.g.: pesticides / herbicides)
C	Contamination from cleaners/sanitizers/lubricants
C	Presence of undeclared, not permitted or exceeding allowable limits of food



- C additives
- C Presence of undeclared allergens could impact on sensitive individuals (e.g.: sulphiting agents)
- C Contamination by non-food chemicals
- P Presence of hazardous extraneous material

VEGETABLES - RELISHES

Data: FDR, Division 11 and Processed Products Regulations for standards.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Presence of environmental contaminants (e.g.: pesticides/ herbicides)
C	Contamination from cleaners/sanitizers/lubricants
C	Presence of undeclared, not permitted or exceeding allowable limits of food additives
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
P	Presence of hazardous extraneous material

VINEGAR

Data: POTENTIAL HIDDEN ALLERGEN (e.g.: sulphites). FDR, Division 19.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Presence of undeclared allergens could impact on sensitive individuals
C	Contamination by non-food chemicals
P	Presence of hazardous extraneous material

VITAMINS – MINERALS – AMINO ACIDS

Data: POTENTIAL HIDDEN ALLERGEN (e.g.: soy, wheat, egg). They are only allowed in some foods: see FDA and FDR (Part D). Maximum and/or minimum application limits may apply

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Contamination by non-food chemicals
C	Inaccurate nutrition information (e.g.: due to mislabelling, nutrient loss during manufacturing or storage) could impact on individuals with certain medical conditions
C	Use of non-permitted form of vitamins, minerals, and amino acids
C	Presence of undeclared allergens could impact on sensitive individuals
P	Presence of hazardous extraneous material

WATER

Data: Guidelines for Canadian Drinking Water Quality, FDR Division Prepackaged water and ice Health Canada.

(http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/doc_sup-appui/sum_guide-



res_recom/index_e.html)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Not meeting the drinking water criteria established by Health Canada
B	Presence of pathogenic bacteria (e.g.: <i>Salmonella spp.</i> , <i>Campylobacter jejuni</i> , <i>Shigella spp.</i> , <i>Yersinia spp.</i> , <i>Escherichia coli</i> , <i>Listeria monocytogenes</i> , <i>Streptococcus suis</i> (pork))
B	Presence of toxins from cyanobacteria (Blue-Green Algae) Water from wells
B	Presence of viruses e.g.: Enterovirus (includes <i>Ecoviruses</i> , <i>Coxsackie</i> , <i>Poliovirus</i> , <i>Hepatitis A & Hepatitis E</i>), <i>Norwalk viruses</i> , <i>Rotaviruses</i>
B	Presence of parasites (e.g.: <i>Toxoplasma gondii</i> , <i>Cryptosporidium</i> , <i>Giardia spp</i>)
C	Contamination by non-food chemicals
C	Contamination due to use of non-food grade water treatment chemicals
C	Presence of chemical residues due to excess levels of water treatment chemicals used (e.g.: chlorine)
C	Improper or inaccurate addition (e.g.: type, concentration) of nutrients (flourine) could impact on certain individuals
C	Presence of environmental contaminants (e.g.: heavy metals, pesticides),
P	Presence of hazardous extraneous material

WHEAT FLOUR – SEE BAKERY PRODUCTS AND GRAINS

WHEY and WHEY PROTEIN CONCENTRATE (milk)

Data: Potential Hidden Allergens (e.g.: milk). Dairy Products Regulations.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogenic bacteria (e.g.: <i>Staphylococcus aureus</i> and/or enterotoxin, <i>Escherichia coli</i> , <i>Listeria monocytogenes</i> , <i>Salmonella spp.</i>)
B	Presence of pathogenic bacteria and non-pathogenic bacteria which retards culture activity
C	Presence of undeclared allergens could impact on sensitive individuals
C	Contamination from non-food chemicals
P	Presence of hazardous extraneous material

YEAST - DRY

Data:

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogenic bacteria (e.g.: <i>Salmonella spp.</i>)

YEAST FOODS

Ammonium Chloride, Ammonium Phosphate dibasic, Ammonium Phosphate monobasic, Ammonium Sulphate, Calcium Carbonate, Calcium Chloride, Calcium Citrate, Calcium Lactate, Calcium Phosphate dibasic, Calcium Phosphate monobasic, Calcium Phosphate tribasic, Calcium Sulphate, Carbon Dioxide, Ferrous Sulphate, Manganese Sulphate, Phosphoric Acid, Potassium



Chloride, Potassium Phosphate dibasic, Potassium Phosphate monobasic, Sodium Sulphate, Zinc Sulphate

Data: Carbon Dioxide is described as a specific incoming material in the “C” section. FDR, Division 16, Table XIV. May not be allowed for use in certain food products or maximum application limits may apply.

Type of Hazard	Name of Hazard
C	Contamination by non-food chemicals
P	Presence of hazardous extraneous material

TABLE 3

FOOD ADDITIVE REFERENCES

<http://laws.justice.gc.ca/en/F-27/C.R.C.-c.870/124280.html#rid-124284>

Reference (FDR, division 16)	
Table I: Anticaking	Table IX: Sweeteners
Table II: Bleaching, Maturing and Dough Conditioning Agents	Table X: pH Adjusting Agent, Acid Reacting Material, Water Correcting Agent
Table III: Colouring Agent	Table XI: Preservatives
Table IV: Emulsifying, Gelling, Stabilizing, Thickening Agent	Table XII: Sequestering Agents
Table V: Food Enzyme	Table XIII: Starch Modifying Agent
Table VI: Firming Agent	Table XIV: Yeast Foods
Table VII: Glazing and Polishing agents	Table XV: Carrier or Extraction Solvents
Table VIII: Miscellaneous Food Additive	

TABLE 4 FOOD ADDITIVES

X : this additive can be used in some specific foods

* : a standard could exist for the use of this additive

Additive Name	Reference	Dairy	Egg	Meat	F&V	Fish	Unstandardized food /others
Acacia Gum	Table IV	X*			X*		X*
Acetone	Table XV		X	X			X*
Acesulfame-potassium	Table IX	X*					X*
Acetic Acid	Table X Table XI	X		X X	X X	X	X X
Acetic Anhydride	Table XIII						X
Acetone Peroxide	Table II						X
α – Acetolactate decarboxylase	Table V						X



Additive Name	Reference	Dairy	Egg	Meat	F&V	Fish	Unstandardized food /others
Acetylated Monoglycerides	Table IV Table VII Table VIII						X X* X
Acetylated Tartaric Acids Esters of mono and diglycerides	Table IV						X*
Adipic Acid	Table X Table XIII						X X
Agar	Table IV	X*		X	X	X	X*
Algin	Table IV	X*			X		X*
Alginic Acid	Table IV	X*			X		X*
Alkanet	Table III	X	X	X*	X	X	X
Allura Red (FD&C Red #40)	Table III FDR, B.06.044	X*		X*	X*	X*	X*
Aluminum Metal	Table III	X	X	X*	X	X	X
Aluminum Sulphate	Table VI Table VIII Table XIII		X*		X	X	X X
Amaranth (FD&C Red #2)	Table III FDR, B.06.041	X*		X*	X*	X*	X*
Amino – peptidase	Table V	X					X
Ammonium Alginate	Table IV	X*			X		X*
Ammonium Aluminum Sulphate	Table VI Table X				X		X X
Ammonium Bicarbonate	Table X						X
Ammonium Carbonate	Table X						X
Ammonium Carrageenan	Table IV	X*		X	X*	X	X
Ammonium Citrate, Mono And Di-Basic	Table X Table XII						X X
Ammonium Chloride	Table XIV						X*
Ammonium Furcelleran	Table IV				X*		X*
Ammonium Hydroxide	Table X			X			X*
Ammonium Persulphate	Table II Table VIII						X* X*
Ammonium Phosphate dibasic	Table X Table XIV						X X*
Ammonium Phosphate monobasic	Table X Table XIV	X*					X X
Ammonium Salt of Phosphorylated Glyceride	Table IV	X*			X		X*
Ammonium Sulphate	Table XIV						X*
Amylase	Table V				X		X
Amylase (maltogenic)	Table V						X
Annatto	Table III FDR, B.06.021	X	X	X*	X	X	X
Anthocyanins	Table III	X	X	X*	X	X	X
Arabino-galactan	Table IV						X



Additive Name	Reference	Dairy	Egg	Meat	F&V	Fish	Unstandardized food /others
Ascorbic Acid	Table II Table XI			X	X*	X	X* X
Ascorbyl Palmitate	Table XI						X*
Ascorbyl Stearate	Table XI						X*
Aspartame	Table IX						X*
Aspartame encapsulated to prevent degradation during baking	Table IX						X*
Azodicarbonamide	Table II						X*
Baker's yeast Glycan	Table IV						X
B-Apo-8'-Carotenal	Table III FDR, B.06.023	X*		X*	X*	X*	X*
Beet Red	Table III	X	X	X*	X	X	X
Beeswax	Table VII Table VIII						X* X*
Benzoic Acid	Table XI				X*	X*	X*
Benzoyl Peroxide	Table II Table VIII	X*					X*
Benzyl Alcohol	Table XV						X
Bovine Rennet	Table V	X					
Brilliant Blue FCF	Table III FDR, B.06.051	X*		X*	X*	X*	X*
Bromelain	Table V			X	X		X
Brominated vegetable oil	Table VIII						X*
n-Butane	Table VIII						X
Butylated Hydroxyanisole (a mixture of 2-tertiarybutyl-4-hydroxyanisole and 3-tertiarybutyl-4-hydroxyanisole)	Table XI			X*			X*
Butylated Hydroxytoluene (3,5-ditertiary-butyl-4-hydroxytoluene) See Butylated Hydroxyanisole	Table XI			X*			X*
1,3-Butylene Glycol	Table XV						X
Caffeine	Table VIII						X*
Caffeine Citrate	Table VIII						X*
Calcium Acetate	Table X						X
Calcium Alginate See Algin	Table IV	X*			X		X*
Calcium Ascorbate	Table XI			X	X*	X	X
Calcium Aluminum Silicate	Table I						X*
Calcium Carbonate	Table IV Table VIII Table X Table XIV	X		X	X	X	X X* X X*
Calcium Carrageenan See Carrageenan	Table IV	X*		X	X*	X	X
Calcium Chloride	Table VI Table X Table XIV	X*			X*	X*	X* X X



Additive Name	Reference	Dairy	Egg	Meat	F&V	Fish	Unstandardized food /others
Calcium Citrate	Table IV Table VI Table X Table XII Table XIV	X*			X*		X X X X X
Calcium Disodium EDTA	Table XII				X*	X*	X*
Calcium Disodium Ethylenediaminetetraacetate (Calcium Disodium EDTA)	Table XII				X*	X*	X*
Calcium Fumarate	Table X						X
Calcium Furcelleran	Table IV				X*		X*
Calcium Gluconate	Table IV Table VI Table X						X X X
Calcium Glycerophosphate	Table IV						X
Calcium Hydroxide	Table X				X*		X
Calcium Hypophosphite	Table IV						X
Calcium Iodate	Table II						X*
Calcium Lactate	Table VI Table VIII Table X Table XIV		X	X	X*	X	X X*
Calcium Oxide	Table VIII Table X			X*		X*	X
Calcium Peroxide	Table II						X*
Calcium Phosphate dibasic (Dicalcium Phosphate Dihydrate)	Table IV Table VI Table VIII Table X Table XIV	X* X*					X X X X*
Calcium Phosphate monobasic (Monocalcium Phosphate, Calcium Biphosphate, Acid Calcium Phosphate)	Table VI Table X Table XII Table XIV	X			X*		X X X X*
Calcium Phosphate Tribasic (Tribasic Orthophosphate, Precipitated Calcium Phosphate)	Table I Table IV Table VIII Table X Table XII Table XIV	X* X		X*			X* X X* X X
Calcium Phytate	Table XII						X
Calcium Propionate	Table XI	X*					X*
Calcium Silicate	Table I Table VIII	X*	X*	X*			X* X*
Calcium Sorbate	Table XI				X*	X*	X*
Calcium Stearate	Table I Table VIII						X* X
Calcium Stearoyl-2-Lactylate	Table II Table VIII	X*					X* X*



Additive Name	Reference	Dairy	Egg	Meat	F&V	Fish	Unstandardized food /others
Calcium Sulphate (calcium sulphate anhydrous)	Table IV Table VI Table VIII Table X Table XIV	X*			X*		X X* X X*
Calcium Tartrate	Table IV						X
Candelilla Wax	Table VII						X*
Canthaxanthin	Table III FDR, B.06.024	X	X	X*	X	X	X
Caramel	Table III	X		X	X	X	X
Carbon Black	Table III FDR,B.06.031	X	X	X*	X	X	X
Carbon Dioxide	Table VIII Table X Table XV	X X	X				X X
Carboxymethyl Cellulose	Table IV	X*				X	X
Carnauba Wax	Table VII						X*
Carob Bean Gum (Locust Bean Gum, Saint John's Bread and is scientifically called Carubin)	Table IV	X*			X		X*
Carotene	Table III FDR, B.06.022	X	X	X*	X	X	X
Carrageenan	Table IV	X*		X	X*	X	X*
Castor Oil	Table VIII Table XV						X X
Catalase	Table V	X	X				X
Cellulase	Table V				X		X
Cellulose	Table 1	X*					
Cellulose Gum	Table IV	X*				X	X
Cellulose Microcrystalline (See also microcrystalline cellulose)	Table VIII	X*					X*
Charcoal	Table III FDR, B.06.032	X	X	X*	X	X	X
Chymosin (Chymosin A and B)	Table V	X					X
Chlorine	Table II						X
Chlorine Dioxide	Table II						X
Chloropentafluoroethane	Table VIII						X
Chlorophyll	Table III	X	X	X*	X	X	X
Citric Acid	Table VIII Table X Table XI Table XII	X	X	X X	X* X	X X*	X X* X X
Citrus Red No. 2	Table III FDR, B.06.053						X*
Cochineal	Table III	X	X	X*	X	X	X
Copper Gluconate	Table VIII						X*



Additive Name	Reference	Dairy	Egg	Meat	F&V	Fish	Unstandardized food /others
Cream of Tartar	Table X						X
L-Cysteine	Table XI						X*
L-Cysteine Hydrochloride	Table II Table XI				X* X		X*
Dimethylpolysiloxane Formulation (methylpolysilicone and methyl silicone)	Table VIII	X*			X*		X*
Disodium EDTA (See Disodium ethylenediaminetetraacetate)	Table XII				X*		X*
Diocetyl Sodium Sulfosuccinate	Table VIII			X*			X*
Disodium Ethylenediaminetetraacetate(Disodium EDTA)	Table XII				X*		X*
Epichlorhydrin	Table XIII						X
Erythorbic Acid	Table XI			X	X*	X	X
Erythrosine (FD&C Red #3)	Table III FDR, B.06.042	X*		X*	X*	X*	X*
Ethoxyquin	Table VIII						X*
Ethyl Acetate	Table XV						X*
Ethyl Alcohol (Ethanol)	Table XV						X
Ethyl alcohol denatured with methanol	Table XV						X*
Ethylene Oxide	Table VIII						X*
Ethyl Beta-Apo-8'-Carotenoate	Table III FDR, B.06.025	X*		X*	X*	X*	X*
Fast Green FCF (FD&C Green #3)	Table III FDR, B.06.049	X*		X*	X*	X*	X*
Ferrous Gluconate	Table VIII				X*		
Ferrous Sulphate	Table XIV						X
Ficin	Table V			X	X		X
Fumaric Acid	Table X				X		X
Furcelleran	Table IV				X*		X*
Gelatin	Table IV	X*		X	X	X	X
Gellan Gum	Table IV	X*			X*		X*
Glucanase	Table V						X
Glucoamylase (Amyloglucosidase; Maltase)	Table V						X
Gluconic Acid	Table X						X
Glucono-Delta-Lactone (GDL)	Table VIII Table X			X*			X
Glucose Isomerase	Table V						X
Glucose Oxidase	Table V		X				X
Glycine	Table XII						X*
Glycerol (Glycerin)	Table VIII Table XV			X			X X
Glycerol ester of wood rosin	Table VIII						X*
Glyceryl diacetate	Table XV						X
Glyceryl triacetate (triacetine)	Table XV						X



Additive Name	Reference	Dairy	Egg	Meat	F&V	Fish	Unstandardized food /others
Glyceryl tributylate (tributylin)	Table XV						X
Gold	Table III						X
Guar Gum	Table IV	X*			X*		X*
Gum Arabic	Table IV Table VII	X*			X*		X* X*
Gum Benzoin	Table VII						X*
Gum Guaiaicum	Table XI						X
Hemicellulase	Table V						X
Hexane	Table XV						X*
4- Hexylresorcinol	Table XI					X*	
Hydrochloric Acid	Table X Table XIII						X X
Hydrogenated starch hydrolysates	Table IX						X
Hydrogen Peroxide	Table VIII Table XIII	X*					X* X
Hydroxylated Lecithin	Table IV						X*
Hydroxypropyl Cellulose	Table IV						X
Hydroxypropyl Methylcellulose	Table IV	X			X		X
Indigotine (FD&C Blue #2)	Table III FDR, B.06.050	X*		X*	X*	X*	X*
Inulinase	Table V						X
Isobutane	Table VIII						X
Isomalt	Table IX						X
Isopropyl alcohol (Isopropanol)	Table XV					X*	X*
Invertase	Table V						X
Irish Moss Gelose (See carrageenan)	Table IV	X*		X	X*	X	X
Iron Oxide	Table III	X	X	X*	X	X	X
Iso-Ascorbic Acid (See ascorbic acid)	Table XI			X	X*	X	X
Karaya Gum	Table IV	X*			X		X*
Lactase	Table V	X					X
Lactic Acid	Table X	X	X		X*		X
Lactylated Mono And Di-Glycerides	Table IV						X*
Lactylic Esters of Fatty Acids	Table IV Table VIII						X X
Lactitol	Table IX						X
Lanolin	Table VIII						X
L-Cysteine Hydrochloride	Table II						X*
Lecithin	Table IV Table VIII Table XI	X*			X		X* X X
Lecithin Citrate	Table XI						X



Additive Name	Reference	Dairy	Egg	Meat	F&V	Fish	Unstandardized food /others
L-Leucine	Table VIII						X
Lipase	Table V	X	X				X
Lipoxidase	Table V						X
Locust Bean Gum (Carob Bean Gum)	Table IV	X*			X		X*
Lysosyme	Table V	X					
Magnesium Aluminium Silicate	Table VIII						X
Magnesium Carbonate	Table 1 Table VIII Table X	X					X* X* X*
Magnesium Chloride	Table IV Table VIII	X					X*
Magnesium Citrate	Table X						X
Magnesium Fumarate	Table X						X
Magnesium Hydroxide	Table X	X		X	X*		X*
Magnesium Oxide	Table 1 Table X	X					X*
Magnesium Phosphate	Table X						X
Magnesium Silicate	Table 1 Table VII Table VIII						X* X* X
Magnesium Stearate	Table 1 Table VIII						X* X
Magnesium Sulphate	Table VIII Table X Table XIII		X				X X*
Malic Acid	Table X	X			X*		X
Maltitol	Table IX						X
Maltitol Products	Table IX						X
Mannitol	Table IX						X
Manganese Sulphate	Table X Table XIV						X X
Methyl Alcohol (methanol)	Table XV						X*
Methyl Cellulose	Table IV						X
Methyl Ethyl Cellulose	Table IV Table VIII	X*					X X*
Methyl ethyl ketone (2-Butanone)	Table XV						X*
Methylene Chloride (dichloro-methane)	Table XV						X*
Methyl Paraben (See Methyl-p-hydroxy benzoate)	Table XI				X*	X*	X*
Methyl-P-Hydroxy Benzoate (Paraben and Methylparaben)	Table XI				X*	X*	X*
Microcrystalline Cellulose	Table 1 Table VIII	X* X*					X* X*
Milk Coagulating Enzyme	Table V	X					X



Additive Name	Reference	Dairy	Egg	Meat	F&V	Fish	Unstandardized food /others
Mineral Oil	Table VII Table VIII			X*	X*		X* X*
Monoacetin	Table VIII						X
Mono and Diglycerides	Table IV Table VIII Table XV	X*		X*	X	X	X* X X
Monoglyceride Citrate	Table XI Table XV						X* X
Mono-Glycerides	Table IV Table VIII	X*		X*		X	X* X
Monoglyceride citrate	Table XV						X
Monoisopropyl Citrate	Table XI						X*
Monosodium Salt of Phosphoryled Mono and Diglycerides	Table IV						X*
Natamycin	Table XI	X*					
Nitric Acid	Table XIII						X
Nitrogen	Table VIII	X*					X*
Nitrous Oxide	Table VIII						X
2- Nitropropane	Table XV						X*
Oat Gum	Table IV						X
Octafluorocyclobutane	Table VIII						X
Octenyl Succinic Anhydride	Table XIII						X
Orchil	Table III	X	X	X*	X	X	X
Oxystearin	Table VIII						X*
Ozone	Table VIII						X
Pancreas Extract	Table VIII						X
Pancreatin	Table V		X				X
Papain	Table V			X	X		X
Paprika	Table III	X	X	X*	X	X	X
Paraffin Wax	Table VIII	X*			X*		
Pectin	Table IV	X*			X		X
Pectinase	Table V				X		X
Pentosanase	Table V						X
Pepsin	Table V	X					X
Peracetic Acid	Table XIII						X
Petrolatum	Table VII Table VIII				X*		X* X*
Phosphoric Acid	Table X Table XII Table XIV	X		X		X	X* X* X
Phosphorus Oxychloride	Table XIII						X
Polydextrose	Table VIII						X
Polyethylene glycol (molecular weight 3000-9000)	Table VIII						X*



Additive Name	Reference	Dairy	Egg	Meat	F&V	Fish	Unstandardized food /others
Polyglycerol Esters of Fatty Acids	Table IV						X*
Polyglycerol Esters of Interesterified Castor Oil Fatty Acids	Table IV						X*
Polyoxyethylene (20) Sorbitan Monooleate (Polysorbate 80)	Table IV	X*		X*	X*		X*
Polyoxyethylene (20) Sorbitan Monostearate (Polysorbate 60)	Table IV						X*
Polyoxyethylene (20) Sorbitan Tristearate (Polysorbate 65)	Table IV	X*					X*
Polyoxyethylene (8) Stearate	Table IV						X*
Polyvinylpyrrolidone	Table VIII						X*
Ponceaux SX (FD&C Red #4)	Table III FDR, B.06.043						X*
Potassium Acid Tartrate (Cream Of Tartar)	Table X						X
Potassium Alginate	Table IV	X*			X		X*
Potassium Aluminum Sulphate	Table VI Table VIII Table X				X		X X* X
Potassium Benzoate	Table XI				X*	X*	X*
Potassium Bicarbonate	Table X	X					X
Potassium Bisulphite	Table XI				X*	X*	X*
Potassium Carbonate	Table X	X		X		X	X
Potassium Carrageenan	Table IV	X*		X	X*	X	X*
Potassium Chloride	Table IV Table X Table XIV						X X X
Potassium Citrate	Table IV Table X	X*					X
Potassium Fumarate	Table X						X
Potassium Furcelleran (See Furcelleran)	Table IV				X*		X*
Potassium Hydroxide	Table X	X			X		X*
Potassium Iodate	Table II						X*
Potassium Lactate	Table X						X
Potassium Metabisulphite	Table XI				X*	X*	X*
Potassium Nitrate	Table XI	X*		X*	X*		
Potassium Nitrite	Table XI			X*			
Potassium Permanganate	Table XIII						X*
Potassium Persulphate	Table II						X*
Potassium Phosphate Dibasic (Dipotassium Phosphate, Dipotassium Monohydrogen Orthophosphate, Dipotassium Monophosphate)	Table IV Table X Table XII Table XIV	X*		X*			X X
Potassium Phosphate Monobasic (Potassium	Table XII	X		X*			X



Additive Name	Reference	Dairy	Egg	Meat	F&V	Fish	Unstandardized food /others
Dihydrogen Orthophosphate, Monopotassium Monophosphate, Monopotassium Phosphate)	Table XIV						X
Potassium Pyrophosphate Tetrabasic	Table XII			X*			X
Potassium Sorbate	Table XI				X*	X*	X*
Potassium Stearate	Table VIII						X*
Potassium Sulphate	Table X						X
Potassium Tartrate	Table X						X
Propane	Table VIII						X
Propionic Acid	Table XI	X*					X*
Propylene Glycol	Table I Table VIII						X* X
1,2-Propylene glycol (1,2- propanediol)	Table XV						X
Propylene Glycol Alginate	Table IV	X*			X*		X*
Propylene Glycol Ether of Methylcellulose	Table IV	X			X		X
Propylene Glycol mono-esters and diesters of fat-forming fatty acids	Table XV						X
Propylene Glycol Mono Fatty Acid Esters	Table IV						X
Propylene Oxide	Table XIII						X*
Propyl Gallate	Table XI			X*			X*
Propyl Paraben	Table XI				X*	X*	X*
Propyl-P-Hydroxy Benzoate	Table XI			X*	X*	X*	X*
Protease	Table V	X		X			X
Pullulanase	Table V						X
Quillaia Extract	Table VIII						X
Rennet	Table V	X					X
Riboflavin	Table III	X	X	X*	X	X	X
Saffron	Table III	X	X	X*	X	X	X
Saponin	Table VIII						X
Saunderswood	Table III	X	X	X*	X	X	X
Shellac	Table VII						X*
Silicon Dioxide	Table I Table VIII						X* X*
Silver Metal	Table III	X	X	X*	X	X	X
Sodium Acetate	Table X Table XIII						X X
Sodium Acid Pyrophosphate (termed SAPP, Disodium Dihydrogen Pyrophosphate, Acid Sodium Pyrophosphate, Disodium Diphosphate and Sodium Pyrophosphate)	Table IV Table VIII Table X Table XII	X* X			 X*	X* X*	 X X
Sodium Acid Tartrate	Table X						X
Sodium Alginate	Table IV	X*			X	X	X*
Sodium Aluminum Phosphate	Table IV	X*					



Additive Name	Reference	Dairy	Egg	Meat	F&V	Fish	Unstandardized food /others
	Table X						X
Sodium Aluminum Silicate (Sodium Aluminosilicate, Sodium Silicoaluminate)	Table I		X*				X*
Sodium Aluminum Sulphate	Table VI Table VIII Table X				X		X X* X
Sodium Ascorbate	Table XI			X	X*	X	X
Sodium Benzoate	Table XI				X*	X*	X*
Sodium Bicarbonate	Table VIII Table X Table XIII	X	X		X		X X X
Sodium Bisulphate	Table X						X
Sodium Bisulphite	Table XI				X*	X*	X*
Sodium Carbonate	Table VIII Table X Table XIII	X	X	X	X	X*	X X
Sodium Carboxymethyl Cellulose	Table IV Table VIII	X				X	X
Sodium Carrageenan	Table IV	X*		X	X*	X	X
Sodium Cellulose Glycolate	Table IV	X*		X	X*	X	X
Sodium Chlorite	Table XIII						X
Sodium Citrate (trisodium citrate)	Table IV Table VIII Table X Table XII	X* X* X X		X*		X*	X X
Sodium Diacetate	Table XI						X*
Sodium Dithionite	Table XI				X*	X*	X*
Sodium Erythorbate	Table XI			X	X*	X	X
Sodium Ferro- cyanide, Decahydrate	Table I Table VIII						X* X*
Sodium Fumarate	Table X						X
Sodium Furcelleran	Table IV				X*		X
Sodium Gluconate	Table IV Table X	X*					X
Sodium Hexametaphosphate	Table IV Table VIII Table X Table XII	X* X		X* X* X*	X X	X* X* X*	X X* X X
Sodium Hydroxide (Caustic Soda, Soda Lye, Sodium Hydrate)	Table VIII Table X Table XIII	X			X	X*	X X
Sodium Hypochlorite	Table XIII						X
Sodium Iso-Ascorbate (See sodium erythorbate)	Table XI			X	X*	X	X
Sodium Lactate	Table X						X
Sodium Lauryl Sulphate	Table VIII		X*	X*			X*
Sodium Metabisulphite	Table XI				X*	X*	X*



Additive Name	Reference	Dairy	Egg	Meat	F&V	Fish	Unstandardized food /others
Sodium Methylsulphate	Table VIII						X*
Sodium Nitrate	Table XI	X*		X*	X*		
Sodium Nitrite	Table XI			X*	X*		
Sodium Phosphate Dibasic	Table IV Table VIII Table X Table XII	X*			X X*	X*	X X X
Sodium Phosphate Monobasic (Monosodium Phosphate, Monosodium Dihydrogen Orthophosphate, Sodium Biphosphate and Monosodium Monophosphate)	Table IV Table X Table XII	X*					X X X
Sodium Phosphate Tribasic (Trisodium Phosphate, Trisodium Orthophosphate, and Trisodium Monophosphate)	Table IV Table X	X*					X X
Sodium Potassium Copper Chlorophyllin	Table VIII						X*
Sodium Potassium Tartrate (Rochelle Salt)	Table IV Table X	X*			X		X X
Sodium Propionate	Table XI	X*					X*
Sodium Pyrophosphate Tetrabasic (Tetrasodium Pyrophosphate, TSPP, Tetrasodium Diphosphate)	Table IV Table VIII Table X Table XII	X*		X*		X* X*	X X X
Sodium Salt of Methyl-P-Hydroxy Benzoic Acid (See methyl-p-hydroxy benzoate)	Table XI			X*	X*	X*	X*
Sodium Trimetaphosphate	Table XIII						X*
Sodium Tripolyphosphate	Table X Table XII Table XIII			X*	X		X X X*
Sodium Salt of Propyl-P-Hydroxy Benzoic Acid (See propyl-p-hydroxy benzoate)	Table XI			X*	X*	X*	X*
Sodium Silicate	Table VIII						X
Sodium Sorbate	Table XI	X*			X*	X*	X*
Sodium Stearate	Table VIII						X
Sodium Stearoyl-2-Lactylate	Table II Table IV Table VIII	X*	X*				X* X* X*
Sodium Stearyl Fumarate	Table II						X*
Sodium Sulphate	Table VIII Table XIV				X		X
Sodium Sulphite	Table II Table VIII Table XI				X*	X* X*	X* X*
Sodium Tartrate (Disodium Tartrate)	Table IV	X*					
Sodium Thiosulphate	Table VIII						X
Sodium Trimetaphosphate	Table XIII					X*	
Sodium Tripolyphosphate (Pentasodium Tripolyphosphate and Sodium Triphosphate)	Table IV Table VIII Table X			X*		X* X*	X



Additive Name	Reference	Dairy	Egg	Meat	F&V	Fish	Unstandardized food /others
	Table XII Table XIII			X*			X X*
Sorbic Acid	Table XI	X*			X*	X*	X*
Sorbitan Monostearate	Table IV						X*
Sorbitan Trioleate	Table IV			X*			
Sorbitan Tristearate	Table IV						X*
Sorbitol	Table IX					X*	X
Sorbitol Syrup	Table IX						X
Spermaceti Wax	Table VII						X*
Stannous Chloride	Table VIII				X*		X
Stearic Acid	Table VIII						X
Stearyl Citrate	Table XII						X*
Stearyl Monoglyceridyl Citrate	Table IV						X
Succinic Anhydride	Table XIII						X
Sucralose	Table IX				X*		X*
Sucrose Acetate Isobutyrate	Table VIII						X*
Sucrose esters of fatty acids	Table IV						X*
Sulphuric Acid	Table VIII Table X Table XIII						X X X
Sulphurous Acid	Table X Table XI			X*	X*	X*	X* X*
Sunset Yellow FCF (FD&C Yellow #6)	Table III FDR, B.06.046	X*		X*	X*	X*	X*
Talc	Table VIII						X
Tannic Acid	Table IV Table VIII						X* X
Tartaric Acid	Table X Table XI	X			X		X X
Tartrazine (FD&C Yellow #5)	Table III FDR, B.06.045	X*		X*	X*	X*	X*
Tertiary Butyl Hydroquinone	Table XI						X
Thaumatococin	Table IX						X*
Titanium Dioxide	Table III	X	X	X*	X	X	X
Tocopherols (alpha- tocopherol; tocopherol concentrate, mixed)	Table XI			X		X	X
Tragacanth Gum	Table IV	X*			X	X*	X*
Transglutaminase	Table V	X		X		X	X
Triacetin	Table VIII						X
Triethyl Citrate	Table VIII Table XV	X*					X
Trypsin	Table V						X



Additive Name	Reference	Dairy	Egg	Meat	F&V	Fish	Unstandardized food /others
Turmeric	Table III	X	X	X*	X	X	X
Wood Smoke	Table XI	X		X		X	X
Xanthan Gum	Table IV	X*			X*		X*
Xanthophyll	Table III	X	X	X*	X	X	X
Xylanase	Table V						X
Xylitol	Table IX						X
Zein	Table VII						X*
Zinc Sulphate	Table XIV						X

X : this additive can be used in some specific foods

* : a standard could exist for the use of this additive



PART II

PROCESSING STEPS



PROCESSING STEPS

In addition to hazard identification for product ingredients and incoming materials, there may be hazards associated with various food processing steps and these should be identified and controlled by the establishment as well. This section of the Reference Database for Hazard Identification aims to provide general information on the different hazards that are potentially associated with common food processing steps.

Table 1 lists the most common food processing steps. On the right side of the table, there are three columns headed by the letters “B”, “C” and “P”. These letters stand for biological, chemical and physical hazards respectively.

Table 2 lists hazard information of the most common food processing steps. For more information on specific hazards, please refer to Part IV for biological hazards, Part V for Chemical hazards including allergen and nutrition hazards, and Part VI for physical hazards.

Note: This section does not contain a complete listing of all possible processing steps and their associated hazards. Users are recommended to conduct a process hazard assessment for each individual processing step to ensure all hazards specific to their food processes are identified and subsequently controlled by implementing appropriate measures.



TABLE 1

PROCESSING STEPS	B	C	P
Acidifying	X		
Additional Marking of suspect Animals -Pork	X	X	X
Age Determination of Bovine	X		
Agglomerating	X		
Aging (Cheese) Ripening	X	X	X
Air compressing	X	X	
Air Filtering	X		X
Air Incorporating / Air Purging / Air Agitating	X	X	
Air Knife / Air Blade / Stream or Blower	X	X	
Animal Identification -Red Meat Species	X	X	X
Animal in Holding Pens-Red Meat Species	X		
Antemortem Screening – Red Meat Species	X		
Antimicrobial Treatment (e.g.: Sprouting seeds)	X	X	
Antiparasite Treatment	X		
Application/Applicator – Meat/Cheese/Garnish	X		X
Aseptic Filling – Dairy Food	X	X	X
Aseptic Packaging (Forming/Filling/Sealing)	X		
Aseptic Storing – Dairy Product	X	X	X
Assembling	X	X	X
Bagging (See also Packaging)	X		
Bag Stripping and Slicing – Ham	X		X
Baking	X		
Baking Oven (Crust)			X
Basket Loading	X		
Battering / Batter Application /Breading	X	X	X
Batter Mixing	X	X	X
Back Slopping (in Fermented Meat)	X		
Blanching (Heat Treatment)	X	X	
Blast Freezing / Chilling	X		
Bleeding Incision – Poultry	X		
Bleeding – Red Meat Species	X		
Blending / Mixing	X	X	X
Boarding or loading (e.g.: Bread and bagel)			X
Boiling	X	X	
Boning (See also Trimming)	X	X	X
Box Forming	X		
Boxing- Hatchery	X	X	
Breading and Pre-browning	X	X	X
Breading – see Battering /Batter Application / Breading			
Breaking (Shell Eggs)	X		
Breast Boning – Poultry	X	X	X
Breast Fillet Sizing – Poultry	X	X	X
Brine Chilling	X		
Brine Filling	X		X
Brine Injecting (See also Curing, Filling)	X	X	X
Brine Mixing-Poultry	X	X	X
Brine Preparation / Making	X	X	X
Brining (See also Salting, Pickling)	X	X	X
Brisket Saw (see also Carcass Dressing)	X		
Bulk Packaging – Dairy Food	X	X	X
Bunging / Brisket & Mid-line Opening / Pizzle Removal / Aitch Bone Splitting / Bung Dropping / Toe Notching -Pork	X		X
Bunging – Red Meat Species (see Carcass Dressing)	X		
Can Cooling	X		
Can Conveying	X		X
Can Drying	X		



PROCESSING STEPS	B	C	P
Candling (eggs)	X		
Candling / Transferring / Inova Vaccination - Hatchery	X	X	
Capping	X	X	X
Carcass Chilling- Red Meat Species	X		
Carcass Chilling & Hanging – Poultry	X	X	
Carcass Detention (specified Hold Area) – Red Meat Species	X	X	
Carcass Dressing (Head removal, Roding and Tying of the oesophagus, recutting of the front feed, trimming and Brisket Splitting – Beef)	X		
Carcass Partial Chilling – Red Meat Species (see Carcass Chilling- Red Meat Species)			
Carcass Shower, Off-line-reprocessing & reconditioning or salvaging – Poultry	X	X	X
Carcass Splitting and Roller Transfer – Beef (see carcass dressing)	X		X
Carcass Wash- Red Meat Species	X		
Carton Assembly / Liner insertion	X		X
Carton Filling	X		
Carton Forming and Sealing	X	X	X
Casing Removal / Slicing	X		
Cavity & Viscera Defect Detection – Poultry	X		
Check Trim -Pork	X	X	X
Cheddaring	X	X	X
Cheese Setting – Renneting	X		X
Chick Handling – Hatcheries			X
Chick Holding - Hatchery	X	X	
Chick Processing - Hatchery	X	X	
Chick Storage – Hatchery	X	X	
Chick Takeoff - Hatchery	X		
Chilling (See also Cooling) - Carcasses– Red meat species	X	X	X
Chilling (See also Cooling) Offals – Red meat species	X		
Chilling, (See also Cooling, Icing)	X	X	X
Chilling (Paws, Giblets, Necks, Portions) - Poultry	X	X	
Chopping	X		
Churning	X	X	X
Clarifying (Processed Egg)	X		
Cleaning/Washing, Cleaning/Inverting Containers	X	X	X
Cleaning/Washing - Primary Vegetable	X	X	X
Cleaning/Washing (Processed Products)	X	X	
Clipping			X
Closing – Maple Products	X	X	X
Coding (See also Labelling)	X	X	
Coding and Holding (Dairy Product)	X		
Cold Side Pasteurizing – Honey		X	
Cold Smoking (Fish)	X	X	
Concentrating		X	
Condensing (See also Evaporating)	X		
Container Washing (Washer/Inverter)	X	X	X
Container Integrity Evaluating/Labelling-Canned food	X	X	
Containers Washing & Sanitizing/Storage	X	X	
Conveying (e.g.: Roller, Belt, Elevators)	X	X	X
Conveying and Cooling – Dairy Foods	X	X	
Conveying/Drying- Canned Food	X		
Conveyor and Sorter	X		
Cooking (See also Smoking)	X		
Cooking “Kettles Loading” – Meat (see cooking)	X		
Cooling (Air Flow) / Chilling	X	X	X
Cooling (Water Contact & Plate Coolers)	X	X	X
Cooling – Dairy Food	X	X	X
Cooling (See also Chilling, Icing)	X	X	
Coring (See also Cutting, Dicing, Peeling, Slicing)	X	X	X
Cream Neutralizing	X	X	X
Cropping – Poultry	X		
Curd Milling	X	X	X



PROCESSING STEPS	B	C	P
Curd Production (Milk Ripening, Setting, Cutting, Heating, Cooking)	X	X	X
Curd Washing	X	X	X
Curing (See also Brine Injecting)	X	X	X
Cutter – Oil Sac-Poultry	X		
Cutting / Slicing / Dicing	X	X	X
Debeaking – chick for reproduction (hatchery) “type ponte” “Layer hen”, “Turkey hen”	X		
Dehairing / Gimming – Pork	X		X
Dehydrating / Drying (Fruits and Vegetables)		X	X
Dehydrating / Drying Meat	X		
Demoulding (Meat)	X		
Depatilletizing – Can	X		
Desalting	X		
Destoning (Riffles) / Dewatering			X
Desugaring Egg Albumen	X		
Detection and inspection of non-compliant carcasses – Poultry	X		
Detention and Marking Suspect Animals -Pork	X	X	X
Dicing (See also Cutting, Slicing)	X	X	X
Disassembly/Harvesting White Viscera – Red Meat	X		
Disinfecting (Tap hole – Maple Syrup)		X	
Disposal - Hatchery	X	X	
Disposal of Waste	X		
Distribution / Distributing	X	X	X
Dividing	X	X	X
Dosage (Dairy Products)	X		X
Dough Rework	X	X	
Draining-Dairy Food (e.g.: Curd, Whey,...)	X	X	X
Draining (Tables / Racks)	X		X
Dressing (Carcass) – See each step for specific hazard	X	X	X
Drop Table – Sausage	X		
Drying/Dehydrating Meat (see Dehydrating/Drying Meat)	X		
Drying (Egg and Egg Product)	X		X
Drying (Forced Air) – Produce (see also: Cooling – Air Flow)	X	X	X
Drying (Milk and Milk Products)	X	X	
Dud Detection	X		
Dumping – Tote			X
Dumping of Returns – Honey			X
Egg Breaking	X		
Egg Saniation –Hatchery			X
Empty Container/Packing Material –Inspection Handling	X	X	X
Emulsifying/Emulsion/Emulsify (e.g.: Silent Cutter)	X	X	X
End Feeding/Closing/Inspection –Canned Foods	X	X	X
Enrobing	X	X	X
Evaporating/Condensing	X	X	
Evisceration –Beef (See also Carcass Dressing)	X		
Evisceration –Pork (See also Carcass Dressing)	X		
Evisceration –Vent Opening, Slitter -Poultry	X		
Examination, Packaging and Labelling -Pork	X	X	X
Extracting (Honey)			X
Fermentation (Egg Products)	X		
Fermentation of Vegetables	X		
Fermenting (see Also Proofing)	X		
Filling – Other	X		X
Filling (Hermetically Sealed)	X	X	X
Filling/Filling With Hopper	X	X	X
Filling Jars with Pickles			X
Filling – Maple Syrup	X		
Filling / Packaging / Labelling	X	X	X
Filtering	X	X	X
Final Trimming Back Rail/Carcass Approval Pork (See also Dressing Carcass)	X		
Final Trimming (Mail Rail) Red Meat Species (See also Carcass Dressing)	X		



PROCESSING STEPS	B	C	P
Final Rinsing -Eggs		X	
Final Wash -Pork	X		
Fine Particles Recycling –Dairy Process	X	X	X
Flaking			X
Flavour Adding	X	X	X
Flotation Cleaning		X	
Fluming	X	X	
Foot Femoval and Hide Removal -Pork	X		
Foreign Object Removing	X		X
Forming Product	X	X	X
Formulation/Formulation (See Mixing)	X	X	X
Freezing/Storing	X		X
Freezing (Dairy Products)	X	X	X
Freezing (IQF)	X	X	X
Fruit and Nut Feeding	X	X	
Frying		X	
Fumigation – Hatchery	X	X	
Fumigation - Spice	X	X	
Garnishing	X		
Gas Flushing	X	X	
Giblets Harvesting & Viscera / Neck Removal & Neck Skin Cutting – Poultry	X		
Glazing	X		
Grading Pork	X		
Grading – Quality / Screen Sizing – Vegetable	X	X	X
Grading, Sixing Bins-Poultry	X	X	X
Grinding	X	X	X
Hanging	X		
Handling of Egg Shells and Inedible Egg	X		
Handling of Ingredients	X		X
Handling of Returns	X		
Hardening (Ice Cream)		X	X
Hatching – Hatchery	X	X	
Head Dropping / Removal – Red Meat Species (See also Carcass Dressing)	X		
Head Removal – Red Meat Species see Head Dropping / Removal - Red Meat Species			
Head Removal – Poultry	X		
Head Spacing	X		X
Heat Exchanger	X	X	X
Heating / smoking /charring	X		
Heat Treating (Dairy)	X	X	X
Heat Treatment / Heat Treated Milk and Dairy Ingredients Storing – Dairy Food	X	X	X
Heat Treatment (Hot Room)	X		
Heat Treatment (See also Parasite Treatment, Cooking)	X		
Held Rail Trimming – Red Meat Species	X	X	X
Hermetic Container Closing (See also Seaming, Packaging)	X	X	
Hide Wash -Pork	X		
Hock Cutter – Poultry	X		
Holding Product	X	X	X
Holding Cooler – Meat	X	X	X
Holding – Heating Tank – Maple Product		X	X
Holding Freezer	X		



PROCESSING STEPS	B	C	P
Holding – Shell Eggs	X		
Homogenizing	X	X	X
Honey Testing		X	
Hooping and Pressing	X	X	X
Hot Room Dumping – Honey			X
Hot Side Pasteurizing – Honey		X	
Hydrating	X	X	X
Hydroflacking	X		X
Hydrolysis Enzymatic	X	X	X
Hyperchloration	X	X	
Ice Making/ Storage	X		X
Icing (See also: Chilling , Cooling)	X		X
I.Q.F. Freezer	X	X	X
Incubating (Low Acid Canned Food)	X		
Incubating / Incubation	X	X	X
Incubation – Hatchery	X	X	
Individually Quick Freezing of Products	X	X	X
Injecting of Brine (See also Brine Injecting)	X	X	X
Injecting (Seed injecting) Honey			X
Injection	X		X
Inoculating see Back Slopping			
Inspecting / Sorting	X	X	X
Internal Vacuum – Poultry	X		
Irradiation	X	X	
Jar Checking			X
Jar Inverter, Air Blasting			X
Labelling (See also Coding)	X	X	
Layering of Sliced Meat	X	X	X
Loading Shell Eggs	X		
Lysozyme Extraction	X		X
Manual Handling	X	X	X
Massaging / Massage	X	X	X
Maturation	X	X	X
Meat Drying	X		
Mechanical Separating	X	X	X
Membrane Processing	X		
Metal Detection / Metal Removing (Magnet)			X
Microwaving	X	X	X
Milk Separating	X	X	X
Mincing	X		
Mixing / Formulation / Preparing (See also Blending and Formulating)	X	X	X
Mixing – Garnish	X	X	X
Mixing/grinding / boning /fabrication	X		X
Mixing / Nitrite – Meat (See also Blending)	X	X	X
Mixing of Additive	X	X	
Modified Atmosphere Packaging (See also Packaging, Sealing)	X		
Moulding	X	X	X
Neck Breaking / Neck and/or Neck Skin Removal – Poultry	X		
Neck Harvesting – Poultry	X	X	X
Offal Harvesting – Pork (See also Carcass Dressing)	X	X	X
Oiling – Shell Egg	X	X	
Open Midline & Brisket-Pork (see also Carcass Dressing)	X		
Ozonation	X	X	X
Packaging, Labelling	X	X	X
Packaging / Packing Into Containers	X	X	X
Packaging – Eggs	X		
Packaging – Eggs – Hatchery	X		
Packaging refrigerated Smoked Fish	X		



PROCESSING STEPS	B	C	P
Palletizing	X		X
Pasteurizing (Honey / Juice)	X	X	X
Pasteurizing (HTST)	X	X	X
Pasteurizing (Steam) – Red Meat Species	X		
Pasteurizing (VAT)	X	X	
Pasteurizing / Heat Treating – (VAT) Discontinuous – Dairy Product	X	X	X
Pasteurizing/Cooling Continuous – Dairy Food	X	X	X
Pasteurizing (See also Cooking, Smoking)	X	X	X
Patty formation	X		X
Peeling / Peeler (Meat Products)	X		X
Peeling (See also: Coring)	X	X	X
Peeling Eggs (automated / by Hand)	X		X
Pickle Making / addition (Top Up)	X	X	X
Pickling (See also Brining, Salting)	X		
Pitting see: Peeling , Coring			
Placing Eggs in drawers – Hatcheries			X
Polishing /Singeing /Shaving (Scraping) - Pork	X	X	
Post Mortem Inspection (Head, Carcass and Viscera) - Pork	X		
Post-Process Container Handling	X		
Preblending	X		X
Pre-Chill Trimming – Poultry	X		
Pre-Cutter – Poultry	X		
Pre-Dusting	X		X
Pre-Evisceration, Wash – Pork	X		
Preheating	X	X	
Premixing	X	X	X
Preselection (Carcass Defect Detection)	X		
Presentation and Review of Livestock Information Sheet (LIS) - Pork	X		
Presentation of Viscera for Inspection (Red Meat and Poultry)	X		
Pressing (Juices)	X	X	X
Pressing (Meat Products)	X		X
Pressing – Moulding (Dairy Products)	X	X	X
Printing (packaging of butter)	X	X	X
Proceeding to Slaughter /Stunning – Pork	X	X	X
Production, Handling and Storage of Starter Cultures (Lactic Ferment)	X	X	
Proofing- Bakery	X	X	
Pumping – Poultry	X	X	X
Pumping into Cups – Meat	X		
Pumping – Vegetable	X	X	X
Refrigerated Batter Mixing and Holding Tank	X		
Receiving-Arrival of Animals (Red Meat Species)	X		
Receiving-Arrival of Poultry	X		
Receiving Chemicals		X	
Receiving of Chicks - Hatchery		X	
Receiving of Egg's – Hatchery		X	
Receiving (Ingredients)	X	X	X
Receiving – Packaging Materials	X		
Receiving /Unloading /Ante Mortem Examination and Holding Live Swine - Pork	X		
Reconstituting	X	X	X
Re-hanging / Automatic Transfer / Grading / Sizing Bins – Poultry	X	X	X
Rejected Packages & Portions	X		X
Rejection – Poultry	X		
Reprocessing, Line Shower, Reprocessing /Cut up, Portion and Carcass Chilling – Poultry	X		
Reprocessing / Rework (Meat)	X		X
Re-mixing of Brine	X		X
Rendering	X		
Repackaging	X		
Retarding - Bakeries (stop yeast from growing)	X	X	
Retorting (See also Sterilizing)	X		
Return (Meat)	X		



PROCESSING STEPS	B	C	P
Reverse Osmosis / Ultrafiltration	X	X	
Reworking	X	X	X
Rework Storage	X		X
Rinsing Pork Tongue	X		
Ripening (Cheese Curd)	X	X	X
Salting (See also Brining, Pickling)	X	X	X
Salting – Dairy Product	X	X	X
Salt Removal	X		
Sampling	X	X	X
Sanitizing (Egg's)		X	
Sanitizing (Egg's in the incubator) Hatchery	X	X	
Sauce Applicator	X		
Sawing	X		X
Scalding Pork	X	X	
Scalding & Defeathering,	X		
Scaling ingredient	X	X	X
Scanning (See also Candling)	X		
Screening of Spice Blend / Coarse Screening			X
Seasoning (Seasoning Vats)	X	X	X
Seaming / Sealing (Non-Hermetic)	X	X	
Segregation of Suspect Product	X	X	X
Selection / Process Time Verification – Prosciutto	X		
Separating / Clarifying	X	X	X
Setting (Cheese Curd)	X	X	X
Shaving / Polishing / Singeing see Polishing /Singeing /Shaving (Scraping) – Pork			
Sheeting	X		X
Shipping	X	X	X
Shipping – Hatchery	X		
Shower – Carcass – Poultry	X		
Shredding – Cheese	X		X
Sifting	X		X
Simmering (See also Cooking)	X		
Singeing / Polishing / Shaving (Scraping) see Polishing /Singeing /Shaving (Scraping) – Pork			
Sizing	X		X
Skinning Beef	X		
Skinning Pork	X		
Slicing / Dicing (See also Cutting)	X	X	X
Smoking (See also Cooking)	X	X	
Smoothing and Cooling Dairy Food	X	X	X
Soaking	X	X	X
Softening of Leaf Fat	X		
Sorting and Conveying – Eggs	X		
Sorting Feet – Poultry	X		
Spacer Removal – Poultry			X
Specified Risk Material Removal (Bovine)	X		
Spiral Freezing Tunnel			X
Splitting – Pork (see also Carcass Dressing)	X		X
Spray Vaccination - Hatchery	X	X	
Spur Removing (Hatchery)	X		
Stacking of Containers	X		X
Standardizing – Dairy Product	X	X	X
Starter Culture – Production, Handling and Storing	X	X	
Steam Injecting		X	X
Steam Vacuuming (Meat)	X		



PROCESSING STEPS	B	C	P
Sterilizing / Retorting	X	X	
Sticking / Bleeding – Pork	X		
Stick Wound and Blood Clot Removal - Pork	X		
Storage see Storing/Storage			
Storage – Egg – Hatchery	X	X	
Storage – Pasteurized Dairy Ingredients / Milk (see storing/storage)	X		
Storage – Raw Milk	X		
Storing / Storage – Dry	X	X	X
Storing / Storage – Maple Products		X	
Storing / Storage	X	X	X
Storing / Storage – Cans / Ends Storing (see storing/ storage)	X	X	
Storing / Storage – Cooler – Eggs	X		
Storing / Storage – Sweetener Agent, Chocolate Coating (see storing/storage)	X	X	X
Straining	X		
Stuffing	X	X	X
Surface rubbing	X		
Syruping	X	X	
Tempering	X		
Tenderizing (See also Aging)	X	X	
Thawing	X		
Thermal Processing (Still Steam Retorts) (see sterilisation)	X		
Tongue, Head Meat / Parts Harvesting - Pork	X		X
Transfer – Automatic / Preselection – Poultry	X		
Transferring / Candling/ Inova vaccination – Hatchery (see Candling /transferring /inova vaccination)			
Transfer / Rehang – Manual and Preselection-Poultry	X	X	
Transfer into Tubs – Meat	X		X
Transfer to the Hopper – Poultry	X		X
Transferring	X	X	
Transferring (Pumps and Pipes)	X	X	X
Transferring – Shell Egg	X		
Traying – Hatchery	X	X	
Tree Sticks and Trees & Sticks – Sausage	X		X
Trimming (See Dressing Carcass)	X	X	X
Trimming / Final Examination – Poultry	X	X	X
Trimming /Final Examination /Grading /Carcass approval - Pork	X	X	X
Trimming (Non-Meat)	X	X	X
Tumbling	X		X
Ultrafiltration	X	X	
Ultrafiltration (UHT)-Sterilizing/Cooling-Dairy Food	X	X	X
Unloading / Hanging – Live Bird	X		
Unmoulding	X		
Vacuum Packaging (See also Sealing)	X		X
Vaccination – Hatchery	X	X	
Vaccine Preparation - Hatchery	X	X	
Vaccine Storage - Hatchery	X		
Venting / Opening / Evisceration and Shower (Poultry)	X		
Vitamin / Mineral Addition	X	X	
Wash & Antibacterial Rinse – Red Meat Species	X	X	X
Washing	X	X	X
Washing – Carcasses – Poultry	X		
Washing – Cheese Curd	X	X	X
Washing – Crate – Poultry	X		
Washing / Emptying Barrels – Maple Products	X	X	X
Washing – Processed and Shell Egg	X	X	X
Washing – Processed Products included Dairy Product	X	X	X
Washing and Disinfecting – Crate / Trailer – Poultry	X		
Washing Used Packaging	X	X	
Wash – Organic Acid – Red Meat Species	X	X	
Wash Water Chlorination	X	X	



PROCESSING STEPS	B	C	P
Water Chlorination	X	X	
Water Distribution	X		X
Water Filling – Canned Foods	X		
Water Filtering / Filtration	X	X	X
Water Treating (Water intake and Treatment)	X	X	X
Wattle removal – Hatchery	X		
Waxing	X	X	
Weighing	X	X	X
Weighing / Inspecting – Maple Product	X	X	
Whey Recuperation	X	X	
Whey Storage (From Processing)	X	X	
Working – Dairy Food – Butter	X	X	X
Weighing / Measuring & Injection – Meat	X	X	X
Wrapping	X	X	X
Yolk Skimming	X		



PROCESSING STEPS – DETAILS TABLE 2

ACIDIFYING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen growth/survival due to pH above 4.6

ADDITION MARKING OF SUSPECT ANIMALS - PORK

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Spreading disease(s) (see incoming materials) to other animals and humans due to the identification not being readily visible or due to the loss of identification of the suspect animals
C	Unacceptable levels of drug (e.g.: antibiotics, coccidiostats, vaccines components), or environmental contaminants (e.g.: heavy metal, and pesticide residues) or contaminants (e.g.: dioxins) due to the identification not being readily visible or due to the loss of identification of the suspect animals
P	Presence of hazardous extraneous material, (e.g.: broken needles, leadshot, wires in tongue/mouth) due to the identification not being readily visible or due to the loss of identification of the suspect animals

AGE DETERMINATION OF BOVINE

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Contamination of the food chain by SRM (Specify Risk Materials) due to inadequate age determination failure to control SRM

AGGLOMERATING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to product accumulations

AGING (CHEESE) RIPENING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen growth due to time/temperature abuse
B	Pathogen growth due to improper pH reduction
B	Pathogen survival (improper temperature and time of aging)
B	Pathogen recontamination (e.g.: damaged containers - rodent damage)
C	Contamination from non-food chemicals
P	Contamination from hazardous extraneous material

AIR COMPRESSING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to unfiltered air or improper cleaning of air hoses on water chillers, as well in certain dairy and processed egg processes
B	Pathogen contamination due to inadequate cleaning of chiller air line or lack of air filter(s) or contaminated air source as well in certain dairy and processed egg processes



- C Contamination by unfiltered air or improper cleaning of air hoses on water chillers as well in certain dairy and processed egg processes
- P Contamination from hazardous extraneous material

AIR FILTERING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination from airborne pathogens
B	Pathogen contamination from infrequent changing of filter or replacement of filter
B	Bacterial growth on filters
P	Contamination from hazardous extraneous material

AIR INCORPORATING / AIR PURGING / AIR AGITATING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Contamination by airborne pathogens (e.g.: <i>Listeria monocytogenes</i>)
C	Contamination by oil from compressors

AIR KNIFE /AIR BLADE /STREAM OR BLOWER

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to missing or overloaded airline filter or wrong air filter
C	Contamination with oil droplets due to missing or overloaded airline filter
C	Contamination by using tank with wrong gas

ANIMAL IDENTIFICATION- RED MEAT SPECIES

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Spreading disease(s) (see incoming materials) to other animals and humans due to the identification not being readily visible or due to the loss of identification of the suspect animals
C	Unacceptable levels of drug (e.g.: antibiotics, coccidiostats, vaccines components), or environmental contaminants (e.g.: heavy metal, and pesticide residues) or contaminants (e.g.: dioxins) due to the identification not being readily visible or due to the loss of identification of the suspect animals
P	Presence of hazardous extraneous material (e.g.: broken needles, leadshot, wires in tongue/mouth) due to the identification not being readily visible or due to the loss of identification of the suspect animals

ANIMAL IN HOLDING PENS- RED MEAT SPECIES

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen increase caused by increase in meat pH due to insufficient resting time in holding pens (e.g.: <i>Salmonella spp</i>)
B	Pathogen contamination due to inadequate temperature of sanitizers with diluted/dirty solution
B	Increase bacterial load on the hide animal due to cross contamination between clean and dirty/sick animal



B
ways

Increase bacterial load on the animal hide due to dirty pens and alley



ANTEMORTEM SCREENING – RED MEAT SPECIES

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathologies non detected from animal
B	Pathologies non detected from poorly identified animal
B	Animal not segregated for veterinary inspection
B	Presence of BSE due to failure to detect symptoms in live animals, difficult to detect during post mortem examination (e.g.: rage, BSE ...)

ANTIMICROBIAL TREATMENT - (e.g.: SPROUTING SEEDS)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen growth /survival due to improper duration of treatment or concentration of disinfectant solution
B	Pathogen survival due to improper agitation
B	Pathogen contamination due to inadequate washing/sanitizing of equipment and utensils
B	Pathogen contamination due to poor hygiene and improper handling by employees
C	Chemical contamination due to excessive concentrations used
C	Contamination due to non food chemicals (e.g.: cleaners, sanitizers and lubricants)

ANTIPARASITE TREATMENT

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Inadequate curing method
B	Survival of parasite due to improper time/temperature applications procedures
B	Survival of <i>Taenia spp.</i> and <i>Trichinella spiralis</i> due to improper application of cooking/freezing

APPLICATION/APPLICATOR – MEAT/ CHEESE/GARNISH

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to improper handling by employees
B	Pathogen contamination due to build up of product during operation
B	Pathogen growth due to time/temperature abuse
P	Contamination from hazardous extraneous material

ASEPTIC FILLING – DAIRY FOOD

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination from inadequate sterilization of the filter
B	Pathogen contamination due to soiled packaging material
B	Pathogen contamination due to inadequate packaging material
sterilisation	
B	Pathogen contamination due to package integrity failure
B	Pathogen contamination due to product accumulations
C	Contamination from non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
C	Contamination from hydrogen peroxide
P	Contamination from hazardous extraneous material



ASEPTIC PACKAGING (FORMING/FILLING/SEALING)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to failure to sterilize packaging materials / packaging equipment

ASEPTIC STORING- DAIRY PRODUCT

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to product accumulations
B	Pathogen contamination due to the failure of aseptic valves
B	Pathogen contamination due to loss of over pressure
B	Pathogen contamination due to time/temperature abuse
C	Contamination from non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
P	Contamination from hazardous extraneous material

ASSEMBLING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination/growth due to improper handling and operation procedure
B	Pathogen growth due to time/temperature abuse
C	Cross contamination due to allergens product
P	Contamination from hazardous extraneous material

BAGGING (See also Packaging)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to damaged or soiled containers/packaging material
B	Pathogen contamination due to air-borne pathogens (e.g.: <i>Listeria monocytogenes</i>)

BAG STRIPPING & SLICING –HAM

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination on product surfaces due to improper handling and operation procedure (e.g.: <i>Staphylococcus aureus</i> , <i>Listeria monocytogenes</i>)
P	Contamination from hazardous extraneous material

BAKING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen survival due to improper temperature distribution / time/temperature applications

BAKING OVEN (CRUST)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
P	Contamination from hazardous extraneous material (e.g.: metal from oven brush)



BASKET LOADING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to damaged containers

BATTERING / BATTER APPLICATION / BREADING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination/growth due to improper handling and operation procedure
B	Pathogen growth due to time/temperature abuse
B	Pathogen contamination due to recycled batter/breading
C	Cross contamination due to allergens product
C	Inaccurate nutrition information (e.g.: due to mislabelling) could impact on individuals with certain medical conditions
P	Contamination from hazardous extraneous material

BATTER MIXING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to improper handling and operation procedure
B	Enterotoxin development due to improper temperature control
C	Chemical residues on product contact surfaces due to improper cleaning procedures
C	Cross contamination due to allergens product
C	Inaccurate nutrition information (e.g.: due to mislabelling) could impact on individuals with certain medical conditions
P	Contamination from hazardous extraneous material

BACK SLOPPING (FERMENTED)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to improper handling and operation procedure, contaminated utensils (e.g.: <i>Salmonella spp</i> , <i>Staphylococcus aureus</i> , <i>Listeria monocytogenes</i>)
B	Pathogen contamination due to inoculum
B	Pathogen contamination due to improper handling by employees

BLANCHING (HEAT TREATMENT)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Contamination by thermophilic micro-organisms in product accumulation
B	Insufficient time/temperature of blanching to remove gases in product (canning)
C	Cleaning chemical residues and/or lubricants

BLAST FREEZING /CHILLING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen growth due to time /temperature abuse
B	Pathogen contamination due to improper packaging (e.g.: lack of packaging procedure) /stacking method /improper air flow



BLEEDING INCISION – POULTRY

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Contamination of poultry by pathogens on bleeding surfaces and wounds
B	Pathogen contamination of the bleeding incision due to build up of organic debris on equipment
B	Pathogen contamination of the bleeding incision due to faulty cleaning and sanitizing of the hands and knife of the back-up employee

BLEEDING- RED MEAT SPECIES

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination of stick wound and head due to employees, or due to the front feet of the animal
B	Pathogen contamination with bleeding equipment due to inadequate temperature of sanitizers

BLENDING / MIXING

Data: Where unknown herbs and other substances that may be novel foods or Natural Health Products are added, contact CFIA or Health Canada.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen growth/survival due to inadequate application of preservative/brine
B	Pathogen contamination due to unclean surfaces of equipment/utensils (e.g.: <i>Listeria monocytogenes</i>)
B	Pathogen contamination due to product accumulations
B	Pathogen contamination due to improper handling by employees
B	Pathogen contamination due to inadequate washing/sanitizing of equipment
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
C	Cross contamination due to allergens product
C	Addition of an allergen/ ingredient containing allergen that is not declared on the product label
C	Inaccurate nutrition information (e.g.: due to mislabelling, nutrient loss during manufacturing or storage) could impact on individuals with certain medical conditions
C	Presence of toxic herbs, unapproved substances/novel foods or substances with other physiological effects/properties poses a potential hazard
C	Chemical contamination from non-food chemicals (cleaners/sanitizers, lubricants)
P	Contamination from hazardous extraneous material

BOARDING OR LOADING (e.g.: Bread and bagel)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
P	Contamination from hazardous extraneous material (e.g.: broken boards/belts)



BOILING

Type of Hazard

Name of Hazard

B

Pathogen survival due to improper time and temperature application

BONING (See also Trimming)

Type of Hazard

Name of Hazard

B

Pathogen contamination due to contamination from conveyors

B

Pathogen growth due to time/temperature abuse

B

Pathogen contamination due to improper handling by employees / poor techniques /contaminates utensils /instruments /equipment

C

Contamination by protective oil (mineral) from various equipment and rollers

P

Contamination from hazardous extraneous material

BOX FORMING

Type of Hazard

Name of Hazard

B

Pathogen contamination due to improper handling by employees

B

Pathogen growth/cross contamination during box forming due to contaminated material being returned from the processing areas to the box forming area

C

Contamination of packaging materials from automatic box forming equipment

BOXING- HATCHERY

Type of Hazard

Name of Hazard

B

Cross contamination due to improper sanitation of re-used boxes (e.g.: *Salmonella sp, sg, se, st*)

B

Pathogenic bacterial contamination due to improper employee handling practices (e.g.: *Salmonella sp, sg, se, st*)

C

Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)

BREADING and PRE-BROWNING

Type of Hazard

Name of Hazard

B

Pathogen growth due to time/temperature abuse

B

Pathogen contamination due to improper handling by employees & operating procedures

B

Pathogen contamination due to inadequate washing/sanitizing of equipment

C

Allergens in finished product due to wrong formulation

C

Cross contamination due to allergens

C

Chemical residues on product contact surfaces due to improper cleaning procedures

C

Contamination from non-food chemicals (e.g: cleaners, sanitizers, and lubricants)

P

Contamination from hazardous extraneous material



BREADING – SEE BATTERING / BATTER APPLICATION / BREADING

BREAKING (SHELL EGGS)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Failure to remove unacceptable product
B	Pathogen contamination due to improper handling by employees

BREAST BONING -POULTRY

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination (growth) due to improper handling by employees / faulty handling procedures
C	Chemical residues on product contact surfaces due to improper cleaning procedures
P	Contamination from hazardous extraneous material

BREAST FILLET SIZING -POULTRY

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination (growth) due to improper handling /employee handling procedures
C	Chemical residues on product contact surfaces due to improper cleaning procedures
P	Contamination from hazardous extraneous material

BRINE CHILLING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination and/or growth due to time/temperature abuse (e.g.: <i>Clostridium perfringens</i> and <i>Clostridium botulinum</i>)
B	Pathogen contamination from chilling solution
C	Contamination due to holes in the plate coolers causing chemical contamination of the brine and then the product

BRINE FILLING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Under processing due to overfill of containers
B	Pathogen contamination / survival due to incorrect preparation/formulation
B	Pathogen contamination in brine due to lack of equipment sanitation
B	Pathogen growth due to time/temperature abuse of brine or recirculating
P	Contamination from hazardous extraneous material (e.g.: breakage during filling could contaminate subsequent jars with glass fragments)

BRINE INJECTION (See also Curing, Filling)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen growth/survival due to inadequate application of preservative/brine
B	Pathogen contamination due to inadequate washing/sanitizing of



- equipment
- C Chemical residues on product contact surfaces due to improper cleaning procedures
- C Improper amounts of salt/nitrites/nitrates
- P Contamination from hazardous extraneous material (Broken injector needles)

BRINE MIXING - POULTRY

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to improper handling by employees & operating procedures
B	Pathogen contamination due to inadequate washing/sanitizing of equipment
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
P	Contamination from hazardous extraneous material

BRINE PREPARATION / MAKING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen survival due to incorrect preparation/formulation
B	Pathogen growth/survival due to degradation of preservatives (excess hold/recycle)
B	Pathogen contamination due to salt-tolerant pathogens
B	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
C	Improper amounts of salt/nitrites/nitrates
C	Cross contamination from non-food chemicals (cleaners and sanitizers)
P	Contamination from hazardous extraneous material

BRINING (See also Salting, Pickling)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to salt-tolerant pathogens
B	Pathogen growth/survival due to inadequate application of preservative (salt/nitrite/nitrate)/brine
B	Salt-tolerant pathogens growth due to inadequate temperature
B	Pathogen growth due to inappropriate turn over
B	Pathogen contamination due to inadequate equipment cleaning and sanitation or improper handling & operating procedures
B	Cross-contamination - raw and pasteurized product using the same brine
C	Improper amounts of salt/nitrites/nitrates/brine due to inadequate application of preservative
C	Contamination from non-food chemicals (e.g.: cleaners, sanitizers)
P	Contamination from hazardous extraneous material

BRISKET SAW (SEE ALSO CARCASS DRESSING)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
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- B Contamination by blind cutting through infected tissues (e.g.: pneumonia abscesses...)
- B Contamination by pathogens due to improper sanitation

BULK PACKAGING- DAIRY FOOD

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to improper handling by employees and damaged containers /packaging material
B	Pathogen contamination due to airborne pathogens (e.g.: <i>Listeria monocytogenes</i>)
C	Contamination by non-food chemicals (e.g.: lubricants)
P	Contamination from hazardous extraneous material

BUNGING / BRISKET & MID-LINE OPENING / PIZZLE REMOVAL / AITCH BONE SPLITTING / BUNG DROPPING / TOE NOTCHING –PORK

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Contamination and cross-contamination of carcasses with pathogens due to contact between bung and skin (e.g.: Bunning, Bung Dropping)
B	Contamination and cross-contamination of carcasses with pathogens due to cutting into the gastro-intestinal tract (e.g.: improper bunning technique)
B	Contamination and cross-contamination of carcasses with pathogens due to failure to detect and mark sources of contamination (e.g.: abscesses) and subsequently override automated equipment or send the carcass to the appropriate trimming station
B	Contamination and cross-contamination of carcasses with pathogens due to cutting through infected tissues (e.g.: pneumonia, abscesses) with no possibility of identifying the situation (e.g.: Brisket Opening)
B	Contamination and cross-contamination of carcasses with pathogens due to cutting through infected tissues (e.g.: abscesses) which will be evident after the cut is made (e.g.: Bunning, Mid-line Opening, Pizzle Removal)
B	Contamination with pathogens due to inadequate temperature and/or water replenishment of sanitizer
P	Contamination from hazardous extraneous material (e.g.: metal fragment from brisket saw, aitch bone cleaver)

BUNGING- RED MEAT SPECIES (SEE CARCASS DRESSING)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Faecal contamination from faulty bunning technique

CAN COOLING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Microbial contamination of product into the cans while the seams are stressed

CAN DRYING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
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B Pathogen contamination by corrosion due to excessive chlorine levels

CAN CONVEYING

Type of Hazard

Name of Hazard

B

Post-process contamination due to damaged cans

P

Contamination from hazardous extraneous material (empty cans)

CANDLING (EGGS)

Type of Hazard

Name of Hazard

B

Pathogen contamination due to improper handling by employees

B

Pathogen contamination (e.g.: *Salmonella*) due to failure to remove dirty, cracked or reject eggs.

B

Contamination from dirty equipment

CANDLING /TRANSFERRING /INOVA VACCINATION - HATCHERY

Type of Hazard

Name of Hazard

B

Pathogenic bacterial contamination due to the transfer of eggs excessively contaminated with dirt (e.g.: *Salmonella sp, sg, se, st*)

B

Pathogenic bacterial contamination due to vaccination needle not functioning properly

B

Pathogenic bacterial contamination due to improper sanitation of equipment

B

Pathogenic bacterial contamination due to improper cleaning procedures

C

Chemical residues on contact surface due to improper cleaning procedures

CAPPING

Type of Hazard

Name of Hazard

B

Pathogen contamination due to default in seal

B

Pathogen contamination due to improper handling by employees

C

Contamination by non-food chemicals (e.g: cleaners, sanitizers and lubricants)

P

Breakage could contaminate surrounding jars with glass fragments

CARCASS CHILLING – RED MEAT SPECIES

Type of Hazard

Name of Hazard

B

Pathogen growth due to time / temperature abuse (inadequate cooling)

B

Pathogen growth due to overloading of cooling area

B

Pathogen growth due to improper air flow resulting in inadequate

cooling

B

Pathogen growth due to inadequate cooling capacity

B

Pathogen contamination due to air-borne pathogens (e.g.: *Listeria monocytogenes*)

B

Pathogen contamination due to condensation dripping from overhead structures onto carcasses (e.g.: *Listeria monocytogenes*)

B

Pathogen contamination due to improper cleaning of filters, condensers, fans, inappropriate use of filters



B Pathogen contamination due to improper employee handling

CARCASS CHILLING & HANGING – POULTRY

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Spread of pathogens and bacterial growth due to inadequate temperature reduction or water dilution
B	Spread of pathogens through the chiller water
B	Pathogen growth due to inadequate chilling (water and air chilling) (e.g.: time/temperature abuse, improper air flow, overloading of cooling area, inadequate chilling capacity)
B	Contamination of exposed carcasses with pathogens due to unsanitary conditions (e.g.: air chilling)
B	Pathogen contamination (e.g.: <i>Listeria monocytogenes</i>) due to condensation dripping from overhead structures onto carcasses (air chilling)
B	Pathogen contamination due to improper cleaning of filters, condensers, fans, inappropriate use of filter (air chilling)
B	Pathogen survival due to insufficient concentration of the antimicrobial agent
C	Residue due to improper cleaning/drainage of chill tanks
C	Contamination of product due to too high a concentration of the antimicrobial agent
C	Contamination of carcasses with soap or sanitizer residue at the beginning of operations due to improper cleaning /drainage

CARCASS DETENTION (Specified Area) – RED MEAT SPECIES

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to air-borne pathogens (e.g.: <i>Listeria monocytogenes</i>)
B	Pathogen contamination due to improper cleaning of filters, condensers, fans, .../inappropriate use of filters
B	Pathogen contamination due to improper employee handling
B	Growth of pathogens (e.g.: <i>Listeria monocytogenes</i>) due to delay in processing the carcasses or temperature abuse
B	Presence of pathological conditions due to losing the identity of the detained carcasses
C	Chemical contamination by direct or indirect surface contact e.g.: carcasses touching floor, overhead condensation, etc
C	Unacceptable levels of drug (e.g.: antibiotics, coccidiostats, vaccines components), environmental contaminants (e.g.: heavy metal, and pesticide residues) or contaminants (e.g.: dioxins) due to identity loss of the detained carcass(es)

CARCASS DRESSING (HEAD REMOVAL, RODING AND TYING OF THE OESOPHAGUS RECUTTING OF THE FRONT FEET, TRIMMING AND BRISKET SPILTTING – BEEF) (The specific hazard for each of these process steps will be described at each process step if required)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
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- B Cross contamination by faecal material and ingesta during separation and tying of the oesophagus or during separation of the head (e.g.: *Escherichia coli* O157:H7)
- B Pathogen contamination due to inadequate brisket trimming
- B Pathogen contamination during recutting of front feet
- B Pathogen contamination due to inadequate temperature of sanitizers with diluted/ dirty solution
- B Pathogen contamination due to improper handling by employees
- B Cross contamination with prion due to inappropriate tools techniques

CARCASS PARTIAL CHILLING- RED MEAT SPECIES (SEE CARCASS CHILLING – RED MEAT SPECIES)

CARCASS SHOWER, OFF-LINE- REPROCESSING&RECONDITIONING OR SALVAGING- POULTRY

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Failure to reduce pathogen levels due to inadequate application of a water biofilm preventing bacterial attachment and the removal of visible contamination on carcasses e.g.: water insufficient volume or pressure to remove visible contamination, spray nozzles at improper location, number or wrong direction or non-functional, ...
B	pathogen survival due to insufficient concentration of the antimicrobial agent
B	Cross-contamination with pathogens between carcasses
B	Presence of pathogens on carcasses and portions due to failure to effectively remove contamination (e.g.: due to too many defective carcasses)
B	Presence of pathogens due to faulty operation (e.g.: lack of vacuum equipment)
B	Pathogen growth due to delay in processing products
B	Pathogen contamination of carcasses and/or portions due to faulty operational cleaning of equipment or build-up of organic debris during operations
C	Contamination of product due to too high a concentration of the antimicrobial agent
C	Contamination of product with soap or sanitizer residue at the beginning of operations due to improper cleaning /drainage of the pumps and pipes
P	Contamination from hazardous extraneous material (Bone fragments from salvaged product)

CARCASS SPLITTING AND ROLLER TRANSFER – BEEF (SEE CARCASS DRESSING)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to inadequate sanitizing procedures of splitting saw



- B Pathogen contamination due to inadequate temperature of sanitizers with diluted/ dirty solution
- B Pathogen contamination due to improper handling by employees
- P Contamination from hazardous extraneous material (metal fragments from carcass saw)

CARCASS WASH - RED MEAT SPECIES

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Contamination with pathogens due to inadequate washing (water at insufficient volume or pressure to remove visible contamination, spray nozzles at improper location, number or wrong direction or non-functional)

CARTON ASSEMBLY / LINER INSERTION

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to dust contamination of plastic liner as opened and inserted (applicable for bulk pack only)
B	Pathogen contamination due to improper handling & operating procedures
B	Contamination from compressed air
C	Contamination from compressed air
P	Contamination from hazardous extraneous material (Incidental material in containers)

CARTON FILLING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to improper handling & operating procedures

CARTON FORMING AND SEALING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to contamination by employee handling
C	Contamination by non-food chemicals (e.g.: lubricants)
P	Contamination from hazardous extraneous material

CASING REMOVAL/ SLICING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to contamination by employee handling
B	Pathogen growth due to time / temperature abuse
B	Pathogen contamination in water bath used for the softening of casing
B	Pathogen contamination due to product contact with contaminated equipment surfaces

CAVITY & VISCERA DEFECT DETECTION-POULTRY

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogens in carcasses and/or on viscera due to failure by company employee(s) to detect visible faecal and/or ingesta contamination and/or to detect visceral pathological conditions; (e.g.:



inadequate presentation of viscera/carcass, lack of synchronization between carcass and viscera, pooling water in the cavity, inadequate lighting, too many defective carcass/viscera, inadequate performance of detectors)

B Cross-contamination with pathogens due to improper removal, handling and placement of defective carcasses

CHECK TRIM – PORK

Type of Hazard

Name of Hazard

B Presence of pathogens due to failure to remove pathological conditions and/or contamination on carcasses

B Cross-contamination due to improper employee handling

B Contamination with pathogens due to inadequate temperature and/or water replenishment of sanitizers

C Presence of chemical contamination due to trimming failure

P Presence of hazardous extraneous material due to trimming failure

CHEDDARING

Type of Hazard

Name of Hazard

B Pathogen contamination due to improper handling by employees

B Pathogen contamination due to product accumulations

B Pathogen contamination due to airborne pathogens (e.g.: *Listeria monocytogenes*)

C Contamination from non food chemicals (e.g.: sanitizers, cleaners)

P Contamination from hazardous extraneous material

CHEESE SETTING – RENNETING

Type of Hazard

Name of Hazard

B Pathogen contamination due to contaminated utensils

B Pathogen contamination due to improper handling by employees

B Pathogen contamination due to air-borne pathogens (e.g.: *Listeria monocytogenes*)

P Contamination from hazardous extraneous material

CHICK HOLDING – HATCHERY

Type of Hazard

Name of Hazard

B Cross contamination from chick to chick through air borne pathogens

B Pathogenic bacterial contamination due to improper sanitation of equipment (e.g.: *Salmonella sp, sg, se, st*)

B Pathogenic bacterial contamination due to pest infestation

C Contamination by non-food chemicals (e.g: cleaners, sanitizers and lubricants)

CHICK HANDLING - HATCHER

Type of Hazard

Name of Hazard

P Mishandling of chicks, causing their injury or death

CHICK PROCESSING- HATCHERY



<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Cross contamination of equipment /needle with pathogenic bacteria from contaminated chicks (e.g.: <i>Salmonella sp, sg, se, st</i>)
B	Pathogenic bacterial contamination due to improper employee handling practices (e.g.: <i>Salmonella sp, sg, se, st</i>)
B	Pathogenic bacterial contamination due to improper sanitation of equipment
C	Contamination by non-food chemicals (e.g: cleaners, sanitizers and lubricants)

CHICK STORAGE- HATCHERY

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Cross contamination of equipment /needle with pathogenic bacteria from contaminated chicks (e.g.: <i>Salmonella sp, sg, se, st</i>)
B	Pathogenic bacterial contamination due to improper employee handling practices (e.g.: <i>Salmonella sp, sg, se, st</i>)
B	Pathogenic bacterial contamination due to pest infestation in storage
B	Pathogenic bacterial contamination due to improper cleaning procedures
C	Contamination by non-food chemicals (e.g: cleaners, sanitizers and lubricants)

CHICK TAKEOFF - HATCHERY

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogenic bacterial contamination due to improper employee handling practices (e.g.: <i>Salmonella sp, sg, se, st</i>)
B	Pathogenic bacterial contamination due to cross contaminated from contaminated chicks to other chicks (e.g.: <i>Salmonella, sp, sg, se, st</i>)

CHILLING (See also Cooling)- CARCASSES – RED MEAT SPECIES

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to product accumulations
B	Pathogen contamination (growth) due to inadequate air cooling of the carcass surfaces (e.g.: time/temperature abuse, improper air flow, over loading of cooling area)
B	Pathogen contamination of carcasses due to contamination by employee handling
B	Pathogen growth due to inadequate cooling (time/temperature abuse, improper air flow, duration of cooling...) (e.g.: <i>Clostridium perfringens</i>)
B	Pathogen contamination due to cooling media
B	Pathogen contamination (growth) due to inadequate spray procedure (cycle, temperature of water, dispersion of water, splashing and dripping)
B	Pathogen contamination due to condensation dripping from overhead



- structures onto carcasses (e.g.: *Listeria monocytogenes*)
- B Growth of pathogens on carcasses from using a cooling process inappropriate for the type of carcasses (size and fat covering)
- C Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
- P Contamination from hazardous extraneous material

CHILLING (See also Cooling) - OFFALS – RED MEAT SPECIES

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination (growth) due to poor air circulation
B	Pathogen contamination due to product accumulations
B	Pathogen growth due to inadequate cooling (rinsing time, time/temperature abuse, water temperature...)
B	Pathogen growth in hot packaged offal due to inadequate cooling

CHILLING (Paws, Giblets, necks, portions) – POULTRY

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen growth due to inadequate chilling (e.g.: time/temperature abuse, improper air flow, overloading of cooling area, inadequate chilling capacity)
B	Spread of pathogens through the chiller water
B	Pathogen survival due to insufficient concentration of the antimicrobial agent
C	Contamination of product due to too high a concentration of the antimicrobial agent
C	Contamination by non-food chemicals (e.g.: cleaners and sanitizers)

CHILLING (See also Cooling, Icing)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination/growth due to contamination by raw product (e.g.: <i>Listeria monocytogenes</i>)
B	Pathogen growth due to poor air circulation between cartons at cooling (e.g.: raw products)
B	Pathogen contamination due to product accumulations
B	Pathogen growth due to inadequate cooling (time/temperature abuse, improper air flow, duration of cooling, stacking procedures) (e.g.: <i>Clostridium perfringens</i>)
B	Pathogen contamination due to improper handling by employees
B	Pathogen contamination due to cooling media
B	Pathogen contamination due to inadequate temperature of sanitizers with diluted/ dirty solution
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
P	Contamination from hazardous extraneous material

CHOPPING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Contamination and growth of <i>Listeria monocytogenes</i> from food



- B contact surfaces and other environmental sources
- B Pathogens contamination from raw products areas, including Salmonella, Campylobacter, *Escherichia coli* O157:H7
- B Outgrowth of Staphylococcus and *Clostridium botulinum*

CHURNING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to product accumulations
B	Pathogen contamination of carcasses due to contamination by employee handling (e.g.: Annato addition)
C	Contamination by non food chemical (e.g.: cleaners, sanitizers and lubricants)
P	Contamination from hazardous extraneous material

CLARIFYING (PROCESSED EGG)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen growth due to product build-up

CLEANING / WASHING, CLEANING /INVERTING CONTAINERS

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Development and growth of micro-organisms if temperature or inversion is not adequate
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
P	Contamination from hazardous extraneous material

CLEANING / WASHING- PRIMARY VEGETABLE

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to contamination from pests (e.g.: insects, rodents, birds)
C	Excessive cleaning chemical concentrations
P	Contamination from hazardous extraneous material

CLEANING / WASHING (PROCESSED PRODUCTS)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to recycled water
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
C	Contamination from non-listed water treatment chemicals
C	Contamination through cross-connections

CLIPPING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
P	Contamination from hazardous extraneous material

CLOSING – MAPLE PRODUCTS



<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Contamination by yeasts and moulds if not properly sealed
C	Dissolved heavy metals (e.g.: improper inner coating, linner of barrels)
P	Contamination from hazardous extraneous material

CODING (See also Labelling)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to damaged containers
B	Pathogen growth due to inaccurate marking of expiration date
B	Pathogen growth may result due to incorrect handling as result of wrong code date (fresh) or (cured)
C	Contamination from inks/solvents
C	Allergenic sensitivity due to incorrect list of ingredients
C	Inaccurate nutrition information (e.g.: due to mislabelling) could impact on individuals with certain medical conditions

CODING AND HOLDING (DAIRY PRODUCT)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to improper temperature control
B	Pathogen contamination due to chill water

COLD SIDE PASTEURIZING- HONEY

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Contamination by chemical residues (e.g.: caustic soda residues)



COLD SMOKING (FISH)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination and/or growth due to time/temperature abuse (e.g.: <i>Staphylococcus aureus</i> , <i>Listeria monocytogenes</i> and faecal bacteria)
B	Pathogen contamination due to improper employee handling (e.g.: <i>Staphylococcus aureus</i> , <i>Listeria monocytogenes</i> and faecal bacteria)
C	Contamination from non-food chemicals

CONCENTRATING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Contamination by chemical residues

CONDENSING (See also Evaporating)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to product accumulations

CONTAINER WASHING (WASHER / INVERTER)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to non potable water
C	Contamination from non-listed water treatment chemicals
P	Contamination from hazardous extraneous material
P	Failure to remove hazardous extraneous matter

CONTAINERS WASHING & SANITIZING /STORAGE

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Contamination of products with pathogens due to survival and/or growth of pathogens in reusable containers caused by their inadequate washing / sanitizing /drying or due to the recontamination of containers
B	Cross-contamination between cleaned and unsanitary containers
C	Contamination of reusable containers by non-food chemical due to the use of unapproved products or too high a concentration of the sanitizer or lack of rinsing

CONTAINER INTEGRITY EVALUATING / LABELLING -CANNED FOOD

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Failure to reject evaluated containers with no/low vacuum and serious defects
B	Post-process contamination due to damaged cans
C	Chemical contamination from non food chemicals (e.g.: sanitizers, cleaners, lubricants)
C	Inaccurate nutrition information (e.g.: due to mislabelling) could impact on individuals with certain medical conditions

CONVEYING (EGG - ROLLER, BELT, ELEVATORS)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
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- B Pathogen contamination due to product accumulations
- B Pathogen contamination due to air-borne pathogens (*Listeria monocytogenes*)
- B Pathogen contamination due to poor/ improper cleaning
- C Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
- P Contamination from hazardous extraneous material

CONVEYING – DAIRY FOODS

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to product accumulations
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)

CONVEYING/DRYING- CANNED FOOD

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Unclean wet can and/or handling equipment could lead to contamination of product

CONVEYOR & SORTER

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to faulty operator hygiene and handling practices (e.g.: <i>Salmonella spp.</i> , <i>Listeria monocytogenes</i> , <i>Staphylococcus aureus</i>)
B	Pathogen contamination due to poor pre-operational cleaning (e.g.: <i>Salmonella spp.</i> , <i>Listeria monocytogenes</i> , <i>Staphylococcus aureus</i>)
B	Pathogen contamination due to product accumulation (e.g.: <i>Salmonella Spp.</i> , <i>Listeria monocytogenes</i> , <i>Staphylococcus aureus</i>)

COOKING (See also Smoking, Pasteurization)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen survival due to improper temperature distribution / time/temperature applications
B	Pathogen survival due to improper equipment calibration
B	Pathogen survival due to improper holding prior to heat treatment
B	Pathogen contamination due to condensate (e.g.: <i>Listeria monocytogenes</i>)
B	Pathogen survival due to improper humidity control
B	Pathogen survival due to improper agitation
C	Inaccurate nutrition information (e.g.: due to mislabelling, nutrient loss during manufacturing or storage) could impact on individuals with certain medical conditions

COOKING “KETTLES LOADING” – MEAT (see cooking)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Insufficient cooking to destroy <i>Trichinella spp</i> and vegetative forms of bacterial pathogens



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COOLING (AIR FLOW) /CHILLING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to air-borne pathogens (e.g.: <i>Listeria monocytogenes</i>)
B	Pathogen contamination due to improper cleaning of filters /inappropriate use of filters
B	Pathogen contamination from unclean environmental air sources
B	Pathogen contamination from dirty air blowing equipment and cooling units
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers, lubricant)
C	Contamination due to excessive chlorine/ vapour (ammonia)
P	Contamination from hazardous extraneous material (e.g.: metal parts from equipment)

COOLING (WATER CONTACT & PLATE COOLERS)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B (canning)	Pathogen contamination due to inadequate residual chlorine levels
B	Post process contamination during cooling and vacuum creation of cans due to contaminated cooling water (canning)
B	Post process contamination due to leakage resulting from corrosion and leakage from excessive bactericide (canning)
B (canning)	Insufficient bactericide contact time could lead to contamination
B	Insufficient cooling could result in thermophilic spoilage (canning)
B	Excessive cooling could result in contamination due to corrosion leakage (canning)
B	Pathogen growth due to improper cooling temperature
B	Pathogen contamination due to cracked plates
B	Pathogen contamination due to use of recycled water
B	Growth of pathogens due to inadequate cooling
B	Pathogen contamination due to inadequate contact time with chlorine
B levels	Pathogen contamination through corrosion from excessive chlorine
B plates)	Pathogen contamination from cooling medium (e.g.: pin-holes in
C	Contamination by non-food chemicals (e.g.: cooling medium, cleaners, sanitizers and water treatment chemicals)
C	Contamination due to excessive chlorine
P	Contamination from hazardous extraneous material

COOLING – DAIRY FOOD

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B treatment)	Bacterial survival which retards culture activity (inadequate heat
B	Pathogen growth due to inadequate heat treatment
B	Pathogen recontamination due to cross contamination during heat



	treatment (raw product)
B	Pathogen contamination due to condensate
B	Pathogen contamination due to cooling medium
B	Pathogen contamination due to product accumulation
B	Pathogen contamination due to inadequate equipment cleaning and sanitation
C	Contamination by non-food chemicals (e.g.: cleaners and sanitizers)
C	Cross contamination from heating and/or cooling media (pinholes)
P	Contamination from hazardous extraneous material

COOLING (See also Chilling, Icing)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen growth due to inadequate cooling (e.g.: <i>Clostridium perfringens</i> , <i>Listeria monocytogenes</i>)
B	Pathogen contamination due to improper handling by employees
B	Pathogen contamination due to cooling media
B	Pathogen contamination due to product accumulations
B	Pathogen contamination due to contamination by raw product
B	Pathogen growth due to poor air circulation between cartons at cooling
C	Contamination from cooling medium

CORING (See also Dicing, Peeling, Slicing)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to inadequate washing/sanitizing of equipment and utensils
B	Pathogen contamination due to improper handling by employees
B	Pathogen contamination due to product accumulations
C	Contamination due to non food chemicals (e.g.: cleaners, sanitizers and lubricants)
P	Contamination from hazardous extraneous material

CREAM NEUTRALIZING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to improper handling by employees
B	Pathogen contamination due to product accumulations
C	Cross contamination from non food chemicals (e.g.: cleaners, sanitizers and lubricants)
C	Contamination by high concentration of neutralizer
P	Contamination from hazardous extraneous material (metal, gaskets)

CROPPING -POULTRY

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Full crops causing spillage of crop contents
B	Spread of crop contamination by equipment
B	Contamination with pathogens due to back splashing from water sprays used to clean the equipment



CURD MILLING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to product accumulations
B	Pathogen contamination due to improper handling by employees
B	Pathogen contamination due to airborne pathogens (e.g.: <i>Listeria monocytogenes</i>)
C	Contamination from non-listed lubricants
C	Contamination from non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
P	Contamination from hazardous extraneous material

CURD PRODUCTION (MILK RIPENING, SETTING, CUTTING, HEATING, COOKING)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination (growth) due to improper handling by employees and damaged containers
B	Pathogen contamination due to product accumulations
B	Pathogen contamination due to air-borne pathogens (e.g.: <i>Listeria monocytogenes</i>)
B	Pathogen contamination due to condensate (e.g.: <i>Listeria monocytogenes</i>)
B	Pathogen contamination due to inadequate equipment cleaning and sanitation
B	Pathogen growth due to failure of culture/ inactive cultures
C	Contamination from non-food chemicals (e.g.: sanitizers, cleaners and lubricants)
P	Contamination from hazardous extraneous material

CURD WASHING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to water-borne pathogens (e.g.: <i>Listeria monocytogenes</i>)
B	Pathogen contamination due to condensate (e.g.: <i>Listeria monocytogenes</i>)
B	Pathogen contamination due to improper handling by employees
B	Pathogen contamination due to product accumulations
C	Contamination from non-listed water treatment chemicals
P	Contamination from hazardous extraneous material

CURING (See also Brine Injecting)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen growth/survival due to inadequate application of preservative/brine
B	Pathogen survival due to improper salt/nitrite/nitrate application
B	Pathogen contamination due to salt-tolerant pathogens in brine
C	Improper amounts of salt/nitrites/nitrates
P	Contamination from hazardous extraneous material

CUTTER –OIL SAC -POULTRY



<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Spread of pathogens from carcass by the equipment

CUTTING / SLICING / DICING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to product accumulations
B	Pathogen growth due to time/temperature abuse (e.g.: <i>Escherichia coli</i> , <i>Listeria monocytogenes</i> , <i>Salmonella spp.</i> , <i>Staphylococcus aureus</i>)
B	Pathogen contamination due to contamination by utensils/cutting tools
B	Pathogen contamination due to inadequate washing/sanitizing of equipment and utensils
B	Pathogen contamination due to contamination from conveyors
B	Pathogen contamination due to improper handling by employees
C	Contamination from non-food chemicals (e.g.: sanitizers, cleaners and lubricants)
P	Contamination from hazardous extraneous material

DEBEAKING - Chick for reproduction (Hatchery) “Layer hen”, “Turkey hen”

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Bacterial contamination due to inadequate debeaking

DEHAIRING /GAMMING - PORK

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Cross contamination of skin by beaters during conventional dehairing operation
B	Contamination by improper removal hair
B	Contamination and cross-contamination of carcass by pathogens due to dehairing equipment expressing gastro-intestinal contents
B	Contamination and cross-contamination of carcass by pathogens due to dehairing equipment breaking the skin
B	Visible contamination due to inadequate / improper supply of water during dehairing (water at insufficient volume)
B	Contamination of the garming incision with pathogens due to inadequately cleaned gams
B	Growth of pathogens due to delay in processing the carcasses
B	Contamination with pathogens due to inadequate temperature and/or water replenishment of sanitizer
B	Contamination of carcasses during the evisceration process caused by gastro-intestinal distension due to delay in processing the carcasses
P	Contamination from hazardous extraneous material (e.g.: metal fragment from garming knife)

DEHYDRATING / DRYING (FRUITS AND VEGETABLES)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Addition of an allergen/ ingredient containing allergen that is not declared on the product label
C	Inaccurate nutrition information (e.g.: due to mislabelling, nutrient loss during manufacturing or storage) could impact on individuals with



P certain medical conditions
Contamination from hazardous extraneous material

DEHYDRATING / DRYING MEAT

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen growth due to inappropriate storage temperatures/humidity (e.g.: <i>Escherichia coli</i> , <i>Staphylococcus aureus</i> and enterotoxin, <i>Salmonella spp</i> , <i>Clostridium botulinum</i> , <i>Listeria monocytogenes</i>)
B	Pathogen survival due to cross-contamination with raw product
B	Pathogen growth due to rise in pH due to development of surface moulds
B	Pathogen survival/growth due to improper time / temperature applications (e.g.: <i>Escherichia coli</i> , <i>Listeria monocytogenes</i> , <i>Staphylococcus aureus</i> and enterotoxin, <i>Clostridium botulinum</i> , <i>Salmonella spp</i>)

DEMOLDING (MEAT)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to contamination by utensils / from equipment (e.g.: <i>Escherichia coli</i> , <i>Staphylococcus aureus</i> , <i>Listeria monocytogenes</i>)
B	Pathogen contamination due to improper handling by employees

DEPATILLETIZING -CAN

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Post-process pathogen contamination due to incorrect or damaged cans

DESALTING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogenic contamination due to improper handling

DESINFECTING (TAP HOLE – MAPLE PRODUCTS)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Contamination by non-food chemicals

DESTONING (RIFFLES) / DEWATERING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
P	Contamination hazardous extraneous matter (e.g.: manually or improper functioning of equipment resulting in stones/glass)

DESUGARING (EGG ALBUMEN)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Growth of pathogens due to extended length of time to reach the proper pH during the furmentatin process

DETECTION AND INSPECTION OF NON-COMPLIANT CARCASSES - POULTRY

<u>Type of Hazard</u>	<u>Name of Hazard</u>
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- B Wrong presentation of viscera/carcasses
- B Non removing from the rail the bird affected by pathological condition due to absence of viscera in the inspection trail

DETENTION AND MARKING SUSPECT ANIMALS- PORK

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Spreading disease(s) (see incoming materials) to other animals and humans due to failure to maintain segregation and mark suspect animals
C	Unacceptable levels of drug (antibiotics, coccidiostats, vaccines components ...), heavy metal, and pesticide residues or contaminants (e.g.: dioxins) due to failure to maintain segregation and mark suspect animals
P	Presence of hazardous extraneous material, (e.g.: broken needles, leadshot, wires in tongue/mouth) due to failure to maintain segregation and mark suspect animals

DICING (See also Cutting, Slicing)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to product accumulations
B	Pathogen growth due to time / temperature abuse for raw product (e.g.: <i>Salmonella spp</i> , <i>Staphylococcus aureus</i> , <i>Escherichia coli</i> , <i>Listeria monocytogenes</i>)
B	Pathogen contamination due to contamination by utensils /conveyors /cutting tools
B	Pathogen contamination due to inadequate washing/ sanitizing of equipment and utensils
B	Pathogen contamination due to improper handling by employees
C	Contamination from non-food chemicals (e.g.: sanitizers, cleaners, lubricants)
P	Contamination from hazardous extraneous material

DISASSEMBLY /HARVESTING WHITE VISCERA – RED MEAT

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contaminations of edible products by the exposed gut content
B	Pathogen cross contamination of edible products due to improper employee handling

DISPOSAL - HATCHERY

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogenic bacterial contamination due to garbage room being improperly ventilated (e.g.: <i>Salmonella sp</i> , <i>sg</i> , <i>se</i> , <i>st</i>)
B	Outgrowth of pathogenic bacterial contamination due to the garbage room being improperly ventilated (e.g.: <i>Salmonella sp</i> , <i>sg</i> , <i>se</i> , <i>st</i>)
C	Residues of chemicals (e.g.: fumigants, disinfectants, antibiotics) in hatchery refuse being shipped to rendering facilities



DISPOSAL OF WASTE

Type of Hazard

Name of Hazard

B

Pathogen growth due to time/temperature abuse

B

Pathogen cross-contamination due to inappropriate storage

DISTRIBUTION /DISTRIBUTING

Type of Hazard

Name of Hazard

B

Pathogen growth due to time/ temperature abuse

B

Pathogen contamination due to damaged containers

C

Contamination from non-food /food chemical materials on truck

C

Contamination by non-food chemicals (e.g.: lubricant on conveyors)

P

Contamination from hazardous extraneous material



DIVIDING

Type of Hazard

Name of Hazard

B	Pathogen contamination due to improper handling by employees / poor techniques and/or due to contaminated tools and equipment
C	Contamination from non-food chemicals (e.g.: sanitizers, cleaners and lubricants)
P	Contamination from hazardous extraneous material

DOUGH REWORK

Type of Hazard

Name of Hazard

B	Pathogenic contamination due to improper employee handling
C	Cross-contamination by allergens

DOSAGE (DAIRY PRODUCTS)

Type of Hazard

Name of Hazard

B	Pathogen contamination due to improper handling by employees
B	Pathogen contamination due to physical damage to the container
C	Inaccurate nutrition information (e.g.: due to mislabelling, nutrient loss during manufacturing or storage) could impact on individuals with certain medical conditions
C	Improper or inaccurate addition (e.g.: type, concentration) of nutrients (vitamins) could impact on certain individuals
P	Contamination from hazardous extraneous material

DRAINING-DAIRY FOOD (e.g.: CURD, WHEY)

Type of Hazard

Name of Hazard

B	Pathogen contamination due to improper handling by employees
B	Pathogen contamination due to product accumulations
B	Pathogen contamination due to airborne pathogens (e.g.: <i>Listeria monocytogenes</i>)
C	Contamination from non-food chemicals (e.g.: sanitizers, cleaners)
P	Contamination from hazardous extraneous material

DRAINING (TABLES / RACKS)

Type of Hazard

Name of Hazard

B	Pathogen contamination due to improper handling by employees
B	Pathogen contamination due to product accumulations
B	Pathogen contamination due to air-borne pathogens (e.g.: <i>Listeria monocytogenes</i>)
P	Contamination from hazardous extraneous material

DRESSING (CARCASS) –SEE EACH STEP FOR SPECIFIC HAZARD

Type of Hazard

Name of Hazard

B	Failure to remove unacceptable product (held product, condemned product)
B	Pathogen contamination due to improper handling by employees / poor



- B techniques and/or due to contaminated tools and equipment
- B Pathogen growth due to delays in submitting carcass / offal to cooling process
- B Pathogen growth due to time/temperature abuse
- B Pathogen contamination due to inadequate temperature of sanitizers
- B Failure to remove visible contamination and dressing defects
- C Failure to remove visible contamination and dressing defects
- P Failure to remove visible contamination and dressing defects

DROP TABLE - SAUSAGE

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to equipment and improper employee handling (e.g.: <i>Salmonella spp.</i> , <i>Listeria monocytogenes</i> , <i>Staphylococcus aureus</i>)

DRYING (EGG AND EGG PRODUCTS)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to inadequate equipment cleaning and sanitation
B	Pathogen contamination by air-borne pathogens (e.g.: <i>Listeria monocytogenes</i>)
B	Pathogen contamination due to product accumulations
B	Pathogen contamination due to dirty air filters; filters that do not meet specification; or ineffective or inoperative dryer resulting in eggs not being properly dried
B	Survival of pathogens dueing heat treatment (dried albumen) because of inadequate drying
P	Contamination from hazardous extraneous material

DRYING (FORCED AIR) – Produce (see also: COOLING – Air Flow)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination from unclean environmental air sources
B	Pathogen contamination from dirty air blowing equipment and cooling units
C	Contamination by non-food grade chemicals (e.g.: cleaners, sanitizers and lubricants)
P	Contamination from hazardous extraneous material (e.g.: metal parts from equipment)

DRYING (MILK AND MILK PRODUCTS)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to product accumulations
B	Pathogen contamination due to inadequate equipment cleaning and sanitation
B	Pathogen contamination due to air-borne pathogens (e.g.: <i>Listeria monocytogenes</i>)
C	Contamination from non-food chemicals (e.g.: cleaners and sanitizers)
C	Inaccurate nutrition information (e.g.: due to mislabelling, nutrient loss)



during manufacturing or storage) could impact on individuals with certain medical conditions

DRYING / DEHYDRATING MEAT (see DEHYDRATING /DRYING MEAT)

DUD DETECTION

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to damaged containers

DUMPING –TOTE

<u>Type of Hazard</u>	<u>Name of Hazard</u>
P	Contamination from hazardous extraneous material

DUMPING OF RETURNS - HONEY

<u>Type of Hazard</u>	<u>Name of Hazard</u>
P	Contamination from hazardous extraneous material

EGG BREAKING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Non-removal of unacceptable substances
B	Pathogenic contamination due to improper employee handling

EGG SANITATION- HATCHERY

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Chemical residue on chicks due to high concentration

EMPTY CONTAINER/ PACKAGING MATERIAL - INSPECTING/ HANDLING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to faulty containers
B	Pathogen contamination due to failure to remove unacceptable product / faulty containers (e.g.: lacquer/tin plate)
B	Pathogen contamination due to serious can/lid/body defects
B	Pathogen contamination due to damaged or soiled containers/packaging material
C	Contamination from non-food chemicals (e.g.: sanitizers, cleaners and lubricants)
P	Contamination from hazardous extraneous material

EMULSIFYING / EMULSION /EMULSIFY (e.g.: SILENT CUTTER)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen growth due to time/temperature abuse
B	Pathogen growth due to incorrect formulation (e.g.: not enough prague powder/nitrite /salt added to the emulsion)
B	Pathogen contamination due to organic material build-up on equipment in non refrigerated kitchen
B	Pathogen contamination due to improper handling by employees
C	Excess of Prague powder/ nitrite /salt added to the emulsion



- C Allergens due to incorrect ingredient
- C Inaccurate nutrition information (e.g.: due to mislabelling, nutrient loss during manufacturing) could impact on individuals with certain medical conditions
- P Contamination from hazardous extraneous material

END FEEDING/ CLOSING/INSPECTING - CANNED FOODS

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Post-process contamination due to damaged ends, compound skips or other serious defects in ends
B	Post-process contamination due to damaged/defective equipment (can sealer)
B	Post process contamination due to improperly formed seams
C	Contamination by non-food chemical (e.g.: cleaners, sanitizers and lubricants)
P	Contamination from hazardous extraneous material

ENROBING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to contamination by employee handling
B	Pathogen contamination due to product accumulations
B	Pathogen growth due to time/temperature abuse
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
C	Contamination from residual ingredient or from incorrect ingredient added
C	Contamination from allergen product
C	Inaccurate nutrition information (e.g.: due to mislabelling, nutrient loss during manufacturing or storage) could impact on individuals with certain medical conditions
P	Contamination from hazardous extraneous material

EVAPORATING / CONDENSING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to product accumulations
C	Contamination by non-food chemicals (e.g.: cleaners and sanitizers)

EVISCERATION – BEEF (SEE ALSO CARCASS DRESSING)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Inadequate trimming prior to abdomen opening
B	Pathogen contamination of carcasses found in intestinal contents and lymph nodes or pathological tissue (e.g.: <i>Salmonella spp.</i> in lymph nodes, rupture of gastro intestinal tract (<i>Escherichia coli</i> 0157:H7))
B	Contamination with pathogens due to inadequate temperature and/or water replenishment of sanitizer

EVISCERATION – PORK (SEE ALSO CARCASS DRESSING)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
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B	Pathogen contamination of carcasses found in intestinal contents and lymph nodes or pathological tissue (e.g.: <i>Salmonella Spp.</i> in lymph nodes, rupture of gastro intestinal tract)
B	Contamination of carcasses or offal with gastro-intestinal content or pathogens due to gastro-intestinal accidents e.g.: rupture of gastro intestinal tract, spillage/contact from bung
B	Contamination of carcasses or offal with gastro-intestinal content or pathogens due to cross-contamination of the brisket area and offal from the tongue
B	Contamination of carcasses or offal with gastro-intestinal content or pathogens due to cutting through contaminated tissues (oral/pharyngeal cavity)
B	Contamination of carcasses or offal with gastro-intestinal content or pathogens due to incision of pathological tissue
B	Contamination of carcasses or offal with gastro-intestinal content or pathogens due to inadequate sanitation of equipment (e.g.: trays, hooks, mobile table)
B	Contamination with pathogens due to inadequate temperature and/or water replenishment of sanitizer

EVISCERATION – VENT OPENING, SLITTER – POULTRY

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Inadequate feed withdrawal
B	Faecal contamination and spread of pathogens

EXAMINATION, PACKAGING AND LABELLING – PORK

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathological conditions and/or contamination due to failure to detect and remove unacceptable products
B	Pathogen contamination due to using damaged or unsanitary packaging material
B	Pathogens growth due to inaccurate marking of production date/code
B	Contamination by pathogens due to punctures through the packaging material by nails or wood pieces from the pallets
B	Pathogen contamination due to improper package seal
B	Growth of pathogens due to delay in processing the product (e.g.: offal, head)
C	Chemical residue contamination due to improper cleaning/drainage
P	Presence of hazardous extraneous material (e.g.: wood splinters, nails) from the pallets

EXTRACTING (HONEY)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
P	Contamination from hazardous extraneous material

FERMENTING (see also proofing)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen growth due to improper pH reduction (e.g.: <i>Listeria</i>



monocytogenes, Staphylococcus aureus, Clostridium botulinum, Escherichia coli and Salmonella spp)

B	Pathogen contamination due to contaminated inoculum
B	Pathogen growth due to failure of culture/inactive cultures
B	Pathogen survival due to improper time/temperature applications
B	Inadequate fermentation could result in high pH and growth of pathogens

FERMENTATION (egg products)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogenic contamination by a contaminated inoculum

FERMENTATION OF VEGETABLES

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Inadequate fermentation leading to excessive pH levels and pathogen growth

FILLING (Hermetically Sealed)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to condensate (e.g.: <i>Listeria monocytogenes</i>)
B	Pathogen contamination due to product accumulations
B	Under processing due to overfill of containers
B	Product compaction during filling resulting in under processing
B	Pathogen contamination due to improper handling by employees
C	Contamination from non-listed lubricants
C	Contamination by non –food chemicals (e.g.: cleaners, sanitizers and lubricants)
P	Contamination from hazardous extraneous material

FILLING / FILLING WITH HOPPER

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to product accumulations
B	Pathogen contamination due to inadequate washing/sanitizing of equipment and utensils
B	Pathogen growth due to time/temperature abuse (e.g.: product warming: raw product)
B	Pathogen contamination due to poor hygiene and improper handling practices by employees
C	Heavy metal dissolved as a result of product acidification (Maple Syrup)
P	Contamination from hazardous extraneous material
P	Broken jars in drum filler could contaminate subsequent jars with glass fragments



FILLING JARS WITH PICKLES

<u>Type of Hazard</u>	<u>Name of Hazard</u>
P	Contamination of subsequent jars by glass fragments from jars broken in drum filler

FILLING – MAPLE SYRUP

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Growth of yeasts and moulds due to too-low temperature
B	Contamination by heavy metals dissolved as a result of product acidification

FILLING/PACKAGING/LABELLING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Growth of pathogens due to warming of the product (e.g. raw products)
B	Pathogenic contamination due to improper employee handling
B	Mislabelling (e.g. “untreated” instead of “treated”)
C	Allergic reaction as a result of undeclared allergens
P	Contamination by hazardous extraneous materials

FILLING – OTHER

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogenic contamination due to product accumulation
P	Contamination by hazardous extraneous materials

FILTERING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to product accumulations
B	Pathogen contamination due to airborne pathogens (<i>Listeria monocytogenes</i>)
B	Pathogen contamination due to infrequent cleaning or replacing filter
B	Bacterial contamination (growth) on filters
C	Contamination from non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
P	Contamination from hazardous extraneous material

FINAL TRIMMING BACK RAIL/ CARCASS APPROVAL –PORK (SEE ALSO DRESSING CARCASS)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to inappropriate removing visible contamination

FINAL TRIMMING (MAIN RAIL) – RED MEAT SPECIES (SEE CARCASS DRESSING)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to inappropriate removing, visible contamination



FINAL RINSING- EGGS

Type of Hazard

Name of Hazard

C

Contamination of eggs due to ineffective or insufficient removal of detergents and /or foamicides

FINAL WASH – PORK

Type of Hazard

Name of Hazard

B

Contamination with pathogens due to inadequate washing (e.g.: water at insufficient volume or pressure to remove visible contamination, spray nozzles at improper location, number or wrong direction or non-functional)

FINE PARTICLES RECYCLING - DAIRY PROCESS

Type of Hazard

Name of Hazard

B

Pathogen contamination due to product accumulations

B

Pathogen contamination due to improper handling by employees

B

Pathogen contamination due to inadequate equipment cleaning and sanitation

C

Contamination from non-food chemicals (e.g.: cleaners and sanitizers)

P

Contamination from hazardous extraneous material

FLAKING

Type of Hazard

Name of Hazard

P

Contamination from hazardous extraneous material

FLAVOUR ADDING

Data: For herbs, Natural Health Products, novel food ingredients and ingredients with therapeutic properties Contact Health Canada

Type of Hazard

Name of Hazard

B

Pathogen contamination due to improper handling by employees

B

Pathogen contamination due to product accumulations

C

Contamination from non-food chemicals (e.g.: sanitizers, cleaners, lubricants)

C

Contamination due to residual/incorrect ingredients from incorrect ingredient added (e.g.: allergens, vitamin)

C

Inaccurate nutrition information (e.g.: due to) could impact on individuals with certain medical conditions

C

Presence of herbs, Natural Health Products, novel food ingredients and ingredients with therapeutic properties pose a potential hazard.

P

Contamination from hazardous extraneous material

FLOATATION CLEANING

Type of Hazard

Name of Hazard

C

Improper chemical concentrations

FLUMING

Type of Hazard

Name of Hazard



- B Pathogen contamination due to recycled water
- C Contamination due to non-listed water treatment chemicals

FOOT REMOVAL AND HIDE REMOVAL - PORK

Type of Hazard

Name of Hazard

- B Pathogen contamination and cross-contamination of exposed meat due to contaminated equipment (chains, knives ...), improper technique in removing hide, aerosols
- B Contamination with pathogens due to inadequate temperature and/or water replenishment of sanitizer

FOREIGN OBJECT REMOVAL

Type of Hazard

Name of Hazard

- B Pathogen contamination due to poor hygiene and improper handling by employees
- B Pathogen contamination due to inadequate cleaning / sanitizing of equipment and utensils
- P Contamination from hazardous extraneous material

FORMING PRODUCT

Type of Hazard

Name of Hazard

- B Pathogen contamination due to improper handling by employees and improper operating procedures
- B Pathogen contamination due to inadequate equipment cleaning and sanitation
- C Contamination due to non-food chemicals (e.g.: sanitizers, cleaners)
- C Cross contamination due to allergens product
- P Contamination from hazardous extraneous material

FORMULATING / FORMULATION (SEE MIXING)

Data: For herbs, Natural Health Products, novel food ingredients and ingredients with therapeutic properties Contact Health Canada

Type of Hazard

Name of Hazard

- B Pathogen contamination due to inadequate equipment cleaning and sanitation
- B Survival/growth of pathogens due to incorrect preparation/formulation
- B Pathogen contamination due to incorrect preparation/formulation (e.g.: emulsifier and salt content, pH, Aw - e.g.: processed cheese) – Dairy Food
- B Pathogen growth due to time/temperature abuse
- B Pathogen contamination due to improper handling by employees and equipment
- B Pathogen growth due to lack of nitrite
- B Pathogen growth due to product accumulation and warming
- C Excessive addition of restricted ingredients and additives (e.g.: Nitrite)



- C Allergens in finished product due to wrong formulation
- C Addition of an allergen/ ingredient containing allergen that is not declared on the product label
- C Inaccurate nutrition information (e.g.: due to mislabelling) could impact on individuals with certain medical conditions
- C Improper or inaccurate addition (e.g.: type, concentration) of nutrients (vitamins / minerals / amino acids) could impact on certain individuals
- C Presence of herbs, Natural Health Products, novel food ingredients and ingredients with therapeutic properties pose a potential hazard
- C Contamination by non-food chemicals (e.g.: sanitizer, cleaners) improper cleaning procedure
- P Contamination from hazardous extraneous material

FREEZING /STORING

Type of Hazard

Name of Hazard

- B Pathogen growth due to poor air circulation between cartons at cooling
- B Pathogen contamination due to faecal matter
- B Pathogen survival due to improper time/temperature applications
- B Pathogen growth due to inadequate freezing (e.g.: time/temperature abuse, improper air flow, space between boxes, stacking procedures)
- P Contamination from hazardous extraneous material

FREEZING (DAIRY PRODUCTS)

Type of Hazard

Name of Hazard

- B Pathogen contamination due to air-borne pathogens (e.g.: *Listeria monocytogenes*)
- B Pathogen contamination due to product accumulations
- C Contamination by non-food chemicals (e.g.: sanitizers and lubricants)
- C Chemical contamination from residual ingredients
- C Cross contamination due to allergens product
- P Contamination from hazardous extraneous material

FREEZING (IQF)

Type of Hazard

Name of Hazard

- B Pathogen contamination due to product accumulations
- C Contamination by non-food chemicals (e.g.: sanitizers, cleaners, lubricants)
- P Contamination from hazardous extraneous material

FRUIT AND NUT FEEDING

Type of Hazard

Name of Hazard

- B Pathogen contamination due to improper handling by employees
- B Pathogen contamination due to product accumulations
- C Allergenic sensitivity - cross contamination from equipment
- C Contamination due to non-food chemicals (cleaners/sanitizers and lubricants)



- C Chemical contamination from residual ingredient (or incorrect ingredient added)
- C Inaccurate nutrition information (e.g.: due to mislabelling, nutrient loss during manufacturing or storage) could impact on individuals with certain medical conditions
- P Contamination from hazardous extraneous material



FRYING

Type of Hazard

Name of Hazard

C	Cross contamination by allergens from previous food cooking in same oil
C	Inaccurate nutrition information (e.g.: due to mislabelling, nutrient loss during manufacturing) could impact on individuals with certain medical conditions
P	Contamination from hazardous extraneous material (e.g.: metallic fragments from belt link)

FUMIGATION- HATCHERY

Type of Hazard

Name of Hazard

B	Inadequate time or concentration for fumigation such that bacteria may survive
C	Inappropriate concentration, duration or inadequate post fumigation ventilation such that a health risk is posed to the eggs or chick
C	Chemical residue on chicks due to high concentration
C	Chemical contamination due to improper use of fumigants

FUMIGATION

Type of Hazard

Name of Hazard

B	Inadequate time or concentration for fumigation such that bacteria may survive
C	Inappropriate concentration, duration or inadequate post fumigation ventilation

GARNISHING

Type of Hazard

Name of Hazard

B	Pathogen contamination due to contaminated equipment
B	Pathogen growth due to time/temperature abuse (e.g.: <i>Salmonella spp.</i> , <i>Listeria monocytogenes</i>)
B	Pathogen contamination due to improper handling by employees
B	Pathogen contamination due to contamination by utensils
C	Inaccurate nutrition information (e.g.: due to mislabelling could impact on individuals with certain medical conditions)

GAS FLUSHING

Type of Hazard

Name of Hazard

B	Pathogen growth due to improper amount of CO ₂
B	Growth of pathogens due to inappropriate vacuum of air volume / pressure of gas (e.g.: CO ₂) in Modified Atmosphere Packaging (MAP)
C	Chemical contamination due to use wrong gas

GIBLETS HARVESTING & VISCERA/NECK REMOVAL AND NECK SKIN CUTTING - POULTRY

Type of Hazard

Name of Hazard

B	Faecal and ingesta contamination of giblets due to: improper equipment operation or employee harvesting techniques, faulty
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	operational cleaning of automatic equipment or build-up of organic debris during operations, failure to discard contaminated giblets what about carcass, see strikethrough hazard
B	Pathogen growth due to delay in processing products
B	Pathogen contamination due to improper handling by employees or contaminated equipment
B	Spread of crop contamination by equipment
B	Pathogen contamination of paws due to build up of organic debris during operations
B	Contamination with pathogens due to back splashing from water sprays used to clean the equipment
B	Spread of pathogens from paw to paw through the scald water and equipment due to inadequate replacement /supply water
B	Presence of pathogens associated with inadequate removal of faecal contamination and loosely attached pathogenic bacteria due to inadequate temperature of scald water, pickers not operating properly, inadequate washing,...
P	Contamination from hazardous extraneous material; Sharp bone from compound fractures

GLAZING

Type of Hazard

Name of Hazard

B	Pathogen contaminated due to contaminated utensils/equipment
B	Pathogen growth due to time/temperature abuse (e.g.: <i>Listeria monocytogenes</i>)
B	Pathogen contamination due to improper handling by employees

GRADING – PORK

Type of Hazard

Name of Hazard

B	Cross contamination of grading “wound” by probe
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GRADING- QUALITY / SCREEN SIZING- VETABLE

Type of Hazard

Name of Hazard

B	Pathogenic contamination by <i>Staphylococcus aureus</i>
B	Pathogen contamination due to improper cleaning
C	Contamination by non-food chemicals (e.g.: sanitizers, cleaners and lubricants)
P	Contamination from hazardous extraneous material

GRADING, SIXING BINS- POULTRY

Type of Hazard

Name of Hazard

B	Pathogen contamination due to improper handling by employees / contaminated equipment
C	Contamination due non-food chemicals residue due to improper cleaning/drainage
P	Plastic particles imbedded into carcass from defective breast tags/improper handling practices

GRINDING



<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to improper handling by employees / operation procedure
B	Pathogen contamination due to organic material build-up on equipment in non-refrigerated kitchen
B	Pathogen contamination due to product accumulations
B	Pathogen growth due to time/temperature abuse
B	Failure to remove unacceptable product
B	Pathogen contamination due to improperly cleaned equipment
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
C	Cross contamination due to allergens products
P	Contamination from hazardous extraneous material

HANGING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to improper handling by employees
B	Pathogen contamination due to inadequate cleaning of equipment

HANDLING OF EGG SHELLS AND INEDIBLE EGG

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to open waste containers

HANDLING OF INGREDIENTS

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to improper handling by employees
C	Cross contamination due to allergens in product
C	Inaccurate nutrition information (e.g.: due to mislabelling, nutrient loss during manufacturing or storage) could impact on individuals with certain medical conditions
P	Contamination from hazardous extraneous material

HANDLING OF RETURNS

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to open waste containers
B	Failure to remove unacceptable product
B	Acceptance of product not meeting specifications
B	Pathogen contamination due to contaminated returns contaminated or returned goods not being properly segregated
C	Inaccurate nutrition information (e.g.: due to mislabelling, nutrient loss during manufacturing or storage) could impact on individuals with certain medical conditions

HARDENING (Ice Cream)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Contamination from non-food chemicals
P	Contamination from hazardous extraneous material



HATCHING- HATCHERY

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination of hatcher due to inadequate cleaning and disinfecting
B	Pathogen growth (e.g.: <i>Salmonella spp</i> , <i>Escherichia coli</i> , <i>Staphylococcus aureus</i>) due to time/temperature abuse
B	Pathogenic Bacterial contamination due to poor employee handling practices
B	Outgrowth of pathogenic bacterial due to pips and exploders contaminating the rest of the hatch (e.g.: <i>Salmonella sp, sg, se, st</i>)
B	Pathogenic bacterial contamination due to the hatcher room being improperly ventilated
C	Hatching room and/or trays chemically contaminated

HEAD DROPPING / REMOVAL- RED MEAT SPECIES (SEE ALSO CARCASS DRESSING)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen growth due to overlooked or improperly removed of cervical abscesses
B	Contamination and cross-contamination with pathogens due to cutting through abscesses (cervical, jowl)
B	Presence of pathological conditions and/or contamination due to failure to discard heads identified as unacceptable
B	Contamination of heads due to inadequate sanitation of equipment (e.g.: trays)
B	Contamination with pathogens due to inadequate temperature and/or water replenishment of sanitizers

HEAD REMOVAL – RED MEAT SPECIES (SEE HEAD DROPPING / REMOVAL - PORK)

HEAD REMOVAL- POULTRY

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination of necks due to build-up of organic debris and heads on head puller
B	Pathogen contamination due to inadequate temperature of sanitizers with diluted/ dirty solution

HEAD SPACING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Under processing due to overfill of containers
P	Contamination from hazardous extraneous material

HEAT EXCHANGER

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to cooling medium (e.g.: pin-holes)
B	Improper equipment calibration
B	Pathogen survival due to improper time/temperature



B	Pathogen recontamination due to improper pressure differential
B	Pathogen recontamination from raw product (product accumulations)
B	Pathogen contamination due to inadequate equipment cleaning and sanitation
C	Contamination due to non-listed lubricants
C	Contamination due to non-food chemicals (e.g.: cleaners and sanitizers)
C	Contamination due to heating and/or cooling media (pinholes)
C	Inaccurate nutrition information (e.g.: due to mislabelling, nutrient loss during manufacturing) could impact on individuals with certain medical conditions
P	Contamination from hazardous extraneous material

HEATING/SMOKING/CHARRING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Outgrowth of raw product and other pathogens that might occur because of improper time and temperature (<i>Salmonella</i> and <i>Escherichia coli</i> O157:H7 in Raw beef and veal products, <i>Salmonella</i> and <i>Campylobacter jejuni/coli</i> in raw chicken, turkey, and other poultry, <i>Clostridium botulinum</i> and <i>Clostridium perfringens</i> in raw meat products)

HEAT TREATING (DAIRY- thermalization where time /temperatures are less than pasteurization)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen survival due to contamination by raw product
B	Pathogen growth due to inappropriate storage temperatures/humidity
B	Pathogen contamination due to condensate (e.g.: <i>Listeria monocytogenes</i>)
B	Pathogen contamination due to inadequate equipment cleaning and sanitation
C	Contamination by non-food chemicals (e.g.: cleaners and sanitizers)
C	Contamination due to non-listed lubricants
C	Inaccurate nutrition information (e.g.: due to mislabelling, nutrient loss during manufacturing or storage) could impact on individuals with certain medical conditions
P	Contamination from hazardous extraneous material

HEAT TREATMENT / HEAT TREATED MILK AND DAIRY INGREDIENTS STORING – DAIRY FOOD

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Pathogen growth due to improper cooling
B	Pathogen survival (improper time and temperature)
B	Pathogen contamination (growth) due to product accumulations
B	Cross-contamination with raw dairy ingredients due to improper storage / line
B	Pathogen contamination due to inadequate equipment cleaning and



	sanitation
C sanitizers)	Cross contamination due to non-food chemicals (cleaners and sanitizers)
C	Contamination due to steam treatment chemicals
C	Inaccurate nutrition information (e.g.: due to mislabelling, nutrient loss during manufacturing or storage) could impact on individuals with certain medical conditions
P	Contamination from hazardous extraneous material

HEAT TREATMENT - EGG PRODUCTS (Hot Room)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen survival due to improper raw product moisture level
B	Pathogen survival due to improper time/temperature applications

HEAT TREATMENT (SEE ALSO PARASITE TREATMENT, COOKING)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B moulds	Pathogen growth due to rise in pH due to development of surface moulds
B	Pathogen survival due to improper agitation
B	Improper holding prior to heat treatment
B	Pathogen survival due to improper time/temperature applications
B	Pathogen survival due to improper humidity control
B	Improper equipment calibration
B	Pathogen survival due to improper temperature distribution
C	Inaccurate nutrition information (e.g.: due to mislabelling, nutrient loss during manufacturing or storage) could impact on individuals with certain medical conditions

HELD RAIL TRIMMING - RED MEAT SPECIES

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Contamination of carcasses or offal with gastro-intestinal content or pathogens due to gastro-intestinal accidents (e.g.: rupture of gastro intestinal tract, spillage/contact from bung)
B	Contamination of carcasses or offal with gastro-intestinal content or pathogens due to cross-contamination of the brisket area and offal from the tongue
B	Contamination of carcasses or offal with gastro-intestinal content or pathogens due to cutting through contaminated tissues (oral/pharyngeal cavity)
B	Contamination of carcasses or offal with gastro-intestinal content or pathogens due to incision of pathological tissue
B	Contamination of carcasses or offal with gastro-intestinal content or pathogens due to inadequate sanitation of equipment (e.g.: trays, hooks, mobile table)
B	Presence of pathological conditions and/or contamination due to failure to remove product identified as unacceptable
B	Cross-contamination by pathogens due to product accumulation
B	Growth of pathogens due to delay in processing the held carcasses



B	Contamination by pathogens due to contaminated straps/hooks
B	Contamination with pathogens due to inadequate temperature and/or water replenishment of sanitizer
B	Cross-contamination due to improper employee handling
C	Presence of chemical contamination due to trimming failure
P	Contamination from hazardous extraneous material (e.g.: metal fragment from saws)
P	Presence of hazardous extraneous material (e.g.: broken needles, leadshot) in suspect animals due to trimming failure
P	Presence of hazardous extraneous material (e.g.: contaminants on carcass surface) due to trimming failure

HERMETIC CONTAINER CLOSING (SEE ALSO SEAMING, PACKAGING)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to loose or faulty seams/seals/packaging material
B	Pathogen contamination due to serious can/lid/body defects
B	Pathogen contamination through damaged seams/seals/packaging material
B	Pathogen contamination from physical damage to the container
C	Contamination by non-food chemicals (e.g.: lubricants)

HIDE WASH - PORK

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Contamination with pathogens due to inadequate washing (e.g.: water at insufficient volume or pressure to remove visible contamination, spray nozzles at improper location, number or wrong direction or non-functional)

HOCK CUTTER – POULTRY

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Contamination of cut surfaces
B	Pathogen contamination of hock surfaces and/or carcasses due to faulty operational cleaning of equipment or build-up of organic debris during operations

HOLDING – PRODUCT SEE COOLING/CHILLING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen survival from the environment
B	Pathogen growth due to time/temperature abuse (improper cooling temperature/duration) (e.g.: <i>Clostridium perfringens</i>)
B	Pathogen growth due to improper cooling temperature/duration (<i>Staphylococcus aureus</i> , <i>Bacillus cereus</i>) (e.g.: Cooked rice/pasta)
B	Contamination due to faulty containers
B	Pathogen growth due to inappropriate storage temperatures/humidity
B	Cross-contamination in storage
B	Pathogen contamination due to contaminated equipment
B	Pathogen contamination due to improper employee handling (e.g.:



- from raw product)
- B Pathogen contamination due to condensate (e.g.: *Listeria monocytogenes*)
- C Contamination by non-food chemicals (e.g.: cleaners and sanitizers)
- P Contamination from hazardous extraneous material

HOLDING COOLER- MEAT

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen growth due to time/temperature abuse (e.g.: <i>Listeria monocytogenes</i>)
B	Pathogen growth due to improper rotation of stock
B	Pathogen growth due to faulty container
B	Pathogen contamination due to improper employee handling
B	Pathogen contamination due to carcasses touching floor and cutting into quarters
B	Pathogen contamination due to air-borne pathogens (e.g.: <i>Listeria monocytogenes</i>)
B	Pathogen contamination due to improper cleaning of filters, condensers, fans, .../inappropriate use of filters B
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
C	Contamination by rail dust
C	Contamination by chemical product due to carcasses touching floor and cutting into quarters
C	Chemical contamination by direct or indirect surface contact (e.g.: carcasses touching floor, overhead condensation)
P	Contamination from hazardous extraneous material
P	Contamination by foreign material due to carcasses touching flour and cutting into quarters

HOLDING – HEATING TANK – MAPLE PRODUCTS

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Chemical contamination from non-food chemicals (e.g.: lead, sanitizers, cleaners, lubricants)
P	Contamination from hazardous extraneous material
C	Lead contamination from soldered heating tanks

HOLDING FREEZER

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to damaged cartons
B	Pathogen growth due to time/temperature abuse

HOLDING - SHELL EGGS

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen growth due to inappropriate storage temperatures/humidity

HOMOGENIZING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
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- B Pathogen contamination due to product accumulations
- B Pathogen contamination due to equipment surfaces
- B Pathogen survival due to inappropriate time/temperature
- B Pathogen contamination due to inadequate washing /sanitizing
- C Contamination by non-food chemicals (e.g.: cleaners, sanitizers, lubricants)
- C Inaccurate nutrition information (e.g.: due to mislabelling, nutrient loss during manufacturing or storage) could impact on individuals with certain medical conditions
- P Contamination from hazardous extraneous material



HONEY TESTING

Type of Hazard

Name of Hazard

C

Lack of or inadequate testing could result in product containing sulphamide residues (e.g.: sulphathiazole and/or phenol residues)

HOOPING AND PRESSING

Type of Hazard

Name of Hazard

B

Pathogen contamination due to improper employee handling

B

Pathogen growth/survival due to inadequate application of preservative/brine

B

Pathogen contamination due to air-borne pathogens (e.g.: *Listeria monocytogenes*)

B

Pathogen contamination due to product accumulations

C

Contamination by non-food chemicals (e.g.: lubricants)

P

Contamination from hazardous extraneous material

HOT ROOM DUMPING - HONEY

Type of Hazard

Name of Hazard

P

Contamination from hazardous extraneous material

HOT SIDE PASTEURIZING- HONEY

Type of Hazard

Name of Hazard

C

Contamination from non-food chemicals (e.g.: caustic soda residues)

HYDRATING

Type of Hazard

Name of Hazard

B

Pathogen contamination due to improper employee handling

B

Pathogen contamination from use of non-potable water

C

Contamination by non-food chemicals (e.g.: cleaners and sanitizers)

P

Contamination from hazardous extraneous material

HYDROFLAKING

Type of Hazard

Name of Hazard

B

Pathogen contamination due to improper employee handling

P

Contamination from hazardous extraneous material

HYDROLYSIS ENZYMATIC

Type of Hazard

Name of Hazard

B

Pathogen contamination due to inadequate equipment cleaning and sanitation

C

Contamination by non-food chemicals (e.g.: cleaners and sanitizers)

C

Incomplete hydrolysis of lactose (for product with lactose free claim)

C

Inefficient hydrolysis of lactose due to inappropriate time/temperature (for product with lactose free claim)

P

Contamination from hazardous extraneous material

HYPERCHLORINATION

Type of Hazard

Name of Hazard



- B Pathogen survival due to improper contact time/concentration
- C Contamination by concentration of chlorine being too high
- C Contamination by chloramine by failure to rinse the carcasses after hyperchlorination

ICE MAKING/STORAGE

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to inadequate washing/sanitizing of equipment and utensils (e.g.: <i>Listeria monocytogenes</i>)
B	Pathogen contamination from use of non-potable water
B	Pathogen contamination due to ice not being stored in a sanitary manner
C	Contamination from non-listed water treatment chemicals
C	Contamination by chemical residues
C	Contamination by environmental contaminants (e.g.: heavy metal, pesticides and herbicides)
C	Excess chlorine/fluoride
P	Contamination from hazardous extraneous material (e.g.: rust, metal, metal fatigue and improper maintenance of equipment from overhead structures, etc.)

ICING (SEE ALSO CHILLING, COOLING)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen growth/ survival due to inadequate cooling (e.g.: time/temperature abuse, improper air flow, inadequate duration of icing)
B	Pathogen contamination due to improper handling by employees
B	Pathogen contamination from cooling media
P	Contamination from hazardous extraneous material (e.g.: rust, metal, oil)

INCUBATING (Low Acid Canned Food)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen survival/growth due to failure to remove unacceptable product
B	Pathogen contamination due to improper employee handling

INCUBATING /INCUBATION

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen growth due to inappropriate incubation time/temperatures (e.g.: preparation of ferment – dairy)
B	Pathogen growth due to inappropriate storage temperatures/humidity
B	Pathogen contamination due to contaminated equipment /utensils
B	Pathogen contamination due to improper employee handling
B	Contamination due to air-borne pathogens (e.g.: <i>Listeria monocytogenes</i>)
C	Contamination from cooling medium
P	Contamination from hazardous extraneous material



INCUBATION-HATCHERY

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Bacterial contamination of incubator due to inadequate clean & disinfecting
B	Outgrowth of pathogenic bacteria due to malfunctioning humidification equipment resulting in the wetting egg's (e.g.: <i>Salmonella sp, sg, se, st.</i>)
B	Out growth of pathogenic bacteria due to pips and exploders
B	Pathogen growth due to the rise in temperature and surplus of humidity
B	Pathogen growth due to contamination by employee handling (e.g.: eggs contaminated)
B	Pathogen growth due to poor air circulation between cartons
C	Incubator and/or room chemically contaminated

INJECTING OF BRINE (SEE ALSO BRINE INJECTING)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen growth/survival due to inadequate application of preservative/brine
C	Improper amounts of salt/nitrites/nitrates
P	Broken injector needles

INJECTING (SEED INJECTING) HONEY

<u>Type of Hazard</u>	<u>Name of Hazard</u>
P	Contamination from hazardous extraneous material

INOCULATING (SEE ALSO BACK SLOPPING)

INSPECTING / SORTING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Failure to remove unacceptable product containing pathogens
B	Pathogen contamination due to product accumulations
B	Pathogen contamination due to improper employee handling (e.g.: <i>Listeria monocytogenes</i>)
B	Pathogen contamination due to contaminated from conveyors
C	Contamination by non-food chemicals (e.g.: cleaners and sanitizers)
C	Failure to remove toxic plant (e.g.: nightshade berries in peas)
P	Contamination from hazardous extraneous material
P	Failure to remove product containing hazardous extraneous material

INTERNAL VACUUM- POULTRY

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to back splashing from water sprays used to clean the equipment
B	Pathogen contamination of carcasses due to faulty operational cleaning of equipment or build-up of organic debris during operations
B	Failure to remove visible contamination and loosely attached bacteria from external surfaces and internal cavity



B Pathogen contamination due to inadequate washing / sanitizing of equipment and utensils

I.Q.F. FREEZER (Freezing – Individually Quick-Frozen (IQF) Products)

Type of Hazard

Name of Hazard

B Pathogenic contamination due to product accumulation
C Contamination by non-food chemicals (sanitizers, cleaning products, lubricants)
P Contamination by hazardous extraneous materials

IRRADIATION

Type of Hazard

Name of Hazard

B Pathogen growth /survival due to inadequate dosage /exposure time to radiation (e.g.: *Salmonella spp.*)
C Possible free radical formation due to excessive dosage or exposure time
C Use of ionizing radiation not permitted/ not allowed
C Inaccurate nutrition information (e.g.: due to mislabelling, nutrient loss during manufacturing or storage) could impact on individuals with certain medical conditions
P Presence of hazardous extraneous material

JAR CHECKING

Type of Hazard

Name of Hazard

P Contamination by hazardous extraneous materials

JAR INVERTER, AIR BLASTING

Type of Hazard

Name of Hazard

P Contamination from hazardous extraneous material

LABELLING (See also Coding)

Type of Hazard

Name of Hazard

B Pathogen growth due to inaccurate marking of expiration date (best before date)
B Pathogen contamination due to improper package seal
C Presence of allergens due to incorrect/ inaccurate list of ingredients resulting in allergenic sensitivity
C Incorrect label being applied to the product resulting in presence of undeclared ingredients/allergens
C Inaccurate nutrition information (e.g.: due to mislabelling, nutrient loss during) could impact on individuals with certain medical conditions
C Excessive addition of restricted ingredients and additives

LAYERING OF SLICED MEAT

Type of Hazard

Name of Hazard

B Pathogen contamination due to inadequate operational sanitation
B Pathogen contamination due to improper employee handling /poor employee hygiene



- B Pathogen contamination due to contamination from equipment (improper cleaning)
- B Pathogen growth due to time/temperature abuse
- C Contamination by non-food chemicals (e.g.: cleaners and sanitizers)
- P Contamination from hazardous extraneous material



LOADING SHELL EGGS

Type of Hazard

Name of Hazard

B

Contamination of egg wash water by excessively dirty eggs not being removed

LYSOZYME EXTRACTION

Type of Hazard

Name of Hazard

B

Pathogen growth due to time/temperature abuse

B

Pathogen growth due to recycling resin

P

Contamination from hazardous extraneous material

MANUAL HANDLING- SEE HANDLING OF INGREDIENTS/ RETURNS

Type of Hazard

Name of Hazard

B

Pathogen contamination due to poor hygiene and improper employee handling

C

Cross contamination due to allergens product

P

Contamination from hazardous extraneous material

MASSAGING /MESSAGE

Type of Hazard

Name of Hazard

B

Pathogen contamination (growth) due to improper cleaning

B

Pathogen growth due to time/temperature abuse

B

Pathogen contamination due to improper employee handling

C

Allergens in finished product due to identify/tag product or wrong ingredients/recipe

C

Contamination by non-food chemicals (e.g.: cleaners and sanitizers)

P

Contamination from hazardous extraneous material

MATURATION

Type of Hazard

Name of Hazard

B

Pathogen growth due to an activity too slow of bacterial culture

B

Pathogen contamination due to improper employee handling

B

Pathogen contamination due to inadequate washing/sanitizing

C

Contamination by non-food chemicals (e.g.: cleaners, sanitizers, lubricants)

P

Contamination from hazardous extraneous material



MEAT DRYING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Growth/survival of pathogens due to inadequate time/temperature parameters (e.g. <i>Escherichia coli</i> , <i>Listeria monocytogenes</i> , <i>Staphylococcus aureus</i> (and staphylococcic enterotoxins), <i>Clostridium botulinum</i> , <i>Salmonella</i> spp.).
B	Growth of pathogens due to increased pH caused by the growth of surface moulds
B	Growth of pathogens due to inadequate temperature/humidity during storage

MECHANICAL SEPARATING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen growth due to time/temperature abuse
B	Pathogen growth due to product warming
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
P	Contamination from hazardous extraneous material

MEMBRANE PROCESSING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen growth due to time/temperature abuse
B	Pathogen contamination due to product accumulations

METAL DETECTION / METAL REMOVING (MAGNET)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
P	Failure to remove hazardous extraneous matter
P	Metal being missed going through the detector due to malfunction or non operation of equipment
P	Improper removing of metal from magnet

MICROWAVING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination/growth due to improper handling and operation procedure
C	Contamination from non-food chemicals (e.g.: cleaners sanitizers, lubricants)
P	Contamination from hazardous extraneous material

MILK SEPARATING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to product accumulations
C	Contamination from non-food chemicals (e.g.: cleaners, sanitizers, lubricants)
P	Contamination from hazardous extraneous material

MINCING



<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Contamination and outgrowth of <i>Listeria monocytogenes</i> from food contact surfaces and other environmental sources
B	Pathogen contamination from raw product areas, including <i>Salmonella spp.</i> , <i>Campylobacter jejuni</i> , <i>Escherichia coli</i> O157:H7
B	Outgrowth of Staphylococcus and Clostridium botulinum

MIXING / FORMULATION / PREPARING/ (SEE ALSO BLENDING AND FORMULATING)

Data: Where unknown herbs and other substances that may be novel foods or Natural Health Products are added, contact CFIA or Health Canada.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination (survival) due to incorrect preparation/formulation
B	Pathogen growth due to time/temperature abuse (e.g.: <i>Listeria monocytogenes</i>)
B	Pathogen contamination due to product accumulations
B	Pathogen growth due to inappropriate storage temperatures/humidity
B	Pathogen contamination due to contaminated utensils /equipment (improper cleaning)
B	Pathogen contamination due to damaged or soiled containers/packaging material
B	Pathogen contamination due to improper employee handling
B	Pathogen growth/survival due to inadequate application of preservative/brine
C	Allergens in finished product due to wrong formulation
C	Cross contamination due to allergens in product
C	Addition of an allergen/ ingredient containing allergen that is not declared on the product label
C	Inaccurate nutrition information (e.g.: due to mislabelling, nutrient loss during manufacturing or storage) could impact on individuals with certain medical conditions
C	Improper or inaccurate addition (e.g.: type, concentration) of nutrients (vitamins / minerals / amino acids) could impact on certain individuals
C	Presence of toxic herbs, unapproved substances/novel foods or substances with other physiological effects/properties poses a potential hazard
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
C	Adding high concentration of neutralizer (dairy food)
P	Contamination from hazardous extraneous material

MIXING – GARNISH

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen growth due to garnish build-up
C	Cross contamination due to allergens product
P	Contamination from hazardous extraneous material



MIXING/GRINDING/BONING/FABRICATION

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Potential outgrowth of raw product pathogens, including <i>Salmonella spp.</i> and <i>Escherichia coli</i> O157:H7 in raw beef and veal products, <i>Salmonella spp.</i> and <i>Campylobacter jejuni/coli</i> in chicken, turkey and other poultry and Salmonella in raw pork and other meat products.
B	Pathogen contamination/growth due to improper handling and operation procedure
B	Contamination from unclean equipment
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
P	Contamination from hazardous extraneous material

MIXING / NITRITE –MEAT (SEE ALSO BLENDING)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen growth due to lack of nitrite
B	Pathogen growth due to product accumulation and warming
C	Contamination by excess of nitrite
P	Contamination from hazardous extraneous material

MIXING OF ADDITIVE

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Inadequate addition of preservative could result in growth of yeast and moulds and subsequent pathogen contamination
C	Too much additive could lead to a level exceeding tolerance
C	Inaccurate nutrition information (e.g.: due to mislabelling, nutrient loss during manufacturing) could impact on individuals with certain medical conditions
C	Improper or inaccurate addition (e.g.: type, concentration) of nutrients (vitamins / minerals / amino acids) could impact on certain individuals

MODIFIED ATMOSPHERE PACKAGING (SEE ALSO PACKAGING, SEALING)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination through damaged seams/seals/packaging material
B	Pathogen contamination by air-borne pathogens (e.g.: <i>Listeria monocytogenes</i>)
B	Pathogen contamination due to loose or faulty seams/seals/packaging material
B	Pathogen growth due to inappropriate gas ratio/gas concentration
B	Pathogen growth due to time/temperature abuse
C	Contamination by the use of non-food grade gases

MOULDING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen survival due to contamination by utensils
B	Pathogen contamination by air-borne pathogens (e.g.: <i>Listeria</i>)



monocytogenes)

- B Pathogen contamination due to product accumulations
- B Pathogen contamination due to improper employee handling
- C Contamination by non-food chemicals (e.g.: lubricants)
- P Contamination from hazardous extraneous material

NECK BREAKING /NECK AND/OR NECK SKIN REMOVAL - POULTRY

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Contamination with pathogens due to back splashing from water sprays used to clean the equipment

NECK HARVESTING -POULTRY

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen growth due to delay in processing necks
C	Contamination of necks with soap or sanitizer at the beginning of operations due to improper cleaning / drainage of the pumps and pipes
P	Presence of hazardous extraneous material (skull fragments) due to improper harvesting of necks

OFFAL HARVESTING- PORK (SEE ALSO CARCASS DRESSING)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination of offal due to equipment and employees
B	Failure to remove unacceptable product (held product, condemned product)
B	Presence of pathological conditions and/or contamination due to failure to trim or discard product identified as unacceptable
B	Cross-contamination by pathogens due to product accumulation
B	Growth of pathogens due to delay in processing the offal
B	Contamination with pathogens due to inadequate temperature and/or water replenishment of sanitizer
C	Contamination by non-food chemicals (e.g.: cleaners and sanitizers)
P	Contamination from hazardous extraneous material (metal fragment from heart slasher)

OILING - SHELL EGG

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen survival due to contamination from equipment
B	Pathogen contamination due to bacterial growth on oiler brushes
C	Contamination by non-food chemicals

OPEN MIDLINE & BRISKET-PORK (SEE ALSO CARCASS DRESSING)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen or pathologies contamination due to accidentally cutting into the gastro-intestinal tract
B	Pathogen contamination due to improper employee handling (e.g.: contamination carcass to carcass)

OZONATION

<u>Type of Hazard</u>	<u>Name of Hazard</u>
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- B Pathogen growth / survival due to inadequate ozone concentration/ exposure time
- B Pathogen contamination due to inadequate cleaning / sanitizing of equipment and utensils
- C Exceeding recommended / allowable levels of ozone
- C Contamination by non food chemicals (e.g.: cleaners, sanitizers and lubricants)
- P Presence of hazardous extraneous material (e.g.: due to inadequate filtering of water/air)

PACKAGING, LABELLING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to improper employee handling or by equipment
B	Pathogen growth due to improper amount of CO ₂
B	Pathogen growth due to incorrect packing/slaughter date
B	Pathogen growth due to improper labelling (e.g.: production code, best before date)
B	Pathogen contamination due to damaged or unsanitary packaging material
B	Growth of pathogens due to delay in packaging /labelling the product
B	Growth of pathogens due to inappropriate vacuum of air volume / pressure of gas (e.g.: CO ₂) in Modified Atmosphere Packaging (MAP)
B	Contamination by pathogens due to punctures through the packaging material by nails or wood pieces from the pallets or by sharp edges from containers or worn damaged containers
B	Use of wrong label (e.g.: “uncured” instead of “cured”)
C	Allergic reaction due to undeclared ingredients (allergens)
C	Inaccurate nutrition information (e.g.: due to mislabelling, nutrient loss during manufacturing or storage) could impact on individuals with certain medical conditions
C	Contamination by non-food chemicals (e.g.: cleaners and sanitizers)
P	Contamination from hazardous extraneous material (e.g.: wood splinters, nails) from the pallets or plastic pieces from reusable containers

PACKAGING /PACKING INTO CONTAINERS

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to condensate (e.g.: <i>Listeria monocytogenes</i>)
B	Pathogen contamination due to air-borne pathogens (e.g.: <i>Listeria monocytogenes</i>)
B	Pathogen contamination due to poor hygiene and improper employee handling (e.g.: <i>Salmonella spp.</i> , <i>Listeria monocytogenes</i> , <i>Staphylococcus aureus</i>)
B	Contamination by pathogens due to product accumulations
B	Pathogen contamination due to damaged / soiled containers /



- packaging material /improper package seal /faulty package seals (e.g.: “leakers”)
- C Contamination from non food chemicals (e.g.: cleaners, sanitizers and lubricants)
- C Cross contamination with allergens
- C Contamination due to use of non-food grade packaging materials (e.g.: chemicals leaching from glue, ink etc.)
- P Contamination from hazardous extraneous material (e.g.: closing devices, staples, plastic, glass)

PACKAGING- EGGS – SEE PACKAGING EGGS - HATCHERY

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to inadequate cleaning / sanitizing of equipment and utensils
B	Pathogen contamination due to reuse of packaging material
B	Pathogen contamination due to improper employee handling
B	Inadequate equipment maintenance will result in the cracking of eggs and can increase the risk of internal egg contamination
B	Cross contamination of eggs by dirty packaging material
B	Improper handling of cartons by employees may result in the cracking of eggs which could later become contaminated

PACKAGING- EGGS- HATCHERY

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to cross contamination with feathers or down (e.g.: <i>Salmonella sp, sg, se, st</i>)

PACKAGING REFRIGERATED SMOKED FISH

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen growth due to insufficient oxygen permeability of packaging material (e.g.: <i>Clostridium botulinum</i>)

PALLETIZING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to damaged containers
P	Contamination from hazardous extraneous material

PASTEURIZING (HONEY / JUICE)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to contaminated equipment
B	Pathogen survival due to improper time/temperature applications
C	Contamination by non food chemicals (e.g.: cleaners, sanitizers and lubricants)
C	Inaccurate nutrition information (e.g.: due to mislabelling, nutrient loss during manufacturing) could impact on individuals with certain medical conditions
P	Contamination from hazardous extraneous material



PASTEURIZING (HTST)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen survival due to recontamination by raw product
B	Pathogen survival/growth due to improper time/temperature applications (time/temperature abuse)
B	Pathogen contamination due to product accumulations (e.g.: raw product)
B	Pathogen contamination due to improper pasteurization
B	Pathogen contamination from cooling medium (e.g.: pin-holes in plates)
B	Pathogen recontamination due to improper pressure differential
B	Pathogen survival due to improper equipment design
C	Contamination from cooling medium
C	Contamination from Heating and Cooling Media (Pinholes)
C	Contamination from non-food chemicals (e.g.: cleaners, sanitizers, coolant)
P	Contamination from hazardous extraneous material

PASTEURIZING (STEAM) – RED MEAT SPECIES

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen survival due to improper time/temperature application
B	Pathogen survival due to out of reach area of carcasses
B	Pathogen survival due to deficiency of steam pressure

PASTEURIZING (VAT)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen survival due to inadequate airspace temperature
B	Pathogen survival due to improper agitation
B	Pathogen contamination due to condensate (e.g.: <i>Listeria monocytogenes</i>)
B	Pathogen contamination due to contamination by raw product
B	Pathogen survival due to improper time/temperature applications
B	Pathogen survival due to improper equipment design
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)

PASTEURIZING/ HEAT TREATING – (VAT) DISCONTINUOUS – DAIRY PRODUCT

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Bacterial survival which retards culture activity (inadequate heat treatment)
B	Pathogen contamination due to contamination by raw product
B	Pathogen contamination due to condensate
B	Pathogen contamination due to contaminated air (e.g.: <i>Listeria monocytogenes</i>)
B	Improper equipment calibration
C	Contamination by non food chemicals (e.g.: cleaners, sanitizers)
P	Contamination from hazardous extraneous material



PASTEURIZING/COOLING CONTINUOUS – DAIRY FOOD

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to cooling medium (e.g.: pin-holes in plates)
B	Improper equipment calibration
B	Pathogen survival due to improper time/temperature
B	Pathogen recontamination due to improper pressure differential
B	Pathogen contamination due to raw product
C	Contamination by non food chemicals (e.g.: cleaners, sanitizers)
C	Contamination from heating and/or cooling media (pinholes)
P	Contamination from hazardous extraneous material

PASTEURIZING (See also COOKING, SMOKING)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to cooling medium (e.g.: pin-holes in plates)
B	Pathogen contamination due to product accumulations
B	Pathogen growth due to improper temperature distribution
B	Improper equipment calibration
B	Improper holding prior to heat treatment
B	Pathogen contamination due to raw product
B	Pathogen survival due to improper time/temperature applications
C	Contamination by non-food chemicals (e.g.: cleaners/sanitizers)
C	Contamination from cooling medium
P	Contamination from hazardous extraneous material

PATTY FORMATION

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Potential outgrowth of raw product pathogens, including <i>Salmonella spp.</i> and <i>Escherichia coli</i> O157:H7 in raw beef and veal products, <i>Salmonella spp.</i> and <i>Campylobacter jejuni/coli</i> in chicken, turkey and other poultry and <i>Salmonella</i> in raw pork and other meat products.
B	Contamination from unclean equipment
B	Pathogen contamination/growth due to improper handling and operation procedure
C	Contamination by non food chemicals (e.g.: cleaners, sanitizers and lubricants)
C	Cross contamination due to allergens product
P	Contamination from hazardous extraneous material

PEELING /PEELER (MEAT PRODUCTS)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to equipment / contact with spent casing
B	Pathogen contamination due to inadequate operational sanitation (e.g.: <i>Salmonella spp.</i> , <i>Listeria monocytogenes</i> and <i>Staphylococcus aureus</i>)
B	Pathogen contamination due to product accumulation (e.g.: <i>Salmonella spp.</i> , <i>Listeria monocytogenes</i>)



- B Pathogen contamination due to improper employee handling
- P Contamination from hazardous extraneous material

PEELING (SEE ALSO CORING)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen growth/survival due to non-uniformity of product
B	Pathogen contamination due to product accumulations
B	Pathogen growth due to time/temperature abuse (e.g.: <i>Salmonella spp</i> , <i>Staphylococcus aureus</i> , <i>Escherichia coli</i> and <i>Listeria monocytogenes</i>)
B	Pathogen contamination due to inadequate washing/sanitizing of equipment and utensils
B	Pathogen contamination due to poor hygiene or improper employee handling
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers, lubricants)
P	Contamination from hazardous extraneous material

PEELING EGGS (AUTOMATED/BY HAND)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to improper employee handling
B	Pathogen contamination due to product accumulations
P	Contamination from hazardous extraneous material

PICKLE MAKING /ADDITION (TOP UP)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Lack of nitrite during the pickle making process
C	Excess of nitrite during the pickle making process / overpump
P	Contamination from hazardous extraneous material

PICKLING (SEE ALSO BRINING, SALTING)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Contamination by salt-tolerant pathogens
B	Pathogen growth/survival due to inadequate application of preservative/brine
B	Pathogen growth/survival due to improper time/temperature applications
B	Pathogen survival due to improper salt/nitrite/nitrate application

PITTING (SEE ALSO PEELING, CORING)

PLACING EGGS IN DRAWERS - HATCHERIES

<u>Type of Hazard</u>	<u>Name of Hazard</u>
P	Mishandling of eggs resulting in their damage

POLISHING /SINGEING /SHAVING (SCRAPING) – PORK

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to improper employee handling
B	Contamination of carcass by polishing brushes
B	Contamination of carcasses by cuts made through skin by the polishers or



- shavers
- B Insufficient bacterial load reduction on carcasses contaminated by scald water and dehairing equipment
- B Contamination and cross-contamination with pathogens of the carcass surface due to polishing
- B Contamination and cross-contamination of carcasses with pathogens by cuts made through skin by shavers
- B Contamination with pathogens due to inadequate temperature and/or water replenishment of sanitizer
- C Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)

POST MORTEM INSPECTION (HEAD, CARCASS AND VISCERA)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathologies not detected due to absence of viscera/head
B	Pathologies not detected due to lack of correlation between carcasses and parts
B	Pathologies not detected due to severe contamination
B	Presence of pathological conditions due to loss of identification of held product(s)
B	Presence of pathological conditions due to carcasses not being transferred to the held rail by the operator's employee

POST-PROCESS CONTAINER HANDLING- SEE HANDLING OF INGREDIENTS/
RETURNS

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to inadequate drying
B	Pathogen contamination due to damaged containers



PRE-BLENDING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Potential outgrowth of raw product pathogens, including <i>Salmonella spp.</i> and <i>Escherichia coli</i> O157:H7 in raw beef and veal products, <i>Salmonella spp.</i> and <i>Campylobacter jejuni/coli</i> in chicken, turkey and other poultry and <i>Salmonella</i> in raw pork and other meat products.
B	Pathogen contamination due to inadequate washing/sanitizing of equipment and utensils
P	Contamination from hazardous extraneous material

PRE-CHILL TRIMMING-POULTRY

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Spread of contamination on cut surfaces and failure to remove affected portions

PRE-CUTTER – POULTRY

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination of hock surfaces and/or carcasses due to faulty operational cleaning of equipment or build-up of organic debris during operations

PRE- DUSTING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to improper employee handling and operating procedure
P	Contamination from hazardous extraneous material

PRE-EVISCERATION, WASH -PORK

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Contamination by failure to wash the carcasses adequately

PREHEATING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination (growth) due to product accumulations
B	Pathogen growth due to improper temperature/ improper time applied
C	Contamination from non-food chemicals (e.g.: cleaners, sanitizers)

PREMIXING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to improper employee handling
B	Pathogen contamination due to air-borne pathogens (e.g.: <i>Listeria monocytogenes</i>)
B	Pathogen contamination due to product accumulations
C	Contamination by non-food chemicals (e.g.: lubricants)
C	Inaccurate nutrition information (e.g.: due to mislabelling, nutrient loss during manufacturing) could impact on individuals with certain medical conditions
P	Contamination from hazardous extraneous material



PRESELECTION (CARCASS DEFECT DETECTION)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen growth due to delay in processing products

PRESENTATION AND REVIEW OF LIVESTOCK INFORMATION SHEET (LIS)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogenic contamination during the evisceration process due to feed withdrawal information missing on LIS

PRESENTATION OF VISCERA FOR INSPECTION (RED MEAT and POULTRY)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to Non presentation of all viscera and bad presentation/ correlation of viscera carcasses: hygiene, separation on the table (red meat only) with viscera/ contaminated carcasses.

PRESSING (JUICES)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to product accumulations
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
P	Contamination from hazardous extraneous material

PRESSING (MEAT PRODUCTS)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to contamination from equipment
B	Pathogen contamination due to improper employee handling
P	Contamination from hazardous extraneous material

PRESSING – MOULDING (DAIRY PRODUCTS)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogenic contamination due to improper employee handling
B	Growth/survival of pathogens due to the incorrect application of preservatives/brine
B	Contamination by airborne pathogens (e.g. <i>Listeria monocytogenes</i>)
B	Pathogenic contamination due to product accumulation
C	Contamination by non-food grade chemicals (lubricants)
P	Contamination by hazardous extraneous materials

PRINTING (packaging of Butter)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to improper employee handling
B	Pathogen contamination due to product accumulations
C	Contamination by non food chemicals (e.g.: cleaners, sanitizers, lubricants)
P	Contamination from hazardous extraneous material



PROCEEDING TO SLAUGHTER /STUNNING (RED MEAT SPECIES)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Diseased animals entering the food chain which have not received Ante Mortem Inspection being moved forward for slaughter
C	Unacceptable levels of drug (e.g.: antibiotics, coccidiostats, vaccines components), or environmental contaminants (e.g.: heavy metal, and pesticide residues) or contaminants (e.g.: dioxins) in animals which have not received Government Ante-Mortem Inspection being moved forward for slaughter
P	Presence of hazardous extraneous material (e.g.: broken needles, leadshot, wires in tongue/mouth), in animals which have not received Government Ante-Mortem Inspection and therefore are not identified and are moved forward for slaughter

PRODUCTION, HANDLING AND STORAGE OF STARTER CULTURES (LACTIC FERMENT)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Growth of pathogens due to inadequate temperature/humidity during storage
B	Contamination by waterborne pathogens
B	Contamination by airborne pathogens (e.g. <i>Listeria monocytogenes</i>)
B	Pathogenic contamination due to product accumulation
B	Contamination/proliferation caused by pathogens from cross-contamination during storage
B	Pathogenic contamination by contaminated utensils/equipment
B	Pathogenic contamination due to improper employee handling
B	Survival of pathogens due to inadequate time/temperature parameters
C	Contamination by non-listed chemicals used in water treatment

PROOFING- BAKERY

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to use unclean steam
B	Pathogen contamination due to condensation falling onto/into uncovered product
C	Contamination by non food chemicals (e.g.: cleaners, sanitizers and lubricants)

PUMPING -POULTRY

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen growth due to product accumulations on equipment and warming of product
C	Contamination by non-food chemicals (e.g.: cleaners and sanitizers)



P Contamination from hazardous extraneous material (wear of pump components e.g.: stators)

PUMPING INTO CUPS- MEAT

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to raw product
B	Pathogen contamination due to improper employee handling

PUMPING -VEGETABLE

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to insufficient hypochlorite
B	Pathogen contamination due to poor cleaning of pipes
C	Contamination due to excessive concentration of hypochlorite
P	Contamination from hazardous extraneous material

REFRIGERATED BATTER MIXING AND HOLDING TANK

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen growth due to time/temperature abuse

RECEIVING- ARRIVAL OF ANIMALS (RED MEAT SPECIES)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to soiled hides of live animals

RECEIVING- ARRIVAL OF POULTRY

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Accepting poultry with inadequate feed withdrawal causing full crop and intestines resulting in contamination of carcasses during evisceration
B	Pathogenic contamination during the evisceration process due to inadequate feed withdrawal or feed withdrawal information missing on Flock Sheet (if applicable)
B	Accepting bird contaminated by pathogenic bacteria
C	Accepting bird with residues (e.g.: antibacterial)
C	Accepting bird with environmental contaminants (e.g.: pesticides)

RECEIVING CHEMICALS

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Receiving unapproved chemicals for use in facility

RECEIVING OF CHICKS- HATCHERY

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Receiving chicks contaminated with antibiotics (over 21 day withdrawal period) and unapproved disinfectants /sanitizers

RECEIVING OF EGGS – HATCHERY

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Bacterial, viral and/parasitic contamination of hatching eggs
C	Receiving of eggs contaminated with environmental contaminants



(e.g.: pesticides residues, antibiotics and unapproved disinfectants /sanitizers)

C Contamination from unapproved disinfectants at the farm level

RECEIVING (INGREDIENTS)

Data: Where unknown herbs and other substances that may be novel foods or Natural Health Products are added, contact CFIA or Health Canada.

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Acceptance of product not meeting specifications
B	Pathogen contamination due to accepting unacceptable product
B	Receiving of non-compliant material
B	Pathogen contamination due to contamination by raw product
B	Pathogen contamination due to improper employee handling
B	Pathogen growth due to time/temperature abuse
B	Pathogen contamination due to damaged containers
B	Pathogen growth /toxins due to low brix or time to unload (milk product and transformed products)
B	Pathogen contamination due to air or equipment
B	Pathogen contamination from equipment at receiving (e.g.: milk product)
B	Pathogen survival due to cross contamination by raw/processed ingredient
C	Receiving of non-compliant material (e.g.: milk with antibiotics)
C	Contamination by non-food chemicals residues (e.g.: cleaners, sanitizers, lubricants, agricultural chemicals)
C	Accepting wrong type and concentration of vitamin (e.g.: milk product)
C	Contamination by allergens in receiving area
C	Allergic residues due to accepting cross-contaminated product
C	Inaccurate nutrition information (e.g.: due to mislabelling, nutrient loss during manufacturing or storage) could impact on individuals with certain medical conditions
C	Presence of toxic herbs, unapproved substances/novel foods or substances with other physiological effects/properties pose a potential hazard
C	Contains substances / ingredients (e.g.: sweeteners) not permitted for use in food
P	Contamination from hazardous extraneous material
P	Receiving of non-compliant ingredient

RECEIVING – PACKAGING MATERIALS

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to damaged cartons/containers (e.g.: from fork lift accident)
B	Pathogen contamination due to unacceptable transport conditions (e.g.: transport vehicle, loading method, stacking procedures at origin)
B	Pathogen contamination due to improper employee handling



RECEIVING /UNLOADING /ANTE MORTEM EXAMINATION AND HOLDING LIVE SWINE - PORK

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Contamination or cross-contamination during dressing procedures (Hide Removal operations only) due to dirty pens and alley ways

RECONSTITUTING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen growth due to time/temperature abuse
B	Pathogen contamination due to improper employee handling
B	Pathogen contamination due to water-borne pathogens
B	Pathogen contamination due to product accumulations
C	Contamination from non-listed water treatment chemicals
C	Inaccurate nutrition information (e.g.: due to mislabelling, nutrient loss during manufacturing) could impact on individuals with certain medical conditions
P	Contamination from hazardous extraneous material

REJECTED PACKAGES & PORTIONS

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to improper employee handling (e.g.: <i>Salmonella spp.</i> , <i>Listeria monocytogenes</i> , <i>Staphylococcus aureus</i>)
B	Pathogen growth due to time / temperature abuse (e.g.: <i>Salmonella spp.</i> , <i>Listeria monocytogenes</i> , <i>Staphylococcus aureus</i>)
P	Contamination from hazardous extraneous material

REJECTION –POULTRY

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogens on carcasses and/or viscera due to failure by rejector(s) to reject carcasses with visceral pathological conditions
B	Cross-contamination with pathogens from contact between carcasses to be rejected and carcasses to be salvaged/reprocessed/returned to the main line

REPACKAGING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Contamination and outgrowth of <i>Listeria monocytogenes</i> from food contact surfaces and other environmental sources
B	Pathogens contamination from raw products areas, including <i>Salmonella</i> , <i>Campylobacter</i> , <i>Escherichia coli</i> O157:H7
B	Outgrowth of <i>Staphylococcus</i> and <i>Clostridium botulinum</i>

REPROCESSING, LINE SHOWER, REPROCESSING /CUT UP, PORTION AND CARCASS CHILLING-POULTRY

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Inadequate removal of visible contamination by shower
B	Spread of contamination on cut surfaces by employees
B	Failure to remove visible contamination by employees



B Pathogen growth due to time/temperature abuse

REPROCESSING/REWORK (MEAT)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogenic contamination due to product accumulation
B	Pathogenic contamination due to improper employee handling and/or inappropriate operational procedures
B	Growth of pathogens due to cross-contamination during storage
B	Growth pathogens due to inadequate temperature/humidity during storage
B	Survival/growth of pathogens due to inadequate time/temperature parameters
B	Survival of pathogens due to cross-contamination of raw and processed ingredients
P	Contamination by hazardous extraneous materials

RE- MIXING OF BRINE

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen growth due to improper pH
P	Contamination from hazardous extraneous material

RENDERING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen survival due to improper time/temperature applications
B	Pathogen survival due to contamination by raw product
B	Pathogen contamination due to improper employee handling

RE HANGING / AUTOMATIC TRANSFER /GRADING / SIZING BINS - POULTRY

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogens growth due to delay in processing carcasses
B	Pathogen contamination of carcasses due to faulty operational cleaning of equipment or build-up of organic debris during operations
B	Contamination of carcasses with pathogens due to inability to adequately clean worn or damaged sizing bins / containers
C	Contamination by non-food chemicals (e.g.: cleaners and sanitizers)
P	Contamination from hazardous extraneous material (presence of imbedded fragments from plastic or metal breast tags or damaged or worn bins / containers

RETARDING -BAKERIES

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to condensation falling onto/into uncovered product
C	Contamination by non food chemicals (e.g.: cleaners, sanitizers and lubricants)



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RETORTING (See also STERILIZING)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen growth due to retort by-pass
B	Scheduled process not established by recognized authority
B	Pathogen survival (growth) due to improper time/temperature applications (e.g.: <i>Clostridium botulinum</i>)
B	Pathogen survival due to improper temperature distribution
B	Improper equipment calibration
B	Pathogen contamination due to damaged containers
B	Under processing due to overfill of containers
B	Pathogen survival due to inadequate vent schedules/procedures
B	Under processing due to inadequate initial temperature
B	Incipient growth due to excessive time lapse-from closure to retort
come-up	
B	Improper holding prior to heat treatment
C	Inaccurate nutrition information (e.g.: due to mislabelling, nutrient loss during manufacturing or storage) could impact on individuals with certain medical conditions

RETURN (MEAT)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen survival due to contamination by raw product
B	Failure to remove unacceptable product
B	Acceptance of product not meeting specifications
B	Pathogen contamination due to returns
B	Pathogen contamination due to time / temperature abuse during distribution
B	Pathogen contamination due to improper employee handling /poor employee hygiene

REVERSE OSMOSIS / ULTRAFILTRATION

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to product accumulations
B	Pathogen growth due to time/temperature abuse
C	Contamination from non food chemicals (cleaners, sanitizers and lubricants)

REWORKING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen growth / toxin due to time/temperature abuse
B	Pathogen contamination due to air-borne pathogens (e.g.: <i>Listeria monocytogenes</i>)
B	Pathogen contamination due to product accumulations
B	Pathogen contamination due to improper employee handling and operating procedure
B	Pathogen growth due to cross-contamination in storage
B	Pathogen growth due to inappropriate storage temperatures/humidity
B	Pathogen survival (growth) due to improper time/temperature



B	applications (time/temperature abuse)
ingredient	Pathogen survival due to cross contamination by raw/processed
C	Allergenic sensitivity - cross contamination from equipment /
ingredients	
C	Contamination by non food chemicals (e.g.: cleaners, sanitizers and lubricants)
C	Inaccurate nutrition information (e.g.: due to mislabelling, nutrient loss during manufacturing or storage) could impact on individuals with certain medical conditions
P	Contamination from hazardous extraneous material

REWORK STORAGE

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen growth due to time/temperature abuse
B	Pathogen growth due to improper stock rotation and inadequate temperature
B	Pathogen contamination due to use of unacceptable product
P	Contamination from hazardous extraneous material (e.g.: improper handling or protection)

RINSING – PORK TONGUE

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Failure to remove visible contamination from the tongue due to inadequate rinsing

RIPENING (CHEESE CURD)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen growth due to time/temperature abuse (e.g.: <i>Staphylococcus aureus</i> and enterotoxin)
B	Pathogen contamination due to improper employee handling
B	Pathogen growth due to failure of culture/inactive cultures
B	Pathogen growth and toxin production from slow starter culture
activity	
B	Pathogen contamination due to air- borne pathogens (e.g.: <i>Listeria monocytogenes</i>)
B	Pathogen contamination due to product accumulation
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
P	Contamination from hazardous extraneous material

SALTING (See also BRINING, PICKLING)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Contamination and growth by salt-tolerant pathogens
B	Pathogen survival due to improper salt/nitrite/nitrate application
B	Pathogen growth/survival due to inadequate application of preservative/brine
B	Trichinella not destroyed due to insufficient quantity of salt or



- C improper application
- C Excessive amounts of salt/nitrites/nitrates
- P Contamination from hazardous extraneous material

SALTING- DAIRY PRODUCT

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to improper employee handling
B	Pathogen contamination due to air-borne pathogens (e.g.: <i>Listeria monocytogenes</i>)
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
P	Contamination from hazardous extraneous material

SALT REMOVAL

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to improper employee handling
C	Inaccurate nutrition information (e.g.: due to mislabelling, nutrient loss during manufacturing or storage) could impact on individuals with certain medical conditions

SAMPLING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to poor hygiene or improper handling by employees
B	Pathogen growth due to time/temperature abuse
B	Pathogen contamination due to inadequate washing / sanitizing of equipment and utensils
C	Inaccurate nutrition information (e.g.: due to mislabelling, nutrient loss during manufacturing or storage) could impact on individuals with certain medical conditions
C	Contamination by non-food chemicals (e.g.: sanitizers, cleaners, and lubricants)
P	Contamination from hazardous extraneous material

SANITIZING (EGGS)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Survival of pathogens on the shell if the concentration of the sanitizer is too low (e.g.: >100 ppm)
B	Growth of pathogens on the conveying equipment if the concentrations of the sanitizer is too low (e.g. :> 100 ppm)
C	Contamination of egg product if concentration of the sanitizer is too high

SANITIZING (EGGS in the incubator) HATCHERY

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Too much moisture on the shell can support the growth and/or penetration of bacteria
B	Pathogenic contamination due to incorrect temperature or improperly



- functioning equipment (low chemical concentration)
- B Pathogenic contamination due to improperly functioning equipment
- C Contamination due to wrong mix of sanitizer or wrong sanitizer
- C High chemical concentration due to improperly functioning equipment

SAUCE APPLICATOR

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen growth due to time/temperature abuse
B	Pathogen contamination due to improper employee handling

SAWING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to improper employee handling
B	Pathogen contamination due to improper cleaning of equipment
P	Contamination from hazardous extraneous material

SCALDING -PORK

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Internal contamination via the stick wound during scalding
B	Contamination of the stick wound tract by pathogens from scald water
B	Spread of pathogens from carcass to carcass through the scald water and by equipment
C	Contamination from improperly used chemicals in the scald water
C	Contamination of carcasses by hydraulic fluid leak or break

SCALDING & DEFEATHERING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Spread of pathogens from carcass to carcass through the scald water and by equipment
B	Muscle contamination resulting from breakage of the skin barrier due to improper scald water temperature, improper adjustment of feather pickers and line stoppage
B	Pathogen contamination of paws due to build up of organic debris during operations
B	Spread of pathogens from paw to paw through the scald water and equipment due to inadequate replacement /supply water
B	Presence of pathogens associated with inadequate removal of faecal contamination and loosely attached pathogenic bacteria due to inadequate temperature of scald water, pickers not operating properly, inadequate washing,...
P	Sharp bone from compound fractures

SCALING INGREDIENT

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to contaminated utensils
B	Pathogen contamination due to damaged or soiled containers/ packaging material



- B Pathogen growth due to uncalibrated scales (e.g.: product use to destroy or reduce pathogen)
- C Excess of additive (e.g.: Nitrite)
- C Cross contamination due to allergens product
- P Contamination from hazardous extraneous material



SCANNING (See also CANDLING)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen growth due to contamination by raw product
B	Failure to remove unacceptable product
B	Pathogen contamination due to contaminated utensils

SCREENING OF SPICE BLEND / COARSE SCREENING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
P	Undetected foreign material
P	Hazardous extraneous material from improper screening

SEAMING / SEALING (Non-Hermetic)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination through damaged seams/seals/packaging material
B	Pathogen contamination due to loose or faulty seams/seals/packaging material
B	Pathogen survival of pathogens due to inadequate airspace temperature
C	Contamination by non-food chemicals (e.g.: lubricant)

SEASONING (SEASONING VATS)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogenic contamination due to product accumulation
B	Pathogenic contamination due to improper employee handling
C	Contamination due to the addition of inappropriate ingredients (e.g. allergens, vitamins)
C	Contamination by non-food chemicals (sanitizers, cleaning products, lubricants)
P	Contamination by hazardous extraneous materials

SEGREGATION OF SUSPECT PRODUCT

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination of product due to loss of identity of suspect product
C	Contamination (residues) due to lost identity of suspect product
P	Physical contamination due to lost identity of suspect product

SELECTION / PROCESS TIME VERIFICATION -PROSCIUTTO

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Non destruction of Trichinella due to not meeting the 48 days minimum salting period
B	Insufficient A _w reduction to control pathogens

SEPARATING / CLARIFYING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to product accumulations
B	Pathogen contamination due to inadequate cleaning/sanitizing



- B Pathogen contamination due to “clarifier sludge” (e.g.: Milk)
- C Contamination from non-food chemicals (e.g.: cleaners, sanitizers, and lubricants)
- P Contamination from hazardous extraneous material

SETTING (Cheese Curd)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to improper employee handling
B	Pathogen growth due to failure of culture/inactive cultures
B	Pathogen contamination from condensate (e.g. <i>Listeria monocytogenes</i>)
C	Contamination by non-food chemicals (e.g.: lubricants)
P	Contamination from hazardous extraneous material

SHAVING / POLISHING / SINGEING (SEE POLISHING /SINGEING /SHAVING (SCRAPING) – PORK)

SHEETING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to improper employee handling
P	Contamination from hazardous extraneous material

SHIPPING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen growth due to high temperature, in shipping trailers
B	Post process contamination due to damaged cans (canning food)
B	Pathogen growth due to poor shipping condition
B	Pathogen growth due to inadequate control of temperature and relative humidity – (e.g.: eggs)
B	Rough handling causing cracks can increase the risk of internal contamination of eggs
B	Pathogen contamination due to damaged containers
B	Pathogen contamination due to torn cartons/packages from improper handling
B	Pathogen contamination due to damaged cartons/containers (e.g.: from fork lift accidents, improper stacking procedure)
B	Contamination by pathogens due to inadequate sanitation / maintenance /condition of shipping container (trailer/truck)
B	Pathogen growth due to time /temperature abuse or product accumulation in the shipping area prior to transportation
B	Pathogen growth due to inadequate continuation of the cooling process (partially chilled carcasses) or due to product being sold as fresh while it should have been cooked (carcasses not chilled)- Pork
B	Pathogen growth on product being sold fresh at the retail level (carcasses not chilled e.g.: BBQ Hogs) – Pork
B	Carcass contamination due to inadequate truck’s sanitation or poor handling practice
C	Contamination from trailers carrying incompatible products or



materials

- C Chemical contamination from contact with incompatible products or materials during transport
- P Contamination from hazardous extraneous material due to fork lift accidents, improper employee handling

SHIPPING- HATCHERY

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogenic bacterial contamination due to improper sanitation of carriers and shipping area
B	Outgrowth of pathogenic bacteria due to improper transportation temperatures (over heating or chilling)

SHOWER – CARCASS - POULTRY

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Inadequate removal of visible external contamination and loosely attached bacteria
B	Failure to reduce pathogen levels due to inadequate application of a water biofilm preventing bacterial attachment and the removal of visible contamination on carcasses and viscera e.g.: water at insufficient volume or pressure to remove visible contamination, spray nozzles at improper location, number or wrong direction or non-functional...
B	Pathogen survival due to insufficient concentration of the antimicrobial agent
C	Contamination of product due to too high a concentration of antimicrobial agent

SHREDDING -CHEESE

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen growth due to cheese build-up
P	Contamination from hazardous extraneous material

SIFTING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to improper employee handling
B	Pathogen contamination due to product accumulations
P	Contamination from hazardous extraneous material

SIMMERING (See also COOKING)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen survival due to improper temperature distribution
B	Pathogen survival due to improper equipment calibration
B	Pathogen contamination due to condensate (e.g.: <i>Listeria monocytogenes</i>)
B	Improper holding prior to heat treatment
B	Pathogen survival due to improper time/temperature applications
B	Pathogen survival due to improper agitation



C Inaccurate nutrition information (e.g.: due to mislabelling, nutrient loss during manufacturing or storage) could impact on individuals with certain medical conditions

SINGEING/ POLISHING/ SHAVING (SCRAPING) SEE POLISHING /SINGEING /SHAVING (SCRAPING) – PORK

SIZING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to improper employee handling
B	Pathogen contamination due to inadequate washing / sanitizing of equipment and utensils
P	Contamination from hazardous extraneous material

SKINNING - BEEF

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Cross contamination of carcass by hide, spillage of milk from the removal of the udder (e.g.: <i>Escherichia coli</i>)
B	Contamination of the head caused by mechanical skinning
B	Pathogen contamination due to inadequate temperature of sanitizers with diluted/ dirty solution
B	Pathogen contamination due to improper employee handling

SKINNING - PORK

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen growth of pathogens due to cross contamination of carcasses by skin
B	Pathogen growth due to contaminated equipment
B	Pathogen contamination due to improper employee handling

SLICING/DICING (SEE ALSO CUTTING)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to poor hygiene or improper employee handling
B	Pathogen growth due to time/temperature abuse
B	Pathogen contamination (growth) due to improper slice thickness / clumping, and percent fines could result in under-processing
B	Pathogen contamination due to inadequate washing / sanitizing of equipment, cutting tools, or utensils
B	Pathogen contamination due to product accumulations
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
P	Contamination from hazardous extraneous material

SMOKING (See also COOKING)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen growth due to rise in pH due to development of surface



moulds

- B Pathogen growth due to improper equipment calibration
- B Pathogen contamination due to condensate (e.g.: *Listeria*

monocytogenes)

- B Improper holding prior to heat treatment
- B Pathogen survival due to improper time/temperature applications /temperature distribution
- B Pathogen survival due to improper agitation
- C Contamination by non-food chemicals from smoke
- C Contamination by cancerigenic burning residues due to non-approved boiler additive

SMOOTHING AND COOLING - DAIRY FOOD

Type of Hazard

Name of Hazard

- B Pathogen contamination due to inadequate washing/sanitizing
- B Contamination from liquid “Caloporteur”
- C Contamination by non-food chemicals (e.g.: cleaners and sanitizers)
- P Contamination from hazardous extraneous material

SOAKING

Type of Hazard

Name of Hazard

- B Pathogen contamination due to product accumulations
- B Pathogen growth due to time/temperature abuse
- B Pathogen growth due to contamination by water-borne pathogens
- B Pathogen survival due to the environment
- C Contamination from non-listed or unapproved water treatment

chemicals

- C Inaccurate nutrition information (e.g.: due to mislabelling, nutrient loss during manufacturing or storage) could impact on individuals with certain medical conditions
- P Contamination from hazardous extraneous material

SOFTENING OF BEEF FAT

Type of Hazard

Name of Hazard

- B Pathogen contamination due to improper employee handling

SORTING AND CONVEYING- EGGS

Type of Hazard

Name of Hazard

- B Pathogen contamination due to dirty equipment
- B Inadequate equipment maintenance will results in the cracking of eggs and can increase the risk of contaminating the internal contents of the egg

SORTING FEET- POULTRY

Type of Hazard

Name of Hazard

- B Growth of pathogens due to delay in processing paws

SPACER REMOVAL -POULTRY



Type of Hazard

P

Name of Hazard

Contamination from hazardous extraneous material

SPECIFIED RISK MATERIAL REMOVAL (BOVINE)

Type of Hazard

B

Name of Hazard

Contamination of edible tissues with SRM by failure to use dedicated tools to remove SRM

B

Contamination of edible tissues with SRM by failing to remove all SRM

B

Cross contamination between carcasses by failing to control SRM particles in splitting process

B

Failure to remove from main line unacceptable product

B

Contamination of edible tissues by SRM due to inappropriate employee handling /technique

B

Contamination by SRM due to inadequate sanitation procedure of splitting saw

SPIRAL FREEZING TUNNEL

Type of Hazard

P

Name of Hazard

Contamination from hazardous extraneous material

SPLITTING –PORK (SEE ALSO CARCASS DRESSING)

Type of Hazard

B

Name of Hazard

Contamination and cross contamination of the carcass by pathogens from failure to detect or mark and/or subsequently cutting through abscesses or other sources of contamination

B

Contamination and cross contamination of the carcass by pathogens by inadequate sanitizing procedures of splitting saw

B

Contamination and cross contamination of the carcass by pathogens by inadequate temperature of sanitizers with diluted/ dirty solution

B

Cross contamination of pathogens via the splitting saw / improper manipulation

P

Contamination from hazardous extraneous material (metal fragment from carcass saw)

SPRAY VACCINATION- HATCHERY

Type of Hazard

B

Name of Hazard

Pathogenic bacterial contamination due to improper sanitation of equipment (e.g.: *Salmonella sp. sg, se, st*)

SPUR REMOVING (HATCHERY)

Type of Hazard

B

Name of Hazard

Presence of pathogen (bacteria, mould, virus)

STACKING OF CONTAINERS

Type of Hazard

B

Name of Hazard

Pathogenic contamination due to damaged containers

B

Growth of pathogens due to insufficient air circulation between cartons during cooling



P Contamination by hazardous extraneous materials

STANDARDIZING- DAIRY PRODUCT

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to inadequate washing and sanitizing
B	Pathogen growth /toxins due to inappropriate time/temperature
C	Contamination by non-food chemicals (e.g.: cleaners and sanitizers)
C	Inaccurate nutrition information (e.g.: due to mislabelling, nutrient loss during manufacturing or storage) could impact on individuals with certain medical conditions
P	Contamination from hazardous extraneous material e.g.: due to broken equipment

STARTER CULTURE - PRODUCTION, HANDLING AND STORING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen survival due to improper time/temperature applications on the medium
B	Pathogen growth due to inappropriate storage temperatures/humidity
B	Pathogen contamination due to product accumulations / inadequate sanitation
B	Pathogen contamination due to air-borne pathogens (e.g.: <i>Listeria monocytogenes</i>)
B	Pathogen contamination due to water- borne pathogens
B	Pathogen contamination due to inappropriate storage (e.g.: daily storage)
B	Pathogen contamination due to contaminated utensils /equipment
B	Pathogen contamination due to improper employee handling
B	Pathogen contamination (growth) due to cross-contamination in storage
C	Contamination from non-listed water treatment chemicals

STEAM INJECTING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
P	Contamination from hazardous extraneous material

STEAM VACUMING (MEAT)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to failing to remove contamination
B	Pathogen contamination due to improper employee handling
B	Pathogen growth due to failure to maintain proper temp /vacuum of the equipment

STERILIZING / RETORTING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen survival due to improper time/temperature applications /improper temperature distribution
B	Pathogen survival due to inadequate vent schedules/procedures
B	Pathogen growth due to improper equipment calibration



- B Pathogen growth due to improper holding prior to heat treatment
- B Pathogen contamination due to damaged containers
- B Under processing due to overfill of containers
- B Under processing due to inadequate initial temperature
- B Scheduled process not established by recognized authority
- B Incipient growth due to excessive time lapse-from closure to retort
- come-up
- B Growth of pathogens due to retort by-pass
- C Contamination from non-listed water treatment chemicals
- C Inaccurate nutrition information (e.g.: due to mislabelling, nutrient loss during manufacturing or storage) could impact on individuals with certain medical conditions



STICKING / BLEEDING-PORK

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Cross-contamination of sick wound from animals that might be condemned or to have abscesses (e.g.: <i>Salmonella spp.</i> , <i>Campylobacter spp.</i> , <i>Yersina spp</i>)
B	Contamination with pathogens due to inadequate temperature and/or water replenishment of sanitizer

STICK WOUND AND BLOOD CLOT REMOVAL- PORK

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Contamination with pathogens due to the incomplete removal of the stick wound tract
B	Contamination with pathogens due to inadequate temperature and/or water replenishment of sanitizer

STORAGE see STORING /STORAGE

STORAGE –EGG- HACHERY

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Bacterial or viral contamination of storage room and/or storage containers
C	Chemical contamination of storage room and/or containers

STORAGE – PASTEURIZED DAIRY INGREDIENTS / MILK (SEE STORING/STORAGE)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen post-contamination due to crude products
B	Pathogen post-contamination due to inadequate cleaning/sanitizing equipment
B	Pathogen contamination due to improper employee handling
C	Contamination by non-food chemicals (e.g.: cleaners and sanitizers)

STORAGE - RAW MILK

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Microbial proliferation and pathogen growth and <i>Staphylococcus aureus</i> Enterotoxin production due to temperature abuse
B	Pathogen growth due to excess of time storage
B	Pathogen contamination due to “bad sanitary condition”
C	Contamination by non-food chemicals (e.g.: cleaners and sanitizers)

STORING /STORAGE

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen survival due to improper agitation (e.g.: product that needed agitation)
B	Pathogen contamination due to improper employee handling
B	Pathogen growth due to inappropriate storage temperatures/humidity
B	Pathogen contamination due to product accumulations (e.g.: inappropriate stock rotation)



- B Pathogen contamination due to condensation falling onto/into uncovered product
- B Pathogen contamination due to pests (e.g.: insects, rodents)
- B Pathogen contamination due to contamination from equipment
- B Pathogen contamination due to inappropriate storage (e.g.: pathogens / parasites)
- B Pathogen growth / mould (mycotoxins) due to time/temperature abuse /temperature control
- B Pathogen growth due to time /temperature abuse
- B Pathogens contamination of uncovered products due to improper cleaning of filters, condensers and inappropriate use of filters
- B Pathogen contamination due to inadequate cleaning/sanitizing (e.g.: dairy product)
- B Pathogen contamination due to damaged cartons/containers (e.g.: from fork lift, improper stacking procedures)
- C Contamination by non-food chemicals (e.g.: cleaners, sanitizers, lubricants, hydraulic fluids)
- C Chemical contamination from refrigerant leak (e.g.: ammonia)
- C Cross contamination due to inappropriate allergens product storage
- C Inaccurate nutrition information (e.g.: due to mislabelling, nutrient loss during manufacturing or storage) could impact on individuals with certain medical conditions
- P Contamination from hazardous extraneous material due to changed packaging or due to fork lift accidents (e.g.: wood splinters from damaged pallets)
- P Foreign material falling into uncovered product or by employee handling

STORING /STORAGE - DRY

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to improper employee handling /practices (e.g.: exposed / damaged packaging material)
B	Pathogen contamination due to exposed packaging material /damaged packaging
B	Contamination of exposed packaging material due to unsanitary conditions
B	Pathogen contamination due to pathogens in product accumulations
B	Pathogen contamination due to pests (insects, rodents, birds)
B	Pathogen growth during storage and from material returned from packaging room
B	Pathogen growth /cross contamination during storage due to contaminated packaging material being returned from the processing areas to the storage rooms
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
C	Contamination by environmental contaminants (e.g.: heavy metals)
C	Inaccurate nutrition information (e.g.: due to mislabelling, nutrient loss)



- during manufacturing or storage) could impact on individuals with certain medical conditions
- C Contamination by non food-chemicals (e.g.: cleaners, sanitizers, lubricants)
- P Contamination from hazardous extraneous material (e.g.: dirt, debris, contamination of exposed packaging material)
- P Contamination of exposed packaging material by hazardous extraneous material (e.g.: debris)

STORING /STORAGE- MAPLE PRODUCTS

<u>Type of Hazard</u>	<u>Name of Hazard</u>
C	Excessive amounts of heavy metals dissolved after prolonged storage

STORING /STORAGE -SWEETENER AGENT, CHOCOLATE COATING (SEE STORING/STORAGE)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen growth /toxins due to UV light failure
B	Pathogen contamination due to air and receiving equipment
C	Contamination by non-food chemicals (e.g.: cleaners and sanitizers)
P	Contamination from hazardous extraneous material

STORING /STORAGE – CANS / ENDS STORING (SEE STORING/STORAGE)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Post process contamination due to can/ends damaged during storage
B	Growth of thermophiles
B	Could be contaminated with filth from insects, animals or the environment
C	Contamination by non-food chemicals (e.g.: cleaners)

STORING /STORAGE – COOLER- EGGS

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen growth on and/or in the egg due to improper holding temperature and relative humidity

STRAINING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to product accumulations

STUFFING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen growth due to time/temperature abuse
B	Pathogen contamination due to contaminated equipment/ utensils
B	Pathogen contamination due to improper employee handling
C	Contamination by non-food chemicals (e.g.: cleaners and sanitizers)
P	Contamination from hazardous extraneous material



SURFACE RUB

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Contamination and outgrowth of <i>Listeria monocytogenes</i> from food contact surfaces and other environmental sources
B	Pathogens contamination from raw products areas, including <i>Salmonella spp.</i> , <i>Campylobacter jejuni</i> , <i>Escherichia coli</i> O157:H7
B	Outgrowth of <i>Staphylococcus aureus</i> and <i>Clostridium botulinum</i>

SYRUPING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to incorrect preparation/formulation
B	Pathogen survival due to improper time/temperature applications
C	Contamination by non-food chemicals

TEMPERING- SEE THAWING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen growth due to inappropriate storage temperatures/humidity
B	Pathogen growth due to time/temperature abuse
B	Pathogen contamination due to condensate (e.g.: <i>Listeria monocytogenes</i>)
B	Pathogenic bacterial contamination due to improperly cleaned room

TENDERIZING (SEE ALSO AGING)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to contaminated equipment
B	Pathogen growth due to inappropriate storage temperatures/humidity
B	Pathogen growth due to time/temperature abuse
C	Excessive addition of restricted ingredients and additives

THAWING- SEE TEMPERING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to condensate (e.g.: <i>Listeria monocytogenes</i>)
B	Pathogen growth due to inappropriate storage temperatures/humidity
B	Pathogen growth and possible production of <i>Staphylococcus aureus</i> Enterotoxin due to time/temperature abuse

THERMAL PROCESSING (STILL STEAM RETORTS) (SEE STERILISATION)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	survival of pathogenic bacteria due to non-validated process or vent schedule could result in underprocessing
B	Improper procedures could result in no heat treatment
B	Underprocessing due to excessive delays between closing and retorting
B	Lack of adherence to time, temperature and other critical factors of scheduled process or vent schedule could result in inadequate heat treatment and growth of pathogens



TRANSFER- AUTOMATIC /PRESELECTION - POULTRY

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to carcasses falling on equipment.
B	Pathogen contamination due to build-up of organic debris on precutter and hockcutter
B	Inadequate detection/removal of obviously condemnable carcasses
B	Growth of pathogens on carcass surfaces due to pile up of carcasses and delay at the transfer /rehang location
C	Contamination of non-food chemicals (e.g.: cleaners, sanitizers and lubricants)

TRANSFER AND CANDLING – HATCHERY (SEE ALSO CANDLING / TRANSFERRING / INOVA VACCINATION)

TRANSFER / REHANG – MANUAL AND PRESELECTION - POULTRY

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Cross contamination due to bird contact and contamination due to cloacal leakage from carcass and subsequent carcass to carcass contact, chute, table or belt to carcass contact
B	Growth of pathogens on carcass surfaces due to pile up of carcasses and delay at the transfer /rehang location
B	Inadequate detection/removal of obviously condemnable carcasses by company employee(s)
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)

TRANSFER INTO TUBS-MEAT

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to improper employee handling
P	Contamination from hazardous extraneous material

TRANSFER TO THE HOPPER – POULTRY

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogenic contamination due to product accumulation
P	Contamination by hazardous extraneous materials

TRANSFERRING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to contaminated equipment
B	Pathogen contamination due to improper employee handling
C	Contamination by non-food chemicals e.g.: (sanitizers, cleaners and lubricants)

TRANSFERRING (Pumps and Pipes)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to contaminated equipment



- B Pathogen contamination due to product accumulations
- C Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
- C Contamination through cross-connections
- P Contamination from hazardous extraneous material

TRANSFERRING - SHELL EGG

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogenic bacterial contamination (e.g.: <i>Salmonell spp</i>) due to failure to remove unacceptable product
B	Pathogenic bacterial contamination (e.g.: <i>Salmonell spp</i>) due to failure to remove excessively dirty and/or leaking eggs resulting in contamination of wash water and the equipment

TRAYING EGG- HATCHERY

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogenic bacterial contamination due to improperly cleaned equipment
B	Pathogenic bacterial contamination due to poor employee handling practices
B	Pathogenic bacterial contamination due to failure to remove unacceptable egg's (cracks, excessive faecal contamination on surface)
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)

TREE STICKS AND TREES& STICKS -SAUSAGE

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to poor cleaning of sticks
P	Contamination from hazardous extraneous material

TRIMMING (SEE DRESSING CARCASS)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to contaminated equipment/utensils
B	Pathogen growth due to time/temperature abuse
B	Pathogen contamination due to improper employee handling (e.g.: poorly sanitized gloves, instruments or erroneous chemical dilution)
B	Pathogen contamination due to inadequate trimming
B	Trichinella transfer from pork to beef during trimming from knives, gloves, employees, etc.
B	Pathogen survival due to contamination from conveyors
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers, lubricants and hydraulic fluid)
P	Contamination from hazardous extraneous material

TRIMMING /FINAL EXAMINATION / GRADING /CARCASS APPROVAL – PORK

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathological conditions due to sending the carcass to the operator held rail instead of the veterinary held rail



B	Contamination on carcasses due to failure to detect, mark and remove contaminated area
B	Presence of pathological conditions and/or contamination due to failure to remove product identified as unacceptable
B	Cross-contamination by pathogens due to carcass accumulation
B	Growth of pathogens due to delay in processing the carcasses
B	Contamination by pathogens due to contaminated straps/hooks
B	Contamination with pathogens due to inadequate temperature and/or water replenishment of sanitizer
C	Cross-contamination due to improper employee handling
P	Physical contamination from the grading probe
P	Presence of hazardous extraneous material due to trimming failure (e.g.: metal particles from rail)

TRIMMING /FINAL EXAMINATION –POULTRY

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen growth due to delay in processing products
B	Presence of pathogens due to failure to detect and remove contaminated (faecal, ingesta, GIT) area

TRIMMING (NON-MEAT)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to inadequate washing / sanitizing of equipment and utensils
B	Failure to remove unacceptable product, due to inadequate trimming
B	Pathogen contamination due to product accumulations
B	Pathogen growth due to time/temperature abuse
B	Pathogen contamination due to poor hygiene or improper handling by employees
C	Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
P	Contamination from hazardous extraneous material

TONGUE, HEAD MEAT / PARTS HARVESTING – PORK

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Contamination and cross-contamination of the head by pathogens due to inadequate sanitizing of conveyors
B	Cross-contamination by pathogens due to product accumulation
B	Growth of pathogens due to delay in processing the tongue and/or meat parts
B	Presence of pathogens on the tongue and contamination from ingesta (regurgitation) and/or faecal material (coprophagia)
B	Contamination or cross-contamination of the head meat by pathogens from the mouth, snout and ear canal
B	Contamination by pathogens due to incision of abscesses while harvesting
B	Contamination with pathogens due to inadequate temperature and/or water replenishment of sanitizers



P Presence of hazardous extraneous material (e.g.: wires in tongue/mouth of suspect animals) not being detected and removed

TUMBLING

Type of Hazard

Name of Hazard

B Potential outgrowth of raw product pathogens, including *Salmonella spp.* and *Escherichia coli* O157:H7 in raw beef and veal products, *Salmonella* and *Campylobacter jejuni/ E.coli* in chicken, turkey and other poultry and *Salmonella* in raw pork and other meat products.

B Contamination from unclean equipment

C Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)

P Contamination from hazardous extraneous material

ULTRAFILTRATION

Type of Hazard

Name of Hazard

B Pathogen growth due to time/temperature abuse

B Pathogen contamination due to product accumulations

B Pathogen contamination due to infrequent cleaning or replacing filter or soiled filters/ biofilms

C Contamination by non food chemicals (e.g.: cleaners, sanitizers and lubricants)

ULTRAHIGH TEMPERATURE (UHT) PROCESSING - STERILIZING /COOLING – DAIRY FOOD

Type of Hazard

Name of Hazard

B Pathogen survival due to improper time / temperature

B Pathogen contamination due to aseptic valves failure

B Pathogen recontamination due to improper pressure differential

B Pathogen contamination due to inadequate equipment sterilization

B Pathogen contamination due to pinholes

B Pathogen contamination due to product accumulations

C Cross contamination by non-food chemicals (e.g.: cleaners and sanitizers)

C Chemical contamination from heating or cooling media (pinholes)

C Inaccurate nutrition information (e.g.: due to mislabelling, nutrient loss during manufacturing or storage) could impact on individuals with certain medical conditions

P Contamination from hazardous extraneous material

UNLOADING /HANGING- live bird

Type of Hazard

Name of Hazard

B Pathological organisms in septicemic birds dead on arrival being hung instead of being discarded

UNMOLDING

Type of Hazard

Name of Hazard

B Pathogen contamination due to improper employee handling



B Pathogen contamination (growth) due to outside of the cook and strip bag

VACUUM PACKAGING (See also Sealing)

Type of Hazard

Name of Hazard

- B Under processing due to overfill of containers
- B Pathogen contamination through damaged seams/seals/packaging material
- B Pathogen contamination due to loose or faulty seams/seals/packaging material
- B Pathogen growth due to insufficient vacuum
- B Pathogen contamination due to improper employee handling or equipment
- C Inaccurate nutrition information (e.g.: due to mislabelling, nutrient loss during manufacturing or storage) could impact on individuals with certain medical conditions
- P Contamination from hazardous extraneous material

VACCINATION – HATCHERY

Type of Hazard

Name of Hazard

- B Vaccines contaminated with biological hazards in process of vaccination
- C Vaccines contaminated with chemical hazards in the process of vaccination

VACCINE PREPARATION – HATCHERY

Type of Hazard

Name of Hazard

- B Pathogenic bacterial contamination due to poor employee handling practices
- B Pathogenic bacterial contamination due to improper sanitation of equipment
- C Improper chemical concentration or wrong mixture
- C Chemical residues on contact surface due to improper cleaning procedures

VACCINE STORAGE- HATCHERY

Type of Hazard

Name of Hazard

- B Pathogen growth outside of the vaccine container due to non-aseptic conditions and /or poor employee handling practices

VENTING /OPENING/ EVISCERATION AND SHOWER (POULTRY)

Type of Hazard

Name of Hazard

- B Contamination with pathogens due to back splashing from water sprays used to clean the equipment

VITAMIN /MINERAL ADDITION

Type of Hazard

Name of Hazard

- B Pathogen contamination due to product accumulations
- C Adding inadequate low concentration (nutritional lack)



- C Adding high concentration of vitamin
- C Cross contamination from non-food chemicals
- C Inaccurate nutrition information (e.g.: due to mislabelling, nutrient loss during manufacturing or storage) could impact on individuals with certain medical conditions
- C Improper or inaccurate addition (e.g.: type, concentration) of nutrients (vitamins / minerals / amino acids) could impact on certain individuals

WASH & ANTIBACTERIAL RINSE – Red Meat Species

Type of Hazard

Name of Hazard

- | | |
|---|---|
| B | Failure to reduce bacterial load at acceptable level due to inappropriate/inadequate intervention (e.g.: time of contact too short or inadequate temperature) |
| B | Contamination by improper washing (e.g.: wash incomplete: water at insufficient force, volume or pressure to remove visible contamination) |
| B | Pathogen contamination due to inadequate concentration of acids organics |
| C | Contamination due to inadequate concentration of acids organics or used a wrong product |
| P | Contamination from hazardous extraneous material |



WASHING

Type of Hazard

Name of Hazard

- B Pathogen growth due to time/temperature abuse
- B Pathogen contamination due to poor hygiene or improper handling by employees
- B Pathogen contamination from washwater
- B Pathogen contamination due to recycled water
- B Pathogen contamination due to product accumulations
- C Contamination by non-food chemicals (e.g: sanitizers, cleaners and lubricants)
- P Contamination from hazardous extraneous material

WASHING – CARCASSES – POULTRY

Type of Hazard

Name of Hazard

- B Contamination of carcasses by non adjusted shower's spray
- B Cross contamination between carcasses resulting in a contamination of on the trim parts
- B Failure to reduce pathogen levels due to inadequate washing and application of a water biofilm preventing bacterial attachment and the removal of visible contamination in the cavity and on the carcass surfaces, (e.g.: water at insufficient volume or pressure to remove visible contamination, spray nozzles at improper location, number or wrong direction or non-functional)
- B Pathogen survival due to insufficient concentration of the antimicrobial agent
- C Contamination of product due to too high a concentration of the antimicrobial agent

WASHING – CHEESE CURD

Type of Hazard

Name of Hazard

- B Pathogen contamination due to improper employee handling
- B Pathogen contamination from washwater
- B Pathogen growth due to failure of culture/inactive cultures
- C Contamination by non-food chemicals (e.g.: lubricants)
- P Contamination from hazardous extraneous material

WASHING – CRATE - POULTRY

Type of Hazard

Name of Hazard

- B Contamination of live birds due to pathogens as a result of improperly cleaned crates

WASHING & DISINFECTING – CRATE /TRAILER- POULTRY

Type of Hazard

Name of Hazard

- B Pathogen contamination of subsequent flocks / live birds due to inadequately cleaned crates and/or trailers

WASHING/ EMPTYING BARRELS- MAPLE PRODUCTS

Type of Hazard

Name of Hazard



- C Chemical contamination from non-food chemicals (sanitizers, cleaners, lubricants)
- P Contamination from hazardous extraneous material

WASHING - PROCESSED AND SHELL EGG

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination of eggs due to dirty wash water
B	Pathogen contamination due to recycled water
B	Pathogen survival in the washwater and/or on the shell due to improper control of temperature and/or pH and insufficient water changes during the grading period
B	Contamination of washwater due to dirty washer and brushes
C	Contamination by non-food chemicals (e.g.: use of unapproved cleaners or sanitizers)
P	Contamination from hazardous extraneous material

WASHING - PROCESSED PRODUCTS included Dairy Product

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to recycled water
B	Pathogen contamination due to improper employee handling
B	Pathogen contamination due to product accumulations
B	Pathogen contamination due to improper washing (e.g.: wrong dilution/ lack of sanitizing)
C	Contamination by non food chemicals (e.g.: cleaners, sanitizers and lubricants)
P	Contamination from hazardous extraneous material

WASHING USED PACKAGING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogenic bacterial contamination due to incorrect temperature
B	Pathogenic bacterial contamination due to improper chemical concentration (too low)
B	Pathogenic bacterial contamination due to improperly functioning equipment (dirty wash water)
C	Chemical contamination due to improper chemical concentration (to high)

WASH –ORGANIC ACID –RED MEAT SPECIES

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen survival due to improper contact time/concentration
C	Excess of organic acid or wrong organic acid.

WASH WATER CHLORINATION

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to inadequate treatment at plant level
B	Pathogen growth through elevated temperature
C	Overdosing with chlorine or acid



WATER CHLORINATION

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen survival in water due to inadequate treatment at the plant level
B	Contamination due to failure to kill water-borne pathogens (e.g.: <i>Listeria monocytogenes</i>)
C	Contamination by non-food chemicals (e.g.: use of non-approved chemicals)
C	Excess of chlorine added to water during treatment at the plant level

WATER DISTRIBUTION

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Bacterial /pathogen growth due to “dead ends”
B	Contamination due to back siphonage or dead ends
P	Contamination from hazardous extraneous material (scale deposits)

WATER FILLING – CANNED FOODS

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen survival due to inadequate temperature could result in low initial temperature (IT)

WATER FILTERING/ FILTRATION

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to infrequent cleaning or replacing filter or soiled filters/ biofilms
B	Pathogen contamination due to improper washing and sanitizing
C	Contamination by heavy metal from pipeline
P	Contamination from hazardous extraneous material

WATER TREATING (WATER INTAKE AND TREATMENT)

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Pathogen contamination due to water-borne pathogens
B	Pathogen survival in water due to inadequate treatment at the establishment
C	Contamination by non-food chemicals
C	Contamination from non-listed water treatment chemicals
C	Excess chlorine added to water during treatment at the establishment
C	Contamination through cross-connections
C	Improper concentration of boiler chemicals
P	Contamination from hazardous extraneous material (e.g.: rust particles, scale deposits)

WATTLE REMOVAL- HATCHERY

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Presence of pathogen (bacteria, mould, virus)

WAXING

<u>Type of Hazard</u>	<u>Name of Hazard</u>
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- B Pathogen contamination due to product accumulations
- B Failure to remove unacceptable product
- C Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)
- C Contamination due to use of non-food grade or unapproved coatings/waxes
- C Chemical residues due to excessive concentrations used

WEIGHING

Type of Hazard

Name of Hazard

- B Under processing due to overfill of containers
- B Pathogen contamination due to improper employee handling / operating procedures /equipment
- B Insufficient amount of additive (e.g.: nitrite)
- B Pathogen growth due to time/temperature abuse
- B Product heavier than maximum fill weight in schedules process could result in under-processing
- C Excess amount of additives (e.g.: nitrite)
- C Inaccurate nutrition information (e.g.: due to mislabelling, nutrient loss during manufacturing or storage) could impact on individuals with certain medical conditions
- P Contamination from hazardous extraneous material

WEIGHING / INSPECTING- MAPLE PRODUCT

Type of Hazard

Name of Hazard

- B Yeasts and moulds from environment and dirty sampling tools
- C Contaminated syrup may be used as a result of inadequate organoleptic inspection

WEIGHING /MEASURING & INJECTION - MEAT

Type of Hazard

Name of Hazard

- B Pathogen growth due to too little pickle in the product
- B Spore germination due to insufficient nitrite
- C Excess of nitrite
- C Contamination from non-food chemicals
- P Contamination from hazardous extraneous material (e.g.: needle broken)

WHEY RECUPERATION

Type of Hazard

Name of Hazard

- B Contamination due to inadequate cleaning and sanitation
- C Contamination by non-food chemicals (e.g.: cleaners, sanitizers and lubricants)

WHEY STORAGE (FROM PROCESSING)

Type of Hazard

Name of Hazard

- B Pathogen contamination due to inadequate cleaning and sanitation



- B Pathogen growth due to time/temperature abuse
- C Contamination by non-food chemicals (e.g.: cleaners and sanitizers)

WORKING – DAIRY FOOD – BUTTER

Type of Hazard

Name of Hazard

- B Pathogen contamination due to improper employee handling
- B Pathogen contamination due to product accumulations
- C Contamination by non food chemicals (e.g.: cleaners, sanitizers and lubricants)
- P Contamination from hazardous extraneous material

WRAPPING

Type of Hazard

Name of Hazard

- B Pathogen contamination due to product accumulations
- B Pathogen contamination due to improper employee handling
- C Contamination from non food chemicals
- P Contamination from hazardous extraneous material

YOLK SKIMMING

Type of Hazard

Name of Hazard

- B Pathogen contamination due to contaminated utensils
- B Pathogen contamination due to improper employee handling



PART III

PLANT LAYOUT



Part III Plant Layout

In simple terms, cross-contamination occurs when safe to eat food or ingredient comes into contact with bacteria, chemicals or other unwanted substances making the food or ingredient unsafe to eat. In a food processing environment, this could happen at any step in the process, from receiving to final shipping, if care is not taken to prevent cross-contamination. This section of the Reference Database for Hazard Identification lists some potential cross-contamination zones in a processing plant and their associated hazards.

Usually, a plant’s schematic diagram or plant layout is an establishment’s primary tool for identifying potential areas of cross-contamination (e.g.: locations where allergen ingredients, food additives or raw ingredients could come into unplanned contact). To help identifying all the potential cross-contamination zones, it is important that the plant determines 1) the flow of finished and raw products as well as employee traffic; 2) the flow of all ingredients and packaging materials from the moment they are received through storage, preparation, processing, packaging, finished product holding and shipping; and 3) employee movement throughout the establishment, including change rooms, washrooms and lunchrooms.

Note: This section does not contain a complete listing of all cross-contamination zones and hazards as the plant layout is different for different establishments. Users are recommended to conduct a hazard assessment for all potential cross-contamination zones in their plants to ensure all hazards specific to their plant layout and traffic patterns are identified and subsequently controlled by implementing appropriate measures.

CROSS CONTAMINATION ZONE

<u>Type of Hazard</u>	<u>Name of Hazard</u>
B	Possible contamination from connections between raw and pasteurized product lines (e.g.: Valves leaking) Dairy and egg products
B	Potential pathogenic cross contamination of ready to eat product due to improper employee movement into the RTE/ packaging room (e.g.: <i>Salmonella spp</i> , <i>Escherichia coli</i> , <i>Listeria monocytogenes</i> , <i>Staphylococcus aureus</i>)
B	Potential pathogenic cross contamination of ready to eat product due to cross contamination as a result of improper employee handling (e.g.: <i>Salmonella spp</i> , <i>Escherichia coli</i> , <i>Listeria monocytogenes</i> , <i>Staphylococcus aureus</i>)
B	Potential pathogenic cross contamination of cooked product with uncooked /raw products
B	Potential pathogenic cross contamination of product (raw and cooked) due to cross utilization of area/equipment for both raw and cooked product (e.g.: <i>Salmonella spp</i> , <i>Escherichia coli</i> , <i>Listeria monocytogenes</i> , <i>Staphylococcus aureus</i>)
B	Potential pathogenic cross contamination due to contamination at source such as visible organic material (e.g.: <i>Salmonella sp</i> , <i>sg</i> , <i>se</i> , <i>st</i>) – Hatchery
C	Possible contamination with CIP chemicals due to cross connection between CIP lines and procut lines (e.g.: valves leaking) Dairy and Processed Eggs)



- C Potential contamination of incoming material/product due to cross contamination by employee as a result of improper movements between raw and cooked areas of the plant and/ or improper handling of allergen product or employee working with allergens product
- C Potential contamination of incoming material/product by other allergenic products (e.g.: dust from allergen product)
- C Potential cross-contamination of product due to common contact area used for multi purpose
- C Potential cross contamination of product with allergens due to improper scheduling of products and/or sanitation/clean up between products
- C Presence of allergens due to inaccurate nutrition information (e.g.: due to mislabelling, nutrient loss during manufacturing or storage) could impact on individuals with certain medical



PART IV

BIOLOGICAL HAZARDS SECTION



Part IV Biological Hazard

Biological hazards are hazards that are caused by spoilage or pathogenic microorganisms. Together, these microorganisms pose the greatest food safety concern to food industry and consumers. In addition, in recent years, antimicrobial resistance has developed to be a potential human health hazard and in turn, is one of the major food safety hazards.

Biological hazards include bacteria, viruses, parasites, fungi and moulds, and other quality/sanitary indicators. Their risks may be assessed as low, medium or high depending on the severity of consequences of the hazard. This section of the Reference Database for Hazard Identification provides basic information on various biological hazards.

Table 1 is a categorized list for some biological agents and their related fact sheets. The data was collected from more than one source and in some cases small variations were observed. However, the information that was gathered and summarized gives a good indication of the parameters influencing the growth of some biological Agents.

Categories of Biological Agents in Food:

1. Bacteria

Bacillus cereus
Campylobacter jejuni
Clostridium botulinum
Clostridium perfringens
Escherichia coli / coliform
Escherichia coli 0157:H7
Listeria monocytogenes
Salmonella spp.
Shigella spp.
Staphylococcus aureus
Vibrio cholerae
Vibrio parahaemolyticus
Vibrio vulnificus
Yersinia enterocolitica

2. Viruses

Bacteriophage (virus)
Enteric Virus (other than Hepatitis A and Noroviruses)
Hepatitis A virus
Norovirus
Norwalk virus

3. Fungi and Moulds

Mycotoxigenic fungi



4. Parasites

Cryptosporidium parvum

Giardia duodenalis (Giardia intestinalis)

Taenia spp.

Toxoplasma gondii

Trichinella spiralis

5. Other Biologics

Prions (Bovine Spongiform Encephalopathy)

Scombroid (Histamine) poisoning



FACT SHEETS FOR BIOLOGICAL HAZARD

TABLE 1

1. FOODBORNE BACTERIAL AGENTS

Bacterial toxins are produced by microorganisms as a by-product of growth. Some bacterial toxins (example *Staphylococcus aureus* and *Clostridium botulinum*) cannot be deactivated by cooking and can have various origins. Illness may be referred to as 'foodborne intoxication' since it results from the ingestion of a toxin produced by a microbe living on a food product. Acute and immediate effects take place after consumption; symptoms may include nausea, vomiting, abdominal cramps, chills, sweats, shock, shallow respiration, dizziness, headache, dryness of mouth & throat, muscle paralysis, breathing difficulties within 30 minutes to 72 hours of consumption of food (depending on microorganism), and recovery within 1-10 days (depending on microorganism). Treatments vary depending on microorganism.



<u>BACILLUS CEREUS</u>	
SOURCES	Distributed in soil, dust, air, water and decaying organic matter, vegetation, human faeces, rice, corn starch, milk products, spices
CHARACTERISTICS	oxygen requirements: aerobic/facultative anaerobe motile spore-forming organism spores resist heat and dry environmental conditions
FOOD AT RISK	boiled or fried rice stored at room temperature starchy food (pasta, noodles, potato products) cooked vegetables and salads cooked meat (ground beef, veal, lamb, pork, poultry) ready-to-eat foods dried herbs and spices dried products such as cereals and flours cream ('sweet curdling' or 'bitty cream' spoilage) puddings, sauces and soups
TEMPERATURE RANGE FOR GROWTH	5-55 °C
pH RANGE FOR GROWTH	4.3 minimum, 9.3 maximum
MINIMUM WATER ACTIVITY	0.912-0.95
ILLNESS CAUSED BY	Intoxication
PREVENTION	<ul style="list-style-type: none">• vegetative cells destroyed by heat (56 °C, 5 minutes)• spores destroyed by heat (126 °C, 90 min)• cooling rates that will prevent growth to hazardous levels• spores lose heat resistance in acidic environments, reduce pH of food to < 4.3• most chemical sanitizers destroy <i>B. cereus</i> on surfaces• antimicrobials which have an effect on <i>B. cereus</i> include: benzoate, EDTA and sorbate
REFERENCES	



CAMPYLOBACTER JEJUNI/COLI/LARI	
SOURCES	<ul style="list-style-type: none">• alimentary tract of wild, domesticated animals and birds, sewage, water, raw milk, raw meats, faecal matter (human, animal), shellfish• often isolated from healthy cattle, chickens, birds and even flies
CHARACTERISTICS	<p>It is quite sensitive to drying, storage at 25 °C, acidic conditions, and heat. Motile, non-sporeforming organism.</p> <p>It is relatively fragile and sensitive to environmental stresses (e.g.: 21% oxygen, drying, heating, freezing, disinfectants, acidic conditions). Because of its microaerophilic characteristics the organism requires 3 to 5% oxygen and 2 to 10% carbon dioxide for optimal growth conditions. This bacterium is now recognized as an important enteric pathogen.</p>
FOOD AT RISK	meat carcasses contaminated with intestinal contents during slaughter and evisceration , raw poultry , shellfish , raw milk, red meat, garlic butter, salads, fresh mushrooms
TEMPERATURE RANGE FOR GROWTH	25 to 45°C
pH RANGE FOR GROWTH	4.9 minimum, 9.5 maximum
MINIMUM WATER ACTIVITY	0.987-0.997
ILLNESS CAUSED BY	Infection
PREVENTION	<ul style="list-style-type: none">• inactivated by heating at 55 °C and above, cannot survive cooking or pasteurization temperatures• sensitive to drying• reduce pH of food to < 4.9, rapid death especially above refrigeration temperatures• survives poorly at atmospheric oxygen concentrations and room temperature• sensitive to NaCl concentrations above 1%• sensitive to sanitizers, e.g.: chlorine• sensitive to ultraviolet radiation
REFERENCES	



<u>CLOSTRIDIUM BOTULINUM</u>	
SOURCES	<p>Dust, soil, mud, water, fish, shellfish, vegetables, honey, faeces and carcasses of birds and animals, uncooked vegetables and grains. Very wide-spread.</p> <p>Examples in Food. Canned product : canned vegetable, canned meat, canned corn, peppers, green beans, soup, beets, asparagus, mushrooms, ripe olives, spinach, tuna fish, chicken and chicken livers and liver pate, luncheon meats, ham, sausage, stuffed eggplant, lobster, smoked and salted fish, garlic in oil, etc.</p>
CHARACTERISTICS	<p>Heat destroys toxin.</p> <p>Anaerobic spore-former; produces extremely heat-resistant spores. Spores may germinate and grow in low-acid shelf-stable products if other microorganisms are not present under certain abuse conditions (cooked foods)</p> <p>Motile.</p> <p>Salt concentration: Bacteria could tolerate up to 5% salt (non-proteolytic strain) and 10% (proteolytic strain).</p> <p>Motile and spore-forming bacteria, extremely heat-resistant spores. Toxin produced at pH > 4.8.</p>
FOOD AT RISK	<p>Uncooked vegetables (type A) that have close contact with the ground (asparagus, potatoes, cabbage) and grains</p> <p>smoked and salted fish, seafood (type E)</p> <p>honey associated with infant botulism</p> <p>refrigerated foods, particularly with long shelf life</p>
TEMPERATURE RANGE FOR GROWTH	<p>Group I, type A, B and F (proteolytic) :min:10°C optimum: 35-40 °C</p> <p>Group II, type B, E and F (non-proteolytic): min: 3°C optimum: 18-25 °C</p>
pH RANGE FOR GROWTH	<p>Group I, type A, B and F (proteolytic): 4.6 minimum, 9 maximum</p> <p>Group II, type B, E and F (non-proteolytic): 5 minimum, 9 maximum</p>
MINIMUM WATER ACTIVITY	<p>Group I, type A, B and F (proteolytic): 0.935</p> <p>Group II, type B, E and F (non-proteolytic): 0.97</p>
ILLNESS CAUSED BY	<p>Illness caused by toxin produced by vegetative cells; most potent toxin known; very low dose required.</p>
PREVENTION	<ul style="list-style-type: none"> • Spore inactivation in low-acid (pH>4.6) foods by heating to 121 °C for 3 minutes • toxin inactivated by treatment at 85 °C for 1 minute, 80 °C for 6 minutes or 65 °C for 1.5 hours • vegetative cell destroyed by few minutes exposure to 60 °C • cooling rates that will prevent growth to hazardous levels • Heat resistance of spores decreases at pH values <5 & >9. • group I inhibition by 10% NaCl and group II inhibition by 5% NaCl • toxin inactivation at pH 11 • reduce pH of food to ≤4.6 • use of preservatives, e.g.: nitrite, sorbates, EDTA • lactic acid bacteria added in starter cultures inhibit growth in



	<p>meat products</p> <ul style="list-style-type: none"> • spores inactivated by ozone or chlorine dioxide
REFERENCES	C. botulinum, J.W. Austin, Food Microbiology: Fundamentals and Frontiers, 2 nd ed.

<u>CLOSTIDIUM PERFRINGENS</u>	
SOURCES	<p>Ubiquitous in nature; soil, dust, air, water, vegetation, human and animal faeces, vegetables and meat</p> <p>In most instances, the actual cause of poisoning by <i>C. perfringens</i> is temperature abuse of prepared foods. Small numbers of the organisms are often present after cooking and multiply to food poisoning levels during cool down and storage of prepared foods. Meats, meat products, and gravy are the foods most frequently implicated</p>
CHARACTERISTICS	Anaerobic spore-former; spores survive up to 100°C ; spores are <u>usually</u> present in "cooked" foods, non-motile, produces enterotoxins
FOOD AT RISK	<p>cooked meat: stews, roast joints</p> <p>gravies, thick soups, vegetable curry (heating drives air off and creates anaerobic conditions for spores to germinate)</p> <p>pies</p> <p>poultry dishes, prepared in advance and allowed to cool slowly</p> <p>rolled meats and stuffed poultry</p>
TEMPERATURE RANGE FOR GROWTH	10 to 52 °C
pH RANGE FOR GROWTH	5 minimum, 9 maximum
MINIMUM WATER ACTIVITY	0.93-0.95
ILLNESS CAUSED BY	Enterotoxin
PREVENTION	<ul style="list-style-type: none"> • vegetative cells are destroyed by heating or by freezing • enterotoxins inactivated by heating for 5 minutes at 60 °C • vegetative cell growth is prevented at < 12 °C • cooling rates that will prevent growth to hazardous levels • 6-8% NaCl inhibits growth • curing salts (e.g.: sodium nitrite and chloride) can inhibit growth • pH below 5 and above 9 destroys cells • high concentration of ethanol (as sanitizer) causes spore death on food contact surfaces
REFERENCES	



<u>ESCHERICHIA COLI / COLIFORM</u> (serotypes that cause invasive type illness)	
SOURCES	Intestinal tract of man and animals, water, raw milk, soil, raw meat and poultry, warm-blood animals
CHARACTERISTICS	Non-spore-forming, facultative anaerobe, non-motile, not heat resistant Difficult to differentiate from non-pathogenic E. coli Killed by mild heat; does not survive freezing over long periods of time Indicator of faecal contamination and the possible presence of enteric pathogens (e.g.: <i>Salmonella typhi</i>) Survives frozen storage for a short period of time
FOOD AT RISK	raw milk, raw meat, raw poultry, raw vegetables, foods that are handled under poor hygienic conditions
TEMPERATURE RANGE FOR GROWTH	10-44.5 °C
pH RANGE FOR GROWTH	4.4 minimum, 9 maximum
MINIMUM WATER ACTIVITY	0.95
ILLNESS CAUSED BY	Infection or intoxication
PREVENTION	<ul style="list-style-type: none">• rapidly inactivated by heating• destroyed at pH values outside the range allowing growth (pH 4.4-9)• growth can be inhibited by a slightly acidic environment (e.g.: acetic, lactic acid)• follow Good Manufacturing Practices (GMPs), e.g.: good personnel practices followed by food handlers• thorough washing of fruits and vegetables• cook raw foods thoroughly, use only pasteurized milk
REFERENCES	



<u>ESCHERICHIA COLI O157:H7</u>	
SOURCES	Cattle FMFF, cows, sheep and deer, water contaminated from faecal sources Examples in food: undercooked or raw hamburger (ground beef) has been implicated in many of the documented outbreaks, however <i>Escherichia coli</i> O157:H7 outbreaks have implicated alfalfa sprouts, unpasteurized fruit juices, dry-cured salami, lettuce, game meat, and cheese curds. Raw milk was the vehicle in a school outbreak in Canada.
CHARACTERISTICS	Non-spore-forming FMFF Facultative anaerobic, non-motile survives well in chilled or frozen food produce potent toxins that cause severe damage to the lining of the intestine Note: test for <i>Escherichia coli</i> are not sensitive to <i>Escherichia coli</i> O157:H7
FOOD AT RISK	undercooked ground meat: (e.g.: raw hamburgers) raw milk alfalfa sprouts unpasteurized fruit juice (e.g.: apple juice) lettuce cheese curds dry-cured salami, fermented sausages
TEMPERATURE RANGE FOR GROWTH	10 to 44.5 °C
pH RANGE FOR GROWTH	3.64 minimum, 9 maximum
MINIMUM WATER ACTIVITY	0.95- 0.995
ILLNESS CAUSED BY	Infection or intoxication <i>Escherichia coli</i> serotype O157:H7 is a rare variety of <i>Escherichia coli</i> that produces large quantities of one or more related, potent toxins that cause severe damage to the lining of the intestine.
PREVENTION	<ul style="list-style-type: none">• rapidly inactivated by heating• cook beef hamburgers until the centre reaches a temperature of 71.1 °C (160°F)• thoroughly wash fruits and vegetables• acidify foods to pH 3.6 or below• benzalkonium chloride, ethanol or hot water (70 °C) are effective food contact sanitizers if organic matter is not present• sensitive to ultraviolet radiation
REFERENCES	



<u>LISTERIA MONOCYTOGENES</u>	
SOURCES	Soil, water, sewage, silage, domesticated animals (cattle, sheep, chickens), raw milk, drains, condensate, pooled water, cracked or worn tiles, ventilation systems and filters <ul style="list-style-type: none">• Examples in Food: raw milk, supposedly pasteurized fluid milk, cheeses (particularly soft-ripened varieties), ice cream, raw vegetables, fermented raw-meat sausages, raw and cooked poultry, raw meats (all types), and raw and smoked fish. RTE product contamination post cooking
CHARACTERISTICS	Facultative anaerobe, non-spore-forming; withstands repeated mild heating and thawing; survives in a dry state, sometimes for years. Tumbling motility at 22 °C. salt tolerant, e.g.: can grow in 10% sodium chloride grows at refrigeration conditions
FOOD AT RISK	raw milk, cheeses (soft-ripened varieties), ice cream, raw vegetables, raw and fermented meat sausages, raw meats (all types), raw and smoked fish, ready-to-eat foods contaminated after cooking
TEMPERATURE RANGE FOR GROWTH	-0.4-50 °C
pH RANGE FOR GROWTH	4.4 minimum, 9.6 maximum
MINIMUM WATER ACTIVITY	.92
ILLNESS CAUSED BY	Infection
PREVENTION	<ul style="list-style-type: none">• growth is inhibited at pH values below 4.4• inactivated at temperatures above 70 °C• inactivated in vegetables by lysozyme• sanitizers (aldehydes, alcohols, quaternary ammonium compounds) are effective in eliminating contamination of food contact surfaces• sensitive to ultraviolet radiation• Refrigeration below 5 °C
REFERENCES	



<u>SALMONELLA</u>	
SOURCES	Humans Poultry, hogs, cattle, meat and poultry, rodents, pets, birds, reptiles, insects, animal by-products, Examples in food: egg products, raw meats, eggs, milk and dairy products, fish, shrimp, frog legs, yeast, coconut, sauces and salad dressing, cake mixes, cream-filled desserts and toppings, dried gelatin, peanut butter, cocoa, and chocolate, spices
CHARACTERISTICS	Facultative anaerobe non-spore-forming motile bacteria survives in refrigerated, frozen or dehydrated foods for long periods heat sensitive, killed by mild heat
FOOD AT RISK	undercooked meat and poultry unpasteurized milk eggs and eggs products (eggshell contaminated with faecal material in the hen's cloaca, egg white and yolk contaminated when breaking the egg) mayonnaise prepared with raw eggs
TEMPERATURE RANGE FOR GROWTH	5 to 47 °C
pH RANGE FOR GROWTH	3.7 minimum, 9.6 maximum
MINIMUM WATER ACTIVITY	0.93 - 0.95
ILLNESS CAUSED BY	Infection
PREVENTION	<ul style="list-style-type: none">• avoid direct handling of food by infected employees• acidify foods at pH 3.7 or below• thoroughly wash fruits and vegetables• heat sensitive, thermal destruction• growth inhibited by 0.1% acetic acid• not resistant to sanitizers used in the food industry• pasteurization of raw eggs, milk
REFERENCES	



SHIGELLA

<u>SHIGELLA</u>	
SOURCES	Human carriers, water Exampels in food: salads (potato, tuna, shrimp, macaroni, and chicken), raw vegetables, milk and dairy products, and poultry. Contamination of these foods is usually through the fecal-oral route. Faecally contaminated water and unsanitary handling by food handlers are the most common causes of contamination
CHARACTERISTICS	Facultative anaerobe, non-spore-forming, non- motile survives better at low temperatures
FOOD AT RISK	uncooked prawn, salads: tuna, shrimp, chicken, raw vegetables, sliced fruit at room temperature
TEMPERATURE RANGE FOR GROWTH	6.1 to 47 °C
pH RANGE FOR GROWTH	4.8 minimum, 9.3 maximum
MINIMUM WATER ACTIVITY	0.96
ILLNESS CAUSED BY	Infection
PREVENTION	<ul style="list-style-type: none">• growth prevented at $\text{pH} \leq 6.0$ in presence of organic acids• rapidly inactivated at temperatures above 65 °C• inactivated at pH values <4• thoroughly wash fruits and vegetables “with potable water”• avoid contamination of ready-to-eat foods from flies
REFERENCES	



<u>STAPHYLOCOCCUS AUREUS</u>	
SOURCES	<p>Human and animal skin, skin glands and mucous membranes of warm blooded animals, hair, human nasal tract, nasal and oral passages, infected wounds, boils, acne, soil, clothing, faeces, insects, marine and fresh water, plant surfaces, dust and air.</p> <p>Examples in food: meat and meat products; poultry and egg products; salads such as egg, tuna, chicken, potato, and macaroni; bakery products such as cream-filled pastries, cream pies, and chocolate eclairs; sandwich fillings; and milk and dairy products. Foods that require considerable handling during preparation and that are kept at slightly elevated temperatures after preparation are frequently involved in staphylococcal food poisoning.</p>
CHARACTERISTICS	<p>Facultative anaerobe, produces enterotoxin Non-sporeforming Resistant to high salt (up to 20% sodium chloride) heat resistant produces toxins, especially in the presence of oxygen killed by mild heat; are resistance to up to 10% salt solutions <u>very stable enterotoxins</u> - may not be completely inactivated by 121 °C</p>
FOOD AT RISK	<p>raw poultry, poultry products, cold cooked meats raw milk, hard cheeses salted meats (e.g.: ham, corned beef) cold sweets, custards and cream-filled bakery products food requiring considerable handling during preparation and kept at slightly elevated temperatures after preparation</p>
TEMPERATURE RANGE FOR GROWTH	7 to 50°C
pH RANGE FOR GROWTH	4 minimum, 10 maximum
MINIMUM WATER ACTIVITY	0.83, for enterotoxin production 0.85
ILLNESS CAUSED BY	Enterotoxin
PREVENTION	<ul style="list-style-type: none">• during food fermentation, lactic acid bacteria produce substances that are inhibitory to <i>S. aureus</i>, including: lactic acid sorbate and benzoate• chemical sanitizers such as chlorine, halogens and quaternary ammonium compounds eliminate <i>S. aureus</i> on food contact surfaces• reduce pH of food to ≤ 4.2• reduce water activity to 0.83• avoid direct handling of cooked ready-to-eat foods or cured/salted foods
REFERENCES	



<u>VIBRIO CHOLERAE</u>	
SOURCES	Estuarine waters, seafood, marine environments: temperate, tropical and sub-tropical waters, contaminated water supplies due to poor sanitation Cholera is generally a disease spread by poor sanitation , resulting in contaminated water supplies. This is clearly the main mechanism for the spread of cholera in poor communities in South America
CHARACTERISTICS	Facultative anaerobe Non-spore-forming Motile produces a potent toxin tolerant to alkaline conditions
FOOD AT RISK	fruits or vegetables washed with contaminated water and consumed without cooking foods coming from a contaminated environment: seafood and frog's legs uncooked fish marinade in lime fish and shellfish (raw or partially cooked) raw oysters
TEMPERATURE RANGE FOR GROWTH	10 to 45°C
pH RANGE FOR GROWTH	5 minimum, 10 maximum
MINIMUM WATER ACTIVITY	0.94-0.97
ILLNESS CAUSED BY	Waterborne infection, ingestion of food that was in contact with contaminated water
PREVENTION	<ul style="list-style-type: none">• consumption of raw, improperly cooked or cooked, recontaminated shellfish may lead to infection• rapidly inactivated at pH values <4.5• sensitive to drying• thoroughly wash all fruit and vegetables• avoid cross contamination from raw to cooked foods• avoid direct food handling by infected food employees• peracetic acid and hypochlorite are effective food contact sanitizers in the absence of protein
REFERENCES	



<u>VIBRIO PARAHAEMOLYTICUS</u>	
SOURCES	Coastal water, brackish water, seafood Examples in food: the consumption of raw, improperly cooked, or cooked, recontaminated fish and shellfish. A correlation exists between the probability of infection and warmer months of the year. Improper refrigeration of seafoods contaminated with this organism will allow its proliferation, which increases the possibility of infection
CHARACTERISTICS	Facultative anaerobe Non-sporeforming Motile
FOOD AT RISK	
TEMPERATURE RANGE FOR GROWTH	5 to 45.3°C
pH RANGE FOR GROWTH	4.8 minimum, 11 maximum
MINIMUM WATER ACTIVITY	0.94
ILLNESS CAUSED BY	Infection
PREVENTION	
REFERENCES	



<u>VIBRIO VULNIFICUS</u>	
SOURCES	Estuarine waters, seafood Found in estuarine environments and associated with various marine species such as plankton, shellfish (oysters, clams, and crabs), and finfish Examples in food: oysters, clams, and crabs
CHARACTERISTICS	Facultative anaerobe Non-sporeforming Motile Mortality rate is high (>50%)
FOOD AT RISK	Shellfish (oysters, clams, shrimps etc)
TEMPERATURE RANGE FOR GROWTH	15 to 43°C
pH RANGE FOR GROWTH	5 minimum, 10 maximum
MINIMUM WATER ACTIVITY	0.96
ILLNESS CAUSED BY	Infection
PREVENTION	Cooking
REFERENCES	



<u>YERSINIA ENTEROCOLITICA</u>	
SOURCES	Humans, swine, water, soil, intestinal tract of many animals rare or raw meats, raw milk, raw vegetables, shellfish Examples in food: meats (pork, beef, lamb, etc.), oysters, fish,
CHARACTERISTICS	Facultative anaerobe, non-spore-forming Motile at 25°C but not at 37°C Could tolerate 6% of salt Good resistance to environmental stress e.g.: High pH, dehydration and freezing
FOOD AT RISK	meats (beef, lamb), raw or undercooked pork products, oysters, raw milk, shellfish, dairy products, fruit and vegetables
TEMPERATURE RANGE FOR GROWTH	-1 to 40°C
pH RANGE FOR GROWTH	4.2 minimum, 10 maximum
MINIMUM WATER ACTIVITY	0.945
ILLNESS CAUSED BY	Infection
PREVENTION	<ul style="list-style-type: none">• Pasteurization• 5-7% sodium chloride inhibits growth• inactivated by a pH value lower than 4.2• growth is retarded by potassium sorbate up to 500 ppm at pH 6.5• sensitive to ultraviolet radiation• avoid direct handling of food by infected food handlers• avoid post-processing contamination of ready-to-eat foods with long shelf lives
REFERENCES	Microorganisms in Foods, ICMSF, vol#5, p462



2. Viruses

<u>BACTERIOPHAGE (VIRUS)</u>	
SOURCES	Raw milk, starter cultures; whey, crevices, walls, floors
CHARACTERISTICS	Phage attack can affect the output of starter bacteria metabolism (acid); a cause of "slow vats" or "dead vats" in cheese production and slow or insufficient fermentation in sausage making.
FOOD AT RISK	
TEMPERATURE RANGE FOR GROWTH	
pH RANGE FOR GROWTH	
MINIMUM WATER ACTIVITY	
ILLNESS CAUSED BY	Not known to cause illness
PREVENTION	
REFERENCES	



<u>ENTERIC VIRUSES (other than hepatitis A and Noroviruses)</u>	
SOURCES	Contaminated water and contamination by infected food handlers
CHARACTERISTICS	Rotavirus, astrovirus, hepatitis E, adenovirus, Sapovirus: does not replicate in food, requires human cells to multiply passes through the gastrointestinal tract resistant to environmental stress such as heat and acid conditions resists freezing and drying
FOOD AT RISK	foods may become contaminated during: handling, preparation, serving or processing salads shellfish grown in shallow, coastal waters
TEMPERATURE RANGE FOR GROWTH	
pH RANGE FOR GROWTH	stable at pH 3
MINIMUM WATER ACTIVITY	
ILLNESS CAUSED BY	All foodborne viruses are transmitted by fecal-oral route. Also by ingesting contaminated foods that undergo extensive handling in their preparation and are consumed without reheating
PREVENTION	<ul style="list-style-type: none">• heating for 30 minutes at 50 °C• reduce pH levels to < 3 or increase to pH >10• thoroughly wash fruits and vegetables• thorough cleaning and disinfection must follow after vomiting on food premises• food handlers trained in effective hand washing techniques
REFERENCES	



<u>Hepatitis A Virus</u>	
SOURCES	Human faeces, contaminated water (fresh and seawater, wastewater, marine sediments) and soil Examples in food: cold cuts and sandwiches, fruit and fruit juices, milk and milk products, vegetables, salads, shellfish, and iced drinks are commonly implicated in outbreaks. Water, shellfish, and salads are the most frequent sources. Contamination of foods by infected workers in food processing plants and restaurants is common.
CHARACTERISTICS	high resistance to chemical and physical agents, including: heat, acid and solvents under freezing and refrigeration conditions the virus remains infective
FOOD AT RISK	milk fruits (strawberries, raspberries) salad vegetables (green onions, lettuce) shellfish manually prepared food products cream-filled cookies cold cuts (precooked or cured meat, sausages or meat loaves, that are sliced and served on sandwiches or on party trays)
TEMPERATURE RANGE FOR GROWTH	
pH RANGE FOR GROWTH	stable at pH 1
MINIMUM WATER ACTIVITY	
ILLNESS CAUSED BY	Transmission occurs by the fecal-oral route, either by direct contact with a Hepatitis A virus infected person or by ingestion of Hepatitis A virus contaminated food or water
PREVENTION	<ul style="list-style-type: none">• cook shellfish at 90 °C for 1.5 min• thoroughly wash all fruit and vegetables (removed potable water)• avoid handling of food by infected employees• ensure training of food handlers in effective hand washing (asymptomatic food handlers can spread the infection)• infectivity is decreased by exposure to 70% alcohol• inactivated by ultraviolet radiation
REFERENCES	



<u>NOROVIRUS (Norwalk and Norwalk-like)</u>	
SOURCES	Environmental surfaces (e.g.: carpets), feces from infected humans may contaminate soil or water. Fecal pollution from sewage discharges
CHARACTERISTICS	Most widely recognized viral agent associated with food and waterborne outbreaks stable and resistant to heat and acidic conditions under refrigeration and freezing conditions the virus remains intact resist gastric acids at pH 3-4 resistant to drying
FOOD AT RISK	shellfish, raw or insufficiently steamed clams and oysters pose a high risk salads water and ice manually prepared food products bakery products
TEMPERATURE RANGE FOR GROWTH	
pH RANGE FOR GROWTH	
MINIMUM WATER ACTIVITY	
ILLNESS CAUSED BY	Ingestion of food contaminated due to poor hygiene practices. Person-to-person spread following projectile vomiting. Transmission via contaminated surfaces (carpets and toilet seats)
PREVENTION	<ul style="list-style-type: none">• cook shellfish at 90 °C for 1.5 min• thoroughly wash all fruit and vegetables• avoid handling of food by infected food handlers• ensure training of food handlers in effective hand washing (asymptomatic food handlers can spread the infection)
REFERENCES	



<u>Norwalk Virus (NOROVIRUS)</u>	
SOURCES	<p>Norwalk gastroenteritis is transmitted by the fecal-oral route via contaminated water and foods. Secondary person-to-person transmission has been documented. Water is the most common source of outbreaks and may include water from municipal supplies, well, recreational lakes, swimming pools, and water stored aboard cruise ships.</p> <p>Examples in food: shellfish, salad ingredients, raw or insufficiently steamed clams and oysters. Foods other than shellfish are contaminated by ill food handlers.</p>
CHARACTERISTICS	<p>Common names of the illness caused by the Norwalk and Norwalk-like viruses are viral gastroenteritis, acute nonbacterial gastroenteritis, food poisoning, and food infection.</p>
FOOD AT RISK	
TEMPERATURE RANGE FOR GROWTH	
pH RANGE FOR GROWTH	<p>Stable at pH 3 to 10</p> <p>Stable at pH 2.7 for 3 hours at room temperature</p>
MINIMUM WATER ACTIVITY	
ILLNESS CAUSED BY	<p>The disease is self-limiting, mild, and characterized by nausea, vomiting, diarrhea, and abdominal pain. Headache and low-grade fever may occur. The infectious dose is unknown but presumed to be low</p>
PREVENTION	
REFERENCES	



3. FUNGI and MOULD

Mycotoxins are considered a chemical hazard even if it came from mould.

Mycotoxins are: toxic chemical compounds, not microorganisms, are very stable, resistant to heat, unaffected by cooking, produced by fungi as secondary metabolites in response to competitive pressures from other fungi/bacteria that compete for the same water, food, or territory. They can have antibiotic properties, cause toxic damage to cells of humans and animals, cause chronic effects such as various cancers, immunosuppression, growth retardation, birth defects, renal dysfunction, serious long-term effects. Even at small concentrations, there are hundreds in existence. Examples are Vomitoxin, Aflatoxin, and Patulin. They are usually associated with particular crops (i.e. corn, cereal crops, apples)

<u>MYCOTOXIGENIC FUNGI</u>	
SOURCES	Nuts, spices, fruit, vegetables, cereals, grains, legumes
CHARACTERISTICS	Multicellular, filamentous fungi, growth on foods usually in the form of fuzzy or cottony appearance. Colour appears white which later becomes dark or smoky Toxic fungi associated with food production is dominated by 3 genera: Aspergillus, Fusarium and Penicillium but not all the species of these genera are capable of producing toxins
FOOD AT RISK	Cereal, Crops, Fruits
TEMPERATURE RANGE FOR GROWTH	Min: 10°C
pH RANGE FOR GROWTH	Min pH: 2, optimum pH: 5-8
MINIMUM WATER ACTIVITY	Minimum Water Activity (A_w): 0.80
ILLNESS CAUSED BY	Ingestion of toxin Some toxins are known carcinogens
PREVENTION	Good Agricultural Practices
REFERENCES	ICMSF, Microorganisms in Foods, vol#5



4. PARASITES

<u>CRYPTOSPORIDIUM Spp.</u>	
SOURCES	<p>Livestock, calves, domestic animals and faecally contaminated water</p> <p>Could occur, theoretically, on any food touched by a contaminated food handler. Incidence is higher in child daycare centers that serve food. Fertilizing salad vegetables with manure is another possible source of human infection. Large outbreaks are associated with contaminated water supplies.</p>
CHARACTERISTICS	<p>Protozoa, is an obligate intracellular parasite most likely to be present as an oocyst (resting stage equivalent to a bacterial spore)</p> <p>oocyst survives on stainless steel if kept wet</p> <p>oocyst survives heating at 60 °C for 1 minute</p> <p>resistant to chlorine</p>
FOOD AT RISK	<p>raw milk</p> <p>raw sausages (non-fermented)</p> <p>any food touched by a contaminated food handler</p> <p>salad vegetables fertilized with manure or washed/processed with contaminated water</p> <p>apple cider (unpasteurized)</p>
TEMPERATURE RANGE FOR GROWTH	No growth outside of host. Oocysts remain viable between -20°C to 50°C
pH RANGE FOR GROWTH	Unknown, but Oocysts viability is reduced at extreme pH values
MINIMUM WATER ACTIVITY	At 0.85, over 99.9% of Oocysts were non-infectious after 24 hr @ 28°C or 1 week at 7°C
ILLNESS CAUSED BY	Person-to-person, by ingesting contaminated food, drinking untreated water
PREVENTION	<ul style="list-style-type: none"> • pasteurization • temperature above 73 °C renders the oocyst non-infectious • acid conditions (pH 4) results in loss of oocyst viability • sensitive to drying • sensitive to ultra violet light • 0.35% peracetic acid inactivates oocysts • avoid cross contamination from raw to ready-to-eat foods • thoroughly wash fruits and vegetables
REFERENCES	



<u>GIARDIA DUODENALIS</u>	
SOURCES	Environmental waters which have been faecally polluted. The organism is found in most animals. Other Giardia species infect birds, reptiles and amphibians
CHARACTERISTICS	survives in food and water as cysts (infective form) water survival at low temperatures (~ 8 °C) cool moist conditions favour survival cysts resistant to ultraviolet radiation and chlorination
FOOD AT RISK	salads vegetables such as lettuce fruit such as strawberries foods washed with contaminated water or handled by infected employees herbs root crops (beet, carrot)
TEMPERATURE RANGE FOR GROWTH	Cysts rapidly killed at 55°C Much less resistant than Cryptosporidium
pH RANGE FOR GROWTH	
MINIMUM WATER ACTIVITY	
ILLNESS CAUSED BY	Person-to-person due to poor hygiene. Contaminated water, food contaminated by water or by a food handler
PREVENTION	<ul style="list-style-type: none">• cysts eliminated by normal cooking procedures in food preparation• heating food to 60-70 °C for 10 min• boiling for 3 minutes• pasteurization• cysts inactivated by freezing• water filtration (8 µm pore size filter)• avoid cross contamination from raw to ready-to-eat foods• thoroughly wash fruits and vegetables• avoid food handling by infected employees
REFERENCES	



<u>TAENIA SPP.</u>	
SOURCES	Infective larvae (cysticerci) may be found in the muscles of cattle (<i>Taenia. saginata</i>) or pigs (<i>Taenia solium</i>). Infection with the adult tapeworm may result from the consumption of raw or poorly cooked beef or pork contaminating viable cysticerci. Severe symptoms may result from ingestion of viable <i>T. solium</i> eggs in water, on fruits and vegetables or hands.
CHARACTERISTICS	Cysticerci measure approximately 1 cm in diameter and are whitish in colour. They may remain infectious in muscle tissue for up to a year or longer.
FOOD AT RISK	Raw beef and pork
TEMPERATURE RANGE FOR GROWTH	-10°C to 60°C
pH RANGE FOR GROWTH	
MINIMUM WATER ACTIVITY	
ILLNESS CAUSED BY	Minor abdominal disturbances may be caused by the presence of adult tapeworms in the small intestine. Severe neurological problems may result if cysticerci develop in brain or spinal cord.
PREVENTION	Cooking, good sanitation and hygiene to prevent ingestion of <i>T. solium</i> eggs
REFERENCES	



<u>TOXOPLASMA GONDII</u>	
SOURCES	Infection may result from ingestion of oocysts in soil, sand, water, cat litter, on fruits and vegetables or hands. Tissue cysts, containing thousands of <i>T. gondii</i> , may be present in the muscles and organs of domestic and wild mammals and birds. Infection may result from ingestion of tissue cysts in raw or poorly cooked meat or poultry. Congenital Infections
CHARACTERISTICS	Oocysts are environmentally resistant and may remain viable in soil for many months. Tissue cysts may remain viable for the lifetime of the host.
FOOD AT RISK	Raw meats, raw milk, raw vegetables
TEMPERATURE RANGE FOR GROWTH	Oocysts; at 50°C, viable for 1hr, at 60°C, viable for 1min, at -20°C viable for 28 days
pH RANGE FOR GROWTH	
MINIMUM WATER ACTIVITY	
ILLNESS CAUSED BY	Severity of symptoms largely determined by the extent of cell destruction in affected organs and tissues, and by immunocompetency of the host.
PREVENTION	<ul style="list-style-type: none">• cats should not be fed raw meat and should be prevented from catching and consuming rodents and bird• wash hands after gardening or changing cat litter.• wash fruits and vegetables,• wash utensils, cutting surfaces and hands after handling raw meat or poultry• cook meat thoroughly. to an internal temperature of 60-70°C• tissue cysts killed by salting or curing.• freezing; -12.4°C is theoretical point at which <i>T. gondii</i> instantly inactivated. Other studies have shown survival at -20°C for 48 hr
REFERENCES	



<u>TRICHINELLA SPIRALIS</u>	
SOURCES	Infective larvae may be found encysted in the muscles of pigs and certain wild mammals, including bears and walruses. Infection may result from consumption of raw or poorly cooked meat containing viable larvae.
CHARACTERISTICS	Cysts measure approximately 0.4 mm by 0.25 mm. They may remain viable for several years.
FOOD AT RISK	Wild animal meat, e.g.: bears, wild boar
TEMPERATURE RANGE FOR GROWTH	Freezing not recommended since most wild animals have <i>T.nativa</i> which is very resistant to freezing. Cook to an internal temperature of 70-75°C for pork and 71°C for game meat.
pH RANGE FOR GROWTH	
MINIMUM WATER ACTIVITY	
ILLNESS CAUSED BY	Severity of symptoms depends on the individual and the intensity of infection. Abdominal disturbances may occur when ingested larvae develop into adults in the intestine. The migration of newborn larvae into the muscle tissues may result in chronic muscle pain, swelling and fatigue.
PREVENTION	Thoroughly cook all pork products and meat from wild mammals. When dealing with meat from wild animals, freezing is not recommended as a means of destroying encysted larvae,
REFERENCES	



5. OTHER BIOLOGICS

BOVINE SPONGIFORM ENCEPHALOPATHY (Mad Cow Disease)	
SOURCES	<p>Cows contain the BSE agent if a cow is infected.</p> <p>Health Canada requires the removal of all specified risk material (SRM) from the food supply. SRM are those tissues that most likely contain the BSE agent if a cow is infected. <u>In cattle over the age of 30 months, those tissues include the skull, brain, spinal cord and a portion of the small intestine.</u> Removing SRM at slaughter is the single most important public health protection measure that can be taken.</p> <p>Note : Muscle meat, milk and milk products are, therefore, considered safe by Health Canada and international health agencies such as the <u>World Health Organization</u></p>
CHARACTERISTICS	Proteinaceous infectious particle, resistant to protease, heat, irradiation and formalin treatments
FOOD AT RISK	Beef
TEMPERATURE RANGE FOR GROWTH	37-39°C (body temperature of a healthy cow)
pH RANGE FOR GROWTH	7.0 to 7.5 (pH of living muscle)
MINIMUM WATER ACTIVITY	0.98 (healthy live animal meat)
ILLNESS CAUSED BY	extremely low risk to human health (variant Creutzfeld-Jakob Disease, (vCJD))
PREVENTION	
REFERENCES	<u>http://www.hc-sc.gc.ca/fn-an/securit/animal/bse-esb/facts-faits_e.html</u>



SCOMBROID (HISTAMINE) POISONING

SOURCES	Foods contaminated with histamine, mainly fish
CHARACTERISTICS	bacteria act as an indirect agent of food poisoning by converting a food component (histidine) into a harmful compound (histamine) histamine is produced during temperature abuse and spoilage cooking or heating does not destroy histamine vacuum packaging is not effective in retarding histamine production
FOOD AT RISK	scombroid fish: tuna, bonito, mackerel (temperature abused raw fish allows bacterial growth and toxin production) fish: sardines, pilchards, herring canned fish cheese, specially Swiss cheese (ripened at warm temperatures) fermented meat products, e.g.: salami fermented vegetables, e.g.: sauerkraut
TEMPERATURE RANGE FOR GROWTH	
pH RANGE FOR GROWTH	
MINIMUM WATER ACTIVITY	
ILLNESS CAUSED BY	Ingestion of contaminated food with histamine
PREVENTION	<ul style="list-style-type: none">• in cheese production the use of starter cultures with low decarboxylase activity prevent histamine formation• short fermentation time for meat products, use appropriate starter culture and rapidly decrease the pH• transport and store fish under refrigeration• chill fish rapidly in seawater or brine at < 10 °C• hold fish at 0 °C up to 14 days, 4.4 °C up to 7 days• raw fish should be purchased from known and reputable suppliers
REFERENCES	



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Bad Bug Book: Foodborne Pathogenic Microorganisms and Natural Toxins Handbook, U.S. Food and Drug Administration, Centre for Food Safety and Applied Nutrition. <http://vm.cfsan.fda.gov/~mow/intro.html>

MICROBIAL PATHOGEN DATA SHEETS, NewZealand Food authority
<http://www.nzfsa.govt.nz/science/data-sheets/index.htm>

Appendix 4: Bacterial Pathogen Growth and Inactivation
<http://www.cfsan.fda.gov/~acrobat/haccp4x4.pdf>



PART V - 1

FOODS CAUSING ADVERSE REACTIONS (ALLERGY AND INTOLERANCE)



Canadian Food
Inspection Agency

Agence canadienne
d'inspection des aliments



Foods Causing Adverse Reactions (Allergy and Intolerance)

1.0 INTRODUCTION

For hypersensitive individuals, certain foods and their derivatives can cause either allergic or intolerance reactions which are included in the general term adverse reactions. Other examples of adverse reactions include chemical and microbiological related illnesses. Both food intolerance and food allergy reactions are abnormal responses to an exposure to a food or food ingredient.

Food intolerance is a term that describes an abnormal physiological response to an ingested food or food ingredient. This reaction does not involve the immune system. Examples include lactose intolerance, monosodium glutamate (MSG) headache and sulphite reaction. Symptoms may include diarrhea and bloating. [1]

Food allergy is an abnormal immune response to proteins found in food. Allergic reactions cannot occur in the absence of proteins. These proteins (antigens) are capable of stimulating the production of antibodies in the body, thereby, triggering allergic reactions. Immediate response to an allergic reaction can range in severity from a skin rash or itching of the mouth, to migraine headaches, a drop in blood pressure, anaphylaxis (a very severe allergic reactions to food involving failure of multiple organ systems), and death. There is no cure for food allergies and the only way for an allergic individual to protect themselves is strict avoidance of the allergen. [1]

Health Canada and the Canadian Food Inspection Agency (CFIA) have jointly identified nine priority foods and their derivatives which are estimated to be responsible more than 90 percent of adverse food reactions within the Canadian population.

- Peanuts
- Tree nuts (almonds, Brazil nuts, cashews, hazelnuts, macadamia nuts, pecans, pine nuts, pistachio nuts and walnuts)
- Sesame Seeds
- Milk
- Eggs
- Seafood (fish, crustaceans and shellfish)
- Soy
- Wheat
- Sulphites

Although sulphites are not considered to be true allergens, for sensitive persons they produce an adverse reaction which can be life threatening. It is the serious outcome of the reaction that has resulted in the inclusion of sulphites on the priority allergen list. [2] Even though this list represents the foods causing the most common and serious adverse reactions, a wide variety of other foods have also been reported to cause adverse reactions in certain individuals, e.g. corn, tartrazine, lentil, strawberry, etc. [3]

Consumers who have food allergies and intolerances rely on accurate label information on food products to avoid eating foods that contain ingredients to which they may be sensitive. If these foods, or their derivatives, are undeclared or declared incorrectly on the label, or if inadvertent cross-contamination occurs during production, the results can be serious and sometimes fatal.



This section of the Reference Database for Hazard Identification contains information on the nine most common food allergens (see Table 1), causes and sources of undeclared allergens, regulations affecting food allergens in Canada, proposed regulatory amendments on allergen labelling, Hazard Analysis Critical Control Points (HACCP), Good Manufacturing Practices (GMPs), and allergen prevention plans (APP). Annex 1 is a reference that can assist users in developing an allergen prevention plan.

2.0 THE NINE PRIORITY ALLERGENS IN CANADA

Table 1: Health Canada/CFIA Priority Allergen List

Note: Information in this table is taken in part from these references: [1], [3], [4], [5], [6] and [7].

<u>Peanuts</u>	
Other Names	Goober nuts, goober peas, ground nuts, mandelonas, arachis oil, kernels, arachide, valencias, nut meats, beer nuts.
Allergy Information	<p>Peanuts have been described as the most dangerous of all food allergens. There have been several reports of fatal and near fatal anaphylactic reactions to peanuts and peanut butter. Peanut allergy can be present in early life and is usually life-long. In most cases allergic individuals need to avoid all traces of peanuts for life.</p> <p>Peanuts belong to the legume family. Allergy to peanut is associated with allergy to certain legumes such as lupin. Peanut allergic individuals frequently react to tree nuts despite the absence of a close botanical relationship. This is often due to cross-contamination during processing, as peanuts are usually processed in manufacturing facilities that handle other nuts.</p> <p>The allergenic protein is present only in the seed and not in the leaf, stem, flower or root. Peanut proteins are heat stable.</p> <p>Peanuts are used in many different forms as a single food as well as a filler or substitute for more expensive or specialty foods. It is widely applied as a component of seasoning blends, sauces, and dressings. Although the awareness of peanut allergy has increased in recent years, hidden uses of peanuts still pose a significant risk for individuals allergic to peanuts.</p> <p><u>Peanut Oil</u></p> <p>In the majority of cases peanut oil is highly refined. Refined peanut oil is generally thought to be free of allergenic protein, therefore, it is not considered to be a risk to consumers with peanut allergies. However, it would be prudent for food manufacturers or importers to request from their supplier a Product Specification Sheet or equivalent information showing that the oil is highly refined with no protein present to trigger any allergic reaction.</p> <p>Currently, sub-section B.01.009(4) of the <i>Food and Drug Regulations</i> requires the declaration of peanut oil, hydrogenated or partially hydrogenated peanut oil and modified peanut oil on the labels of prepackaged foods regardless of</p>



	<p>component declaration exemptions for ingredients. Health Canada is finalizing regulatory amendments where the declaration of all priority food allergens will be required, without exception, should the ingredient be or contain any protein from the allergen source.</p> <p>A Fact Sheet on Peanuts can be viewed at: http://www.inspection.gc.ca/english/fssa/labeti/allerg/pearaae.shtml</p>
Possible hidden sources	<p>Almond icing, chilli, infant formula, vegetable burgers, cold pressed peanut oil, flavouring in dry soup mix, chocolate, gravy, egg rolls, hazelnut paste, deflavoured or re flavoured peanuts sold as walnuts or almonds, e.g. mandelona nuts, peanut oil in enrichment vitamins added to milk, ice cream, baked goods, vegetarian meat substitutes.</p>

<u>Tree nuts</u>	
(almonds, Brazil nuts, cashews, hazelnuts, macadamia nuts, pecans, pine nuts and walnuts)	
Other Names	<p>marzipan, calisson (almonds) amazon nuts (Brazil nuts) anacardium nuts (cashews) filberts (hazelnuts) queensland nuts (macadamia nuts) pignolias, pinon (pine nuts)</p>
Allergy Information	<p>Tree nuts are from a different botanical family than peanuts. Individuals allergic to peanuts may not necessarily be allergic to tree nuts and vice versa. Like peanut allergy, allergy to tree nuts is usually lifelong. Allergic reactions to tree nuts tend to be more severe in nature, causing life-threatening and sometimes fatal reactions. People with tree nut allergies also often react to a number of different types of nuts, even though they do not come from closely related plant species. For instance, coconut and nutmeg are not usually restricted from the diet of someone allergic to tree nuts, however, some people have reacted to coconut and nutmeg. Avoidance of all tree nuts is recommended for individuals allergic to any tree nut.</p> <p>There is also a milder form of tree nut allergy which is associated with birch pollen allergy, where symptoms are confined largely to the mouth, causing a condition called oral allergy syndrome (OAS). This condition is triggered by certain proteins found in tree nuts which are very similar to birch pollen. These proteins tend to be destroyed by cooking, which can reduce the oral allergenicity of nuts for these allergic consumers. For more information on OAS, please visit the CFIA website at http://www.inspection.gc.ca/english/fssa/concen/tipcon/orale.shtml</p> <p>A Fact Sheet on Tree Nuts can be viewed at: http://www.inspection.gc.ca/english/fssa/labeti/allerg/nutnoie.shtml</p>



Possible hidden sources	Pesto and barbeque sauce, coffee grinders used to grind nut-flavoured coffee, cereals, natural flavours and extracts, ice-cream, spreads, baked goods.
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<u>Sesame Seeds</u>	
Other Names	Tahini, tahina, gingelly seeds, hummus, halwa, benne seeds, sim sim, semsamol, sesamum indicum, til.
Allergy Information	<p>The incidence of sesame allergy appears to be increasing, likely as a result of sesame seeds and oil being used in a wider variety of foods. A high degree of cross-reactivity has also been reported among sesame seeds, poppy seeds, kiwi fruit, hazelnut, and rye grain.</p> <p>Sesame is an oil seed plant of the family of Pedaliaceae. The seeds contain approximately 50% oil, most often used for cooking and salad dressings. Common foods containing sesame are Middle Eastern dishes, dips, salad dressing, vegetarian foods, Turkish halwa, tahini (ground sesame seed, tahina), fast food confections, and various bakery products.</p> <p>Similar to peanut oil and other plant based oils, it is possible to refine sesame oil to a point to which there is no longer any protein left. Allergic reactions cannot occur in the absence of protein. However, it would be prudent for food manufacturers or importers to request from their supplier a Product Specification Sheet or equivalent information showing that the oil is in fact highly refined with no protein residue left to trigger any allergic reaction.</p> <p>A Fact Sheet on Sesame Seeds can be viewed at: http://www.inspection.gc.ca/english/fssa/labeti/allerg/sese.shtml</p>
Possible hidden sources	Natural flavours, seasonings, sesame oil carried over to other oils, dips, spreads, baked goods, sauces, vegetarian dishes, snack foods, dressings.

<u>Milk</u>	
Other Names	Casein, sodium caseinate, lactalbumin, lactoglobulin, lactoferrin, whey, whey proteins, curds, lactose, lactate, modified milk ingredients, milk derivatives, hydrolyzed casein, hydrolyzed milk protein.
Allergy Information	<p>Milk sensitivities including milk allergy and intolerance are complex and often misunderstood. Unlike allergic reactions, intolerance reactions, e.g. gastrointestinal discomfort as a result of lactose intolerance, can begin several hours or days after ingestion of single or continuous quantities of lactose. This is not a food allergy as it does not involve the immune system. On the other hand, a person allergic to milk can react to a very small quantity of milk proteins (casein and B-lactoglobulin), including minor cross-contamination, in which the result may be life-threatening.</p> <p>Milk allergy is the most common food allergy in children and is often found in</p>



	<p>infants under the age of three years. Severe allergic reactions to milk can be outgrown by three years of age, but a few individuals retain the allergy into adulthood.</p> <p>Heat treatment can reduce the allergenicity of <i>B</i>-lactoglobulin, but has almost no effect on the allergenicity of casein. Although highly hydrolysed milk formulas are regarded as less allergenic, anaphylactic reactions have been reported. Individuals who are allergic to cow's milk may also react to sheep's or goat's milk. Milk from other species such as horse or camel may sometimes be tolerated. Cheese and cream contain milk protein and should be avoided by milk sensitive individuals.</p> <p>A Fact Sheet on Milk can be viewed at: http://www.inspection.gc.ca/english/fssa/labeti/allerg/milklaite.shtml</p>
Possible hidden sources	Sorbet, seasoning and natural flavour, fat substitutes, seasoned potato chips, hot dogs or bologna, baked goods, chocolate, coffee whitener, margarine, butter, dressings, snack foods, soups and soup mixes.

<u>Eggs</u>	
Other Names	Albumin, ovalbumin, ovomucoid, conalbumin, lysozyme, ovotransferrin, meringue, ovoglobulin, ovomacroglobulin, livetin, vitellin, ovovitellin.
Allergy Information	<p>Egg (hen's egg) plays an important role in nutrition all over the world and is used as an ingredient in a variety of foods. Egg allergy is now one of the most frequent food allergies in childhood. Similar to milk allergy, severe allergic reactions to eggs can be outgrown by three years of age, but a few individuals retain the allergy into adulthood.</p> <p>Although ovalbumin, ovomucoid, and ovotransferrin have been identified as the major allergens in egg white, there are other unnamed allergens present in egg yolk in much lesser quantities. Most of the allergenic proteins present in the egg white are both heat and digestion resistant, except for conalbumin. Allergenic proteins in the yolk only contribute to a minor degree and isolated allergy to egg yolk proteins is rare.</p> <p>Egg protein is found in everyday diets all over the world in many types of foods ranging from cooked whole egg to pasta, cakes and cookies. While cooking can alter the protein of a raw egg, it may not be sufficient to prevent an allergic reaction.</p> <p>Eggs from other birds may contain allergenic proteins similar to those in hen's egg and may elicit reactions in egg allergic patients. There have also been reports of egg allergic individuals reacting to chicken meat (due to contamination during slaughter).</p> <p>A Fact Sheet on Eggs can be viewed at: http://www.inspection.gc.ca/english/fssa/labeti/allerg/eggoeue.shtml</p>



Possible hidden sources	Fat substitutes, glazes on baked goods, lysozyme in cheese, lecithin derived from egg, sauces and salad dressings, cream-filled pastries, pasta, baby food, confectionary, cream-filled pies, meat mixtures.
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<u>Seafood (Fish, Crustaceans and Shellfish)</u>	
Other Names	Surimi, kamaboko, taramasalata, tarama, sushi, caviar, roe.
Allergy Information	<p><u>Fish:</u> Fish may find its way into processed foods in raw, powder or oil form. Allergy to fin fish is relatively common and can be associated with severe symptoms such as anaphylactic shock. Symptoms can also occur after ingestion of only a small quantity of fish. Some individuals allergic to fish can develop allergic symptoms when exposed to the steam from cooking fish. Fish allergy is therefore sometimes a problem in the fish industry and among restaurant cooks, where handling and inhalation might cause eczema and asthma. Allergy to fish is not to be confused with a toxic reaction to histamine in spoiled fish (scombroid fish poisoning). Fish allergens are for the most part heat stable. Canning tuna may decrease the allergen's potency. Almost all fish allergy seems to involve the protein parvalbumin, which is found in the muscle of most fish. As the parvalbumins are similar in all fish species, individuals allergic to one fish are likely to react to a range of different fish species. Thus after a diagnosis, individuals allergic to fish are normally advised to avoid all fin fish. Although fin fish and shellfish allergies are not linked, individuals can be allergic to both foods.</p> <p><u>Crustaceans (e.g. crayfish, lobster, shrimp, crab):</u> Crustaceans are among the most commonly consumed seafood. Crustaceans belong to the Arthropod family. Amongst these is a variety of commonly and less commonly eaten seafoods like langoustine, lobster, crayfish, and crab. Other sea foods like clams, mussels, oysters, scallops, abalone and squid are not crustaceans but molluscs or shellfish. Crustacean allergy is a food allergy which seems to involve a muscle protein called tropomyosin that is very similar in a wide range of crustacean foods. As a result, someone with an allergy to tropomyosin from one kind of crustacean is likely to react to others. Thus individuals with allergy to one kind of crustacean are usually advised to avoid all types of crustacean foods. Crustacean allergens are heat stable, water soluble and can enter the atmosphere from cooking. Reactions to inhaled vapours are extremely rare but reactions to inhaled particles have been reported. Cooking oil contaminated with seafood residues has also been reported to cause adverse reactions. Allergic reactions in workers at every stage of seafood processing also occur and are a serious public health problem in countries with major shellfish industries.</p> <p><u>Shellfish (e.g. mussel, clam, oyster, scallop):</u> Allergy to shellfish is less well known than allergy to fish and crustaceans. Reactions appear to be less severe than those of other seafood. As with most food allergies, symptoms are usually mild such as oral allergy syndrome,</p>



	<p>but severe symptoms such as anaphylactic shock can also occur after consumption. Shellfish allergens are heat stable.</p> <p>Seafood allergies are rare in children.</p> <p>A Fact Sheet on Seafood (fish, crustaceans and shellfish) can be viewed at: http://www.inspection.gc.ca/english/fssa/labeti/allerg/fispoie.shtml</p>
Possible hidden sources	Pizza, Worcestershire sauce, meat sauce, Caesar salad dressing, oil in which fish was cooked, deli meats, antipasto, gelatin, marshmallows, spreads.

<u>Soy</u>	
Other Names	Soya, Soybean, tofu, miso, tempeh, edamame, yuba, kinako, kouridofu, nimame, okara, soy lecithin, soy protein isolate
Allergy Information	<p>Soy allergy is considered to be the fourth most common childhood food allergy, after peanuts, milk and egg. Soybeans, which belong to the legume family, have been used for infant feeding by the Chinese and Japanese for centuries. Reactions may occur to small quantities of soy protein, and anaphylaxis to soybean protein has been reported. Although there is virtually no protein in soy lecithin, it has been associated with allergic reaction.</p> <p>Soybeans may be ingested as whole beans, flour, oil, protein isolate or concentrate. Other uses for soy include the manufacture of tofu which may in turn be used for the manufacture of soy-based ice-cream. Soy may be converted into products having a meat-like texture and this textured vegetable protein is used in simulated meat products or may be added to meat as an extender. It is so widely distributed in processed foods that avoidance of soy in the diet is very difficult.</p> <p>Soy allergies are most common in infants and usually develop at three months of age. Most infants outgrow their soy allergy by the age of three, however, a severe soy allergy can last a lifetime.</p> <p>A Fact Sheet on Soy can be viewed at: http://www.inspection.gc.ca/english/fssa/labeti/allerg/soye.shtml</p>
Possible hidden sources	Margarine, milled corn, soup stock cubes, Spanish sausage, bread crumbs, canned tuna (in broth), bread, meat based pizza topping, simulated meats, chewing gum, sauces and gravies, spreads, protein shakes, meat binder and fillers, peanut butter, baked goods, cereals, crackers, infant formulas, soups, dressings, bean sprouts, snack foods, vegetarian dishes.



<u>Wheat</u>	
Other Names	Spelt, kamut, triticale, gliadin, wheat germ agglutinin, bulgur, farina, durum, couscous, seitan, semolina, graham, emmer, atta.
Allergy Information	<p>Wheat is the most allergenic of all cereals. Anaphylactic reactions to wheat, although not common, have been reported, and it is unclear whether this allergy can be outgrown.</p> <p>Wheat allergies and celiac disease are two different conditions. When a person with a wheat allergy consumes wheat, they have a Immunoglobulin E (IgE) mediated abnormal immune response to the protein (gliadin) found in wheat. This involves the production of IgE antibodies, with symptoms similar to that of other allergic food reactions.</p> <p>Celiac disease is also considered an allergy since the reaction involved the immune system, however it does not involve the production of IgE antibodies. When a person with celiac disease consumes storage proteins (prolamins) found in wheat and other grains such as rye, barley, oat and their hybridized strains, it damages the lining of the small intestine which stops the body from absorbing nutrients. This can lead to diarrhea, weight loss and malnutrition. Gluten is a general term for these storage proteins. Wheat, spelt, kamut, rye, barley, oats and their hybridized strains are rich in gluten, which individuals with celiac disease should avoid.</p> <p>A Fact Sheet on Wheat can be viewed at: http://www.inspection.gc.ca/english/fssa/labeti/allerg/wheblee.shtml</p>
Possible hidden sources	Binders and fillers in meat, poultry and fish products, icing sugar, baking powder, paprika, black pepper, seasonings, flavours, coffee substitutes, falafel, simulated meat, sauces and dressings, sausages, ice cream, beer, chicken broth, modified starch, pie fillings, snack foods.

<u>Sulphites</u>	
Other Names	Potassium bisulphite/metabisulphite Sodium bisulphite/dithionite/metabisulphite/sulphite Sulphur dioxide Sulphiting agents Sulphurous acid E 220, E 221, E 222, E 223, E 224, E 225, E 226, E 227, E 228 (European names)
Allergy Information	Sulphites are substances that naturally occur in food and the human body. They are also regulated food additives that are used as preservatives to maintain food colour and prolong shelf-life, prevent the growth of micro-organisms, and to maintain the potency of certain medications. Sulphites are



	<p>used to bleach food starches, e.g. potato, and are also used in the production of some food packaging materials, e.g. cellophane.</p> <p>Sulphite sensitivity is a non-allergenic food hypersensitivity as the reaction does not involve the immune system. The reaction appears to be the result of a deficiency of sulphite oxidase, an enzyme responsible for oxidizing sulphite (SO₃) to inactivate sulphate (SO₄). Levels of sulphite below 10 ppm in food are thought to be tolerated by most sulphite-sensitive individuals. Sulphites can trigger asthma in susceptible individuals. Adverse reactions to sulphites in non-asthmatics are rare.</p> <p>Heat does have an effect on the structure of sulphites. Heating will reduce the quantity of sulphites in some foods, however the exact amount of reduction is unknown.</p> <p>A Fact Sheet on Sulphites can be viewed at: http://www.inspection.gc.ca/english/fssa/labeti/allerg/sulphe.shtml</p>
Possible hidden sources	Coconut juice, vinegar, grape juice, wine, beer, cider, glucose, molasses, dried fruit (raisins, papaya, pineapple, and etc.), dried potato, salad dressings, coconut, sliced apples, concentrated lemon and lime juice, snack foods, tomato paste, deli meats, canned fruits and vegetables, baked goods.

3.0 CAUSES AND SOURCES OF UNDECLARED ALLERGENS

The CFIA has divided the various causes of undeclared allergens in foods sold in Canada into 8 groups.

3.1 Cross-Contamination or Carry Over

Cross-contamination or carry over involves the transfer of a particular ingredient to another product, to which addition of the ingredient is not intended. It can occur at the raw material supplier, during transport or storage of raw materials, or during manufacture or packing of the finished product. It can also happen when two or more products with different ingredients are manufactured or packed on the same line. [7]

In most cases, cross-contamination or carry over is the result of one or more of the following factors:

- Inadequate cleaning of the work surfaces, equipment and/or utensils.
- Poorly designed equipment and/or production lines (e.g. cracks, crevices and pockets that are difficult to clean).
- Inappropriate production scheduling (e.g. products with allergens before products without allergens).
- Inadequate employee hygiene.

3.2 Inappropriate Use of Rework

Rework is recycled processed food that is reintroduced into the production line at an earlier stage. This is an acceptable practice as long as the re-worked product does not contain any allergens not already declared on the label of the host product. Sometimes, rework containing an allergen is



reintroduced into the production line for a different food that, according to the original formulation, should not contain the allergen. This poses a health risk to an individual with food allergies.

3.3 Ingredient Changes, Substitutions or Additions

Changes, substitutions or additions of ingredients may create a health risk to an allergic individual if the list of ingredients is not modified to reflect the changes before the product is marketed.

3.4 Incorrect Labels

The list of ingredients must describe exactly what ingredients were used to manufacture the product. For an allergic consumer, the accuracy of the information on the label is critical. It is important for the manufacturer to ensure that the correct labels are applied to the finished products.

3.5 Incorrect or Incomplete List of Ingredients

The list of ingredients is the main communication tool that the industry has to inform consumers as to the ingredients in a pre-packaged food. The omission of an allergen or the use of an inappropriate name can result in a health risk for an allergic individual.

Incorrect or incomplete lists of ingredients could be the result of the following situations:

- Failure to include on the list of ingredients in a finished product some of the ingredients included in the formulation, or failure to declare the ingredients of ingredients (components), where such declaration is required by legislation.
- Inaccurate transcription of list of ingredients in the raw materials onto the list of ingredients for the finished product or transcription of ingredients provided for in the formulation.
- Missing or inadequate information on a label as a result of an error made at the printing stage.
- Changes in suppliers.
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3.6 Unknown Ingredients

The dealer or legal agent is responsible for the safety of the food that they sell. It is essential that they are aware of the composition of the ingredients (raw materials) they handle. There may be situations where the list of ingredients for the raw material does not exist, is incomplete or inaccurate, and where the information is difficult to obtain. For example, raw material imported from a country where the labelling regulations differ from the Canadian labelling regulations. The onus is on the dealer or legal agent to ensure food safety.

3.7 Misrepresentation of Common Names and Hidden Allergens

The common name of a food or ingredient must be used as prescribed by the applicable regulations. If the common name is not prescribed, then it is the name by which the food or ingredient is generally known. When a common name is misleading or does not truly reflect the content of the food, the risk of triggering an allergic reaction increases. For example, common names such as “mandelonas” or “marzipan” should be labelled as “almond flavoured peanuts” or “almond paste” respectively to reveal the true nature of the product.

3.8 Labelling Exemptions



Labelling exemptions do not apply to food allergens. Currently, food allergens must be declared on pre-packaged foods with a list of ingredients when their presence poses a risk to individuals with food allergies. The CFIA requires industry to identify the source in the common name of ingredients, such as hydrolysed plant proteins, starches, modified starches and lecithin (e.g. hydrolysed soy protein, wheat starch, modified wheat starch, soy lecithin) if their presence poses a risk to individuals with food allergies.

4.0 LEGISLATION AFFECTING FOODS CAUSING ADVERSE REACTIONS IN CANADA

There are a number of laws that deal with the labelling of food products in Canada. The CFIA is responsible for administering the labelling provisions of the *Food and Drugs Act* and the *Consumer Packaging and Labelling Act* and their relevant Regulations. Other acts such as the *Canada Agricultural Products Act*, the *Meat Inspection Act* and the *Fish Inspection Act* that the CFIA administers, contain regulations pertaining to food labelling. [2] Manufacturers and importers should consult the specific regulations for labelling requirements of specific product commodities. These regulations may be accessed from the CFIA's website at www.inspection.gc.ca. From the main page, select "Acts and Regulations" from the menu bar on the left of the page, and then the appropriate act or regulations from the listing of legislation.

This section will review Canadian labelling requirements as they relate to allergens, administrative guidelines and claims, and links to reference material with respect to foods that cause adverse reactions.

Note: The information below is not a complete listing of all labelling requirements. Canadian Labelling Requirements are set out in *2003 Guide to Food Labelling and Advertising (GFLA)*. The GFLA is available on the CFIA website at <http://www.inspection.gc.ca/english/fssa/labeti/guide/toce.shtml>

4.1 Ingredients and Preparations Exempt from Component Declaration

Food allergens must be declared on all pre-packaged foods with a list of ingredients when they are added to the pre-packaged food as required by sub-section B.01.008 (1)(b) of the FDR. The food allergen must be declared so that consumers with food allergies are alerted to avoid the product.

Under sub-section B.01.009 (1), there are 36 ingredients or groups of ingredients whose components do not have to be declared on the label of the final food. Also, some preparations or mixtures are exempt from component declaration under sub-section B.01.009 (2) of the FDR. These exemptions do not apply to food allergens that pose a health risk to individuals with food allergies. Failure to declare food allergens may be contrary to Section 5(1) of the *Food and Drugs Act*. This means that each instance of undeclared or mis-declared allergens are evaluated on a case-by-case basis by Health Canada to determine if the food poses a risk to individuals with food allergies. If so, the CFIA takes appropriate enforcement action including product recall.

The following table shows examples of allergenic components that may be present in food mixtures or preparations. Since there are no exemptions for food allergens that pose a risk to individuals with food allergies, all of these components should be declared in the ingredient list.

Mixtures and preparations	Examples of components that cause adverse reactions
Food colour preparations	Lecithin (e.g. soy, egg)
Natural and artificial flavouring	Malt



preparations	Wheat starch, wheat flour, wheat gluten Enzyme modified cheeses
Spice mixtures	Wheat flour, wheat starch Sesame seeds Soy
Seasoning or herb mixtures	If <2% of product : Sauces Cheese powder Skim milk powder Wheat flour, wheat starch Peanuts Tree nuts Seeds Fish
Vitamin preparations	Soybean oil Wheat starch
Food additive preparations	Wheat starch Wheat flour
Compressed, dry, active or instant yeast preparations	Starch (e.g. wheat, corn)

Note: Information in this table is taken in part from reference. [1]

4.2 Administrative Guidelines

4.2.1 Seasonings

The term “seasoning” is currently not defined in the FDR. In other food regulations,

- *Meat Inspection Regulations, 1990* define seasoning as a substance listed in Division 7 of the FDR.
- *Dairy Products Regulations* define seasoning as a condiment, spice or herb used to flavour, but not salt.
- *Processed Products Regulations* have no definition for seasoning.
- *Fish Inspection Regulations* have no definition for seasoning.

Where ingredients other than herbs and spices are present in a "seasoning" preparation at more than 2% of the weight of the final food, they must be declared by their common names in the list of ingredients of the final food. If present at 2% or less of the weight of the final food, they may, subject to B.01.009 (3), be declared as "seasoning". Consequently, it is possible that some allergenic components may not be declared in the list of ingredients. The CFIA requires identification of all allergens in the ingredient list if their presence poses a health risk to allergic individuals.

4.2.2 Sulphites

Sulphites must be declared if they are added as an ingredient or component in a food as per section B.01.008 (1)(b) of the FDR. Undeclared sulphites in pre-packaged foods with a list of ingredients can pose a health risk to individual sensitive to sulphites. The general rule is that if sulphites are added to a pre-packaged food with a list of ingredients they should be declared regardless of the residual level. When an ingredient containing sulphites is added to a food and is exempt from declaring its components under



B.01.009 of the FDR, the sulphites should be declared if the amount of sulphites in the final food is greater than 10 p.p.m.

4.3 Claims

4.3.1 Wheat-free vs. Gluten-free Claim

The claim "gluten-free" cannot be used interchangeably with the claim "wheat-free". "Wheat-free" means that the food contains no wheat, which includes spelt, kamut, and triticale (a hybrid of wheat and rye), but not barley, oats and rye. "Gluten-free", on the other hand, describes a food which contains no gluten, which is found in wheat, including spelt, kamut, and triticale (a hybrid of wheat and rye), as well as in barley, oats and rye (see section B.24.018 of the FDR).

A product that is wheat-free is suitable for people who have an allergy to wheat but may not be suitable for those with intolerance to gluten. The individual with a wheat allergy needs only to avoid wheat, and thus could consume both "wheat-free" and "gluten-free" foods, whereas a person with celiac disease can consume only those foods that are "gluten-free".

4.3.2 Monosodium Glutamate Claim

Although monosodium glutamate is not a priority food allergen, it is capable of causing adverse reactions in some sensitive individuals. Therefore, manufacturers or importers who wish to declare a monosodium glutamate claim on the label should consider the following guidelines.

Section 4.3.3 of the GFLA states: "Claims pertaining to the absence or non-addition of monosodium glutamate such as 'contains no MSG' or 'no MSG Added' are considered misleading and deceptive when other sources of free glutamates are present. These include hydrolysed vegetable protein, soya sauce or autolysed yeast extracts. In addition, a number of common food ingredients contain high levels of naturally-occurring free glutamates, including tomatoes and tomato juice, grapes and grape juice, other fruit juices, cheeses such as Parmesan and Roquefort, and mushrooms."

Although the physiological effect of MSG has been shown to be insignificant at very low levels, a threshold level below which sensitive individuals will not react has not been conclusively determined. Until such time as scientific data, which has been verified and accepted by Health Canada, is available, claims regarding the absence of MSG will, as in the past, be permitted only when less than 0.1% free glutamic acid is present in a food. If any of the ingredients listed above are present in a food, claims such as "contains no MSG" and "no MSG added" will not be permitted unless analytical data are available to verify that less than 0.1% free glutamic acid is present.

4.4 Precautionary Labelling

The CFIA recognizes that despite all possible precautions, the presence of allergenic ingredients cannot always be avoided. In order to assist consumers with food sensitivities, the Canadian government, in consultation with industry and allergy groups, developed a policy on precautionary labelling, e.g. "may contain X" and "not suitable for consumption by persons with an allergy to 'X'", where 'X' is the name by which the allergen is commonly known. This policy allows the food industry to voluntarily label products which may inadvertently contain substances capable of causing severe adverse reactions. Precautionary labelling, however, must be risk based, truthful, and must not be used as substitute for good manufacturing practices. When an allergen is likely to be present in a product, the use of precautionary labelling is not acceptable and the presence of the allergenic ingredient should be accurately declared on the label.



Furthermore, where suppliers have labelled raw material with a precautionary statement, manufacturers are advised to use the same statement on the finished product label unless it can be demonstrated that the allergen in the finished product is not likely to represent a health risk.

Currently, Health Canada and CFIA are jointly updating the policy and developing policy options for precautionary labelling and allergen-free claims, and an Issue Identification Paper has been developed. In consultation with the food industry, medical and consumer groups, the Government of Canada is working on providing further guidance on the use of precautionary labelling to better protect the allergic consumer. Further guidelines will be established in the future.

4.5 Reference Materials

The CFIA has published reference materials including information letters to inform Canadian food manufacturers, importers, distributors, retailers and consumers about allergen labelling. These documents are available through our website at:

<http://www.inspection.gc.ca/english/fssa/labeti/allerg/allerge.shtml>

5.0 PROPOSED REGULATORY AMENDMENTS

Health Canada is proposing to amend the FDR to enhance labelling requirements for a list of specified substances when added to foods. The proposed labelling regulations will require food labels to identify all priority allergens, gluten sources and sulphites. This includes ingredients, components and ingredients of components, to the nth generation wherever possible. Failure to declare allergens, gluten sources, and sulphites appropriately would be considered a violation of the FDR.

The scope of the proposed amendments is described in the following links in Health Canada's website:

http://www.hc-sc.gc.ca/fn-an/label-etiquet/allergen/allergy_label_letter-lettre_etiquetage_alergene_e.html

http://www.hc-sc.gc.ca/fn-an/label-etiquet/allergen/allergy_label_letter-lettre_etiquetage_alergene_2004_09_27_e.html

6.0 HAZARD ANALYSIS CRITICAL CONTROL POINT (HACCP) SYSTEM

HACCP systems are invaluable in the control of allergens in the manufacturing environment because they give a clear indication of the risk of allergens being present in a specific product, particularly through potential cross-contamination from or to other products. Critical Control Points (CCPs), in relations to allergens, are those specific parts of a manufacturing process where there is a risk of the unintentional introduction of allergens occurring through cross-contamination and where a specific control needs to be introduced to minimize the risk. [7] This includes the proper design of food labels with accurate ingredient information and the correct application of the food labels to the final products.

6.1 Food Safety Enhancement Program (FSEP)

The objective of FSEP is to ensure that the conditions under which food products are manufactured and the ingredients used in their manufacture lead to the production of safe food. FSEP encourages manufacturers to adopt HACCP principles. A HACCP system includes a HACCP plan and prerequisite programs as well as procedures for the reassessment and validation of the HACCP system.



The HACCP system reduces food safety hazards by providing control of the prerequisite programs and throughout the manufacturing process at critical steps identified as CCPs. These controls permit operators to detect and control hazards before products are distributed. Under FSEP, manufacturers are required to monitor and verify manufacturing processes, maintain records of their HACCP system and update the HACCP system regularly.

6.1.1 Prerequisite Programs

Prior to developing HACCP plans, each company must develop written prerequisite programs, monitor them and verify that they are effective in meeting all regulatory and program requirements. With respect to allergen control, when a manufacturer has allergens or foods that cause adverse reactions to sensitive individuals in the plant, there should be monitoring, deviation and verification procedures as per bullet requirements in the *FSEP Manual*.

For instance, procedures should be established to ensure that products without allergens are manufactured prior to products containing allergens. Also, there should be special sanitation procedures for clean-up to ensure that the allergen has been cleaned-up prior to any product without allergens being introduced into any equipment.

6.1.2 HACCP Plan

Form 2 and Form 3 of the HACCP Plan should be reviewed to determine whether or not the manufacturer has allergens in the plant, either as an ingredient or as a component of an ingredient. Allergens are considered chemical hazards; hazard information should be recorded on Form 6 of the HACCP Plan. These hazards should be identified in the HACCP Plan at receiving, storing, mixing, blending/formulation, labelling, and at various other processing steps for cross-contamination with allergens. Each of these hazards must be put through the decision tree (Form 8) to determine if the associated processing steps will become CCPs.

Information regarding FSEP, i.e. *FSEP Manual* and HACCP generic models, may be found in the CFIA website at <http://www.inspection.gc.ca/english/fssa/polstrat/haccp/haccpe.shtml>

6.2 Quality Management Program (QMP)

The QMP uses the principles of HACCP to provide assurance that fish and seafood products produced in Canada are safe and wholesome. The QMP also deals with non-safety issues, including fish quality and federal regulatory requirements such as labelling.

FSEP and QMP share similar requirements for prerequisite programs and HACCP Plans. The criteria evaluated for the FSEP requirements were found to have met all the needs associated with the QMP prerequisite programs. Both programs are based on the principles of HACCP and use the Codex Alimentarius decision tree to determine CCPs. Regulatory Action Points (RAPs) have been added to the Scope of the Audit in order to meet fish program and QMP requirements.

For more information on QMP, please visit the CFIA website at <http://www.inspection.gc.ca/english/anima/fispoi/qmp/qmppgqe.shtml>

6.3 On-Farm Food Safety Recognition Program (OFFSRP)

The OFFSRP is an agricultural program, involving small-to-large-scale farmers and producers, the Canadian agriculture industry and all levels of government. Growing safe food and protecting it from hazards on the farm before it passes through the farm gate is the primary focus of on-farm food safety programs. Government recognition of HACCP-based on-farm food safety programs may enhance Canada's



domestic and international reputation as a leader in food safety and quality. This, in turn, could mean expanded markets for Canadian products.

For more information on OFFSRP, please visit the CFIA website at <http://www.inspection.gc.ca/english/fssa/polstrat/reco/recoe.shtml>

7.0 GOOD MANUFACTURING PRACTICES (GMPs)

Good manufacturing practices (GMPs) in the food industry are a series of controls used during production to ensure that all products are consistently manufactured to a quality appropriate to their intended use. GMPs aim to produce safe and wholesome food through well-controlled operations that avoid any type of contamination with allergens not normally present in that product. [7]

GMPs, based on *Codex Recommended International Code of Practice – General Principles of Food Hygiene*, require that appropriate standards and practices be met with respect to product manufacturing and handling, design of premises, transportation and storage, maintenance of equipment, sanitation, personnel hygiene and training. [8]

Controlling food allergens in the food industry is an essential part of GMPs. The following CFIA guidance documents are designed to help manufacturers and importers create their own controls to improve food safety and meet regulatory requirements by providing a foundation for the development of a system for ensuring food safety. They are written based on the *Codex Recommended International Code of Practice – General Principles of Food Hygiene*.

1. General Principles of Food Hygiene, Composition and Labelling (GPFHCL)
2. Good Importing Practices for Food (GIP)

Please visit the CFIA website at <http://www.inspection.gc.ca/english/fssa/fssae.shtml> for more details.

8.0 ALLERGEN PREVENTION PLAN (APP)

Whether or not systems such as GMPs and HACCP are employed, an allergen prevention plan (APP) should be implemented for any operation in which potential allergen hazards exist in order to effectively manage food allergy risks. In development of an effective APP, which is often led by an allergy-prevention team, consideration is given to risk evaluation, allergen mapping, ingredient control, engineering and system design, traffic patterns, work-in-progress, rework, maintenance, packaging and labelling and training. [6] All processing steps need to be undertaken thoroughly to ensure that even the small amounts of common allergens are addressed.

Annex 1 is a reference that can assist users in developing an allergen prevention plan.

The CFIA has also published a tool/checklist that can assist users in managing allergen risks in food products. This document is available in the internet at this address: <http://www.inspection.gc.ca/english/fssa/invenq/inform/toualle.shtml>



9.0 REFERENCES

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- [8] Codex Alimentarius. *Recommended International Code of Practice, General Principles of Food Hygiene*. FAO/WHO:1997. This publication is also available on the Internet at the following address: <http://www.fao.org/docrep/W6419E/w6419e03.htm>



ANNEX 1 - DEVELOPING YOUR ALLERGEN PREVENTION PLAN

Food allergies have become a major issue for many food manufacturers, importers, and distributors. Increased consumer awareness, improvements in allergen detection methods, recognition of the serious consequences of undeclared allergens, and the financial impact of food recalls have all served to raise the visibility of this issue. It is important that food companies take steps to prevent the presence of undeclared ingredients in their products that may cause allergic reactions in sensitive individuals.

Hazard Analysis Critical Control Point (HACCP) systems, Good Manufacturing Practices (GMPs) and Good Importing Practices (GIPs) are food safety controls with respect to preventing allergen contamination. Many food companies have developed successful allergen prevention plans which include allergy awareness of all staff and company commitment. Effective steps can include the following:

1. Establish an allergy control team: In a large manufacturing plant this could include staff from quality assurance, purchasing, manufacturing, engineering, food safety, etc. In a small plant it is advisable to have at least one person who has the responsibility for assessing and maintaining an allergy prevention plan. The HACCP Team/Coordinator may choose to develop this prevention plan.
2. Identify the key allergens in your operation:

Most adverse food reactions are caused by the following foods and their derivatives:

- ▶ peanuts
- ▶ tree nuts (almonds, Brazil nuts, cashews, hazelnuts, macadamia nuts, pecans, pine nuts, pistachios, walnuts)
- ▶ sesame seeds
- ▶ milk
- ▶ eggs
- ▶ seafood (fish, crustaceans and shellfish)
- ▶ soy
- ▶ wheat
- ▶ sulphites

A company may wish to identify other allergens of specific concern to its products.

Conduct a hazard analysis on the incoming materials and processing steps to determine areas of greatest concern. Each product, process and possible allergen should be assessed. This can be done by preparing a master list of all ingredients, raw materials and products, identifying those that contain allergens, and indicating any special handling and storage instructions for each of them.



3.1. Review Prerequisite Programs/GMP's/GIP's:

- ▶ *Storage and Handling:* Store and handle allergenic foods and ingredients in a manner that will avoid cross-contamination with other food products. This may require dedicated storage areas for the various allergen-containing ingredients handled in the plant. If it is not possible to store allergenic foods and ingredients in separate areas, it is suggested they be stored below non-allergenic foods and ingredients, e.g. in bottom shelf/rack, to prevent allergens falling on other foods and ingredients. Ensure that allergenic foods and ingredients are clearly identified by signs or colour codes.
- ▶ *Equipment and System Design:* Determine which products and production lines present the highest risk. Consider dedicated lines for certain allergen-containing foods. Minimize the amount of equipment that comes into contact with allergenic ingredients by isolating allergen addition points and adding allergenic ingredients near the end of the process. Reduce cross-over of lines and design equipment to allow for complete cleaning and inspection.
- ▶ *Cleaning and Maintenance of Equipment:* Ensure that your sanitation program addresses the need to remove allergenic foods. Disassemble equipment and manually clean where necessary. With equipment that is very difficult to clean, you may consider dedicating it to specific allergen-containing foods.
- ▶ *Employee Training:* Incorporate allergy awareness and controls into the training for all employees, using a variety of approaches and educational materials to reinforce awareness and commitment.

3.2. Review process controls (HACCP programs where applicable):

- ▶ *Incoming Ingredients:* Obtain accurate ingredient information from all suppliers to identify all allergens, including allergens present as components (ingredients of ingredients). This can be done by obtaining ingredient specification sheets, letter of guarantees, certificate of analysis or a complete list of ingredients. Ensure that they meet your company's specifications and are completely labelled. You may also consider adjusting formulations to avoid allergenic ingredients.
- ▶ *Product Formulation:* Provide current written formula to production employees. Establish process controls to ensure that multi-component products are produced in accordance with the formula, to ensure a consistent product and prevent the addition of allergen-containing ingredients not listed on the label.
- ▶ *Allergen Mapping of the Plant:* Using flow diagrams of the processes for multiple production lines, identify equipment that is used for both allergenic and non-allergenic products. The identified equipment may have greater potential for allergen cross-contamination. Control measures such as cleaning and production scheduling can be used to reduce the carry-over potential.
- ▶ *Production Scheduling:* If dedicated lines are not available, products containing allergens should be scheduled at the end of production runs so equipment can be thoroughly cleaned, before the next run of products. The same precautions should be in place to avoid cross-contamination between products containing different allergens.



- ▶ *Use of Rework:* Ensure that rework containing allergens is redirected to the originally intended product, or to a product with the same ingredients.
- ▶ *Labelling and Packaging:* Ensure that the labelling and packaging is accurate and matches the right product. Ensure that ingredient substitutions are reflected on the label. Dispose of outdated labels.

4. Communicate food allergy and sensitivity awareness regularly to employees and suppliers.

5. Regularly assess the allergy prevention plan: This is to ensure continual effectiveness. Reassess after any changes are made to products or processes, e.g., ingredient suppliers, formulations, equipment, process flows, production schedules, etc.



PART V - 2

NUTRITION HAZARDS SECTION



Canadian Food
Inspection Agency

Agence canadienne
d'inspection des aliments



Nutrition Hazards

1.0 INTRODUCTION

The nutrients in food are required to maintain health. They belong to the broad groups of carbohydrates, proteins, fats, vitamins, minerals and water. In consideration of the nutritive aspects of food, the following should be taken into account: 1) what nutrients do foods contain; 2) what are the daily intake requirements of these nutrients for humans; and 3) what are the relative stabilities of these nutrients and how are they affected by food processing, storage and preparation. [1] In the following pages, the hazards associated with vitamins and minerals in foods will be discussed.

Vitamins

Vitamins are organic compounds that are required in relatively low (microgram to milligram) amounts in the diet to prevent disease and maintain health. They are classified according to their solubility. The water-soluble vitamins include the eight vitamins in the B-complex and vitamin C. These vitamins are often found in fruits, vegetables, grains, meats, fish and poultry. The fat-soluble vitamins are vitamins A, D, E, and K. These vitamins are often found in fatty foods such as animal fats, vegetable oils, dairy foods, eggs, liver and oily fish. [2] Some vitamins are vulnerable to destruction by heat, light, and chemical agents. The strategies of cold storage of fresh foods, handling foods at moderate temperatures, in or over small amounts of water, and for shorter times, all help to preserve the vitamins. [3]

Minerals

Minerals are inorganic elements of the periodic table. They can be found in varying amounts in a variety of foods such as meat, cereals, fish, milk and dairy products, vegetables, fruits and nuts. Because minerals are relatively stable, they need not be handled with the special care that vitamins require to preserve their content in foods. They can, however, be bound by substances that make it hard for the body to absorb them. In fact, the ash that remains when a food is burnt contains all the minerals that were in the food originally, except for selenium and iodine which are lost in combustion. Note: the “minerals” in ash may also contain toxic elements as well as mineral nutrients. Mineral nutrients can be lost from food when leached into water or lost during food refining processes. [3] Mineral nutrients are often consumed in complexes as mineral salts (e.g. calcium, phosphate) or bound to proteins (e.g. heme iron).

Food fortification refers to the addition of one or more vitamins or mineral nutrients to a food product. In Canada, addition of these nutrients to food is regulated under the *Food and Drug Regulations* (FDR). Where a nutrient has not been added to the prescribed amounts, i.e. overage or underage, as permitted by the FDR, or where the nutrient is not present at the declared amount at the end of the expected shelf-life of the product, the seriousness of consequences may range between low, medium or high (e.g. from weakness and slight skin discoloration to rickets and brain abnormalities) depending on the segment of population being considered, the nutrient quantity, the nature and type of deficiency or excess. Therefore, regulating the addition of vitamins and minerals to our foods is one way to help to ensure that consumers receive adequate amounts of nutrients and to help to ensure that consumers do not consume excessive amounts of nutrients from foods. [4]

This section of the Reference Database for Hazard Identification contains information on all vitamins and mineral nutrients that could be added to foods in Canada as per the FDR (see Tables [1](#) and [2](#)). A list of vitamins and mineral compounds permitted in Canada is also included to assist manufacturers in identifying and using permitted forms of vitamins and mineral nutrients ([Table 3](#)). Other topics include regulations affecting food fortification, proposed regulatory amendments, and process control in manufacturing to enhance compliance with regulations and ensure consistent nutritional composition of food products



distributed in Canada. A reference is also given for a list of foods to which vitamins, mineral nutrients and amino acids may or must be added as per the FDR.

2.0 INFORMATION ON VITAMINS AND MINERAL NUTRIENTS

Table 1: Vitamins in Foods, D.01.002 of the FDR

Note: Information in this table is taken in part from these references: [5] to [10], [12] and [13].

<u>Vitamin A</u>	
Common Name	Vitamin A, retinol
Recommended Daily Intake [D.01.004, FDR]	1000 RE intake for persons 2 years of age or older 400 RE intake for infants or children less than 2 years of age [Table 1 to Division 1, Part D, FDR]
Functions	<ul style="list-style-type: none"> • A factor in the maintenance of good health; • Helps to maintain eyesight, growth and repair of body tissue; • Required for gene expression, reproduction, embryonic development and immune function; • Helps in the development and maintenance of bone and teeth; and • An antioxidant in the form of beta-carotene.
Tolerable Upper Intake Limit (UL)	<p>UL for Infants</p> <ul style="list-style-type: none"> - 0-12 months: 600 µg/day of preformed vitamin A <p>UL for Children</p> <ul style="list-style-type: none"> - 1-3 years: 600 µg/day of preformed vitamin A - 4-8 years: 900 µg/day of preformed vitamin A - 9-13 years: 1700 µg/day of preformed vitamin A <p>UL for Adolescents</p> <ul style="list-style-type: none"> - 14-18 years: 2800 µg/day of preformed vitamin A <p>UL for Adults</p> <ul style="list-style-type: none"> - 19 years or older: 3000 µg/day of preformed vitamin A <p>UL for Pregnancy & Lactation</p> <ul style="list-style-type: none"> - 14-18 years: 2800 µg/day of preformed vitamin A - 19 years and older: 3000 µg/day of preformed vitamin A
Deficiency Symptoms	<p>Deficiency Disease Name: Hypovitaminosis A</p> <ul style="list-style-type: none"> • Night blindness - decreased adaptation to darkness; • Bitot's Spots - lesions on the eye that develop as a result of decreased Vitamin A-dependent mucous production, dry eyes, and bacterial infection; • Xerophthalmia - blindness resulting from the spread of infection between Bitot's Spots;



	<ul style="list-style-type: none"> • Keratinization – accumulation of keratin in a tissue resulting in rough and scaly skin with white lumps; and • Other symptoms include rough skin, susceptibility to infection, impaired bone growth, abnormal tooth and jaw alignment, suppression of immune reactions and anemia.
Toxicity Symptoms	<p>Toxicity Disease Name: Hypervitaminosis A</p> <ul style="list-style-type: none"> • Primary adverse effects are reduced bone mineral density, teratogenicity (birth defects) and liver abnormalities; and • Other symptoms include red blood cell breakage, nosebleeds, abdominal cramps, nausea, diarrhea, weight loss, blurred vision, irritability, loss of appetite, bone pain, dry skin, rashes, hair loss and cessation of menstruation. <p>Note: Vitamin A is a fat-soluble vitamin which is often found in fats and oily portions of foods. Unlike water-soluble vitamins, it is stored in the liver and adipose tissue until it is needed, therefore, increasing the risk of toxicity when consumed in excess. Except for beta-carotene which is found in a wide variety of plant foods, it is not stored in the skin. Over-consumption of beta-carotene may turn the skin yellow, but this is not harmful.</p> <p>Individuals with high alcohol intake, pre-existing liver disease, hyperlipidemia or severe protein malnutrition may be distinctly susceptible to the adverse effects of excess pre-formed vitamin A intake.</p>

<u>Vitamin D</u>	
Common Name	Vitamin D
Recommended Daily Intake [D.01.004, FDR]	5 µg intake for persons 2 years of age or older 10 µg intake for infants or children less than 2 years of age [Table 1 to Division 1, Part D, FDR]
Functions	<ul style="list-style-type: none"> • A factor in the maintenance of good health; • Helps in the normal development and maintenance of bones and teeth; and • Helps in the absorption and use of calcium and phosphorus.



<p>Tolerable Upper Intake Limit (UL)</p>	<p>UL for Infants - 0-12 months: 25 µg (1000 IU)/day</p> <p>UL for Children and Adolescents - 1-18: 50 µg (2000 IU)/day</p> <p>UL for Adults - 19 years or older: 50 µg (2000 IU)/day</p> <p>UL for Pregnancy & Lactation - 14 years or above: 50 µg (2000 IU)/day -</p> <p>The UL is based on hypercalcemia as the critical endpoint.</p>
<p>Deficiency Symptoms</p>	<p>Deficiency Disease Names: Rickets, Osteomalacia</p> <ul style="list-style-type: none"> • Rickets - enlarged head, joints and rib cage, deformed pelvis, and bowed legs as a result of poor calcium deposition in bones in children; • Osteomalacia - rickets in adults. Hip, spine and other bone fracture due to poor calcium deposition in bones; and • Other symptoms include joint pain, soft bones and muscle spasms.
<p>Toxicity Symptoms</p>	<p>Toxicity Disease Name: Hypervitaminosis D</p> <ul style="list-style-type: none"> • The adverse effects of hypervitaminosis D are largely mediated by hypercalcemia (elevated calcium level in the blood), results primarily from the vitamin D-dependent increase in intestinal absorption of calcium and the enhanced resorption of bone. This involves the deposition of calcium in organs such as the kidneys, liver, or heart, resulting in irreversible renal damage and calcification of soft tissues; and • Other symptoms include mental retardation, abnormal bone growth, loss of appetite, headache, weakness and fatigue. <p>Note: Vitamin D is a fat-soluble vitamin which, when in excess, is stored in the liver and adipose tissue until it is needed. Therefore, it increases the risk of toxicity when consumed in excess. Also, vitamin D can be synthesized in the body with the help of natural sunlight. The sun poses no risk of vitamin D toxicity; prolonged exposure to sunlight degrades the vitamin D precursor in the skin, preventing its conversion to the active vitamin.</p>

<u>Vitamin E</u>	
<p>Common Name</p>	<p>Vitamin E, alpha-tocopherol</p>
<p>Recommended Daily Intake [D.01.004, FDR]</p>	<p>10 mg intake for persons 2 years of age or older 3 mg intake for infants or children less than 2 years of age [Table 1 to Division 1, Part D, FDR]</p>



Functions	<ul style="list-style-type: none">• A metabolic function has not yet been identified;• Vitamin E's major function appears to be as an antioxidant; and• Other functions may include stabilization of cell membranes, regulation of oxidation reactions, maintenance of nerve functions and protection of red blood cells, polyunsaturated fatty acids and vitamin A.
Tolerable Upper Intake Limit (UL)	<p>UL for Infants</p> <ul style="list-style-type: none">- 0-12 months: source of intake should be from food and formula only <p>UL for Children</p> <ul style="list-style-type: none">- 1-3 years: 200 mg/day of any form of supplementary alpha-tocopherol- 4-8 years: 300 mg/day of any form of supplementary alpha-tocopherol- 9-13 years: 600 mg/day of any form of supplementary alpha-tocopherol <p>UL for Adolescents</p> <ul style="list-style-type: none">- 14-18 years: 800 mg/day of any form of supplementary alpha-tocopherol <p>UL for Adults</p> <ul style="list-style-type: none">- 19 years or older: 1000 mg/day of any form of supplementary alpha-tocopherol <p>UL for Pregnancy & Lactation</p> <ul style="list-style-type: none">- 14-18 years: 800 mg/day of any form of supplementary alpha-tocopherol- 19 years or older: 1000 mg/day of any form of supplementary alpha-tocopherol <p>The UL for vitamin E applies to any form of alpha-tocopherol obtained from supplements, fortified foods, or a combination of the two. The adverse effect of hemorrhaging was used towards setting the UL.</p>
Deficiency Symptoms	<ul style="list-style-type: none">• Deficiency is rare; and• Symptoms may include degeneration of nerves by free radicals resulting in weakness, difficulty walking, and severe pain in calf muscles.
Toxicity Symptoms	<ul style="list-style-type: none">• There is no evidence of adverse effects from the consumption of vitamin E naturally occurring in foods; and• Adverse effects from vitamin containing supplements may include hemorrhagic toxicity and interference with the blood-clotting action of vitamin K.



<u>Vitamin K</u>	
Common Name	Vitamin K
Recommended Daily Intake [D.01.004, FDR]	80 µg intake for persons 2 years of age or older 30 µg intake for infants or children less than 2 years of age [Table 1 to Division 1, Part D, FDR]
Functions	<ul style="list-style-type: none">• Helps in synthesis of blood-clotting proteins and a bone protein that regulates blood calcium.
Tolerable Upper Intake Limit (UL)	There is not sufficient data on which to base a UL for vitamin K.
Deficiency Symptoms	<ul style="list-style-type: none">• Hemorrhage (due to lack of blood clotting factor)• Increased susceptibility to bruising and bleeding; and• Decreased calcium in bones.
Toxicity Symptoms	<p>No adverse effects associated with vitamin K consumption from food or supplements have been reported in humans or animals. This does not mean that there is no potential for adverse effects resulting from high intakes. Because data on the adverse effects of vitamin K are limited, caution may be warranted. Other symptoms may include interference with anticlotting medication.</p> <p>Note: Vitamin K analogues may cause jaundice, red blood cell hemolysis and brain damage.</p>

<u>Vitamin C</u>	
Common Name	Vitamin C, ascorbic acid, dehydroascorbic acid
Recommended Daily Intake [D.01.004, FDR]	60 mg intake for persons 2 years of age or older 20 mg intake for infants or children less than 2 years of age [Table 1 to Division 1, Part D, FDR]
Functions	<ul style="list-style-type: none">• A factor in the maintenance of good health;• A factor in the normal development and maintenance of bones, cartilage, teeth and gums;• Helps in collagen synthesis (strengthens blood vessel walls, forms scar tissue, provides matrix for bone growth), thyroxin synthesis, amino acid metabolism, and increased resistance to infection by strengthening the immune system;• Used to prevent or treat scurvy; and• Acts as an antioxidant and aids in absorption of iron.
Tolerable Upper Intake Limit (UL)	UL for Infants - 0-12 months: not established; source of intake should be from food and formula only



	<p>UL for Children</p> <ul style="list-style-type: none">- 1-3 years: 400 mg/day- 4-8 years: 650 mg/day- 9-13 years: 1200 mg/day <p>UL for Adolescents</p> <ul style="list-style-type: none">- 14-18 years: 1800 mg/day <p>UL for Adults</p> <ul style="list-style-type: none">- 19 years or older: 2000 mg/day <p>UL for Pregnancy & Lactation</p> <ul style="list-style-type: none">- 14-18 years: 1800 mg/day- 19 years or older: 2000 mg/day <p>The UL for vitamin C applies to intake from both food and supplements. The adverse effects of osmotic diarrhea and gastrointestinal disturbances were used toward setting the UL.</p>
Deficiency Symptoms	<p>Deficiency Disease Name: Scurvy</p> <ul style="list-style-type: none">• Symptoms include poor wound healing, opening of previously healed wounds, rough skin, bone pain, fractures and bruises, muscle degeneration, anemia, pinpoint hemorrhages (petechiae), depression, frequent infections, bleeding gums and loosened teeth; and• Other symptoms include dyspnea, edema, dry eyes and mouth, depression, weakness and fatigue.
Toxicity Symptoms	<ul style="list-style-type: none">• Adverse effects include gastrointestinal disturbances, oxalate excretion and kidney stone formation; and• Symptoms include nausea, abdominal cramps, diarrhea, headache, fatigue, hot flashes and rashes, excess iron absorption, urinary tract problems and kidney stones. <p>Note: Although vitamin C is known to be the least toxic vitamin, instances of vitamin C causing harmful effects have surfaced as vitamin C supplements became more popular. Because of its health benefits, fortification of foods with vitamin C has also become a trend. Large amounts of vitamin C excreted in the urine can obscure the results of tests used to detect diabetes, giving false positive results in some instances and false negative in others. People taking anticlotting medications may unwittingly abolish the effect if they also take massive doses of vitamin C. Excessive vitamin C is dangerous for people with iron overload as vitamin C further enhances iron absorption.</p> <p>Individual who smoke require an addition 35 mg/day of vitamin C over that needed by non-smokers. Non-smokers regularly exposed to tobacco smoke are encouraged to ensure they meet the Recommended Daily Intake for vitamin C.</p>



<u>Thiamin, Thiamine or Vitamin B₁</u>	
Common Name	Vitamin B ₁ , thiamin, thiamine
Recommended Daily Intake [D.01.004, FDR]	1.3 mg intake for persons 2 years of age or older 0.45 mg intake for infants or children less than 2 years of age [Table 1 to Division 1, Part D, FDR]
Functions	<ul style="list-style-type: none"> • Helps maintain good health and normal growth; • Helps the body metabolize carbohydrates and branched-chain amino acids; and • Specifically it helps to release energy from carbohydrates.
Tolerable Upper Intake Limit (UL)	There is not sufficient data on which to base a UL for thiamine.
Deficiency Symptoms	<p>Deficiency Disease Name: Beriberi</p> <ul style="list-style-type: none"> • Degeneration, weakness, loss of appetite, anorexia, weight loss, irritability, nervous tingling throughout the body, poor arm and leg coordination, deep muscle pain in the calves, muscle weakness and mental confusion; and • Enlarged heart, severe edema, abnormal heart rhythms and heart failure can develop. <p>Note: Persons who may have increased needs for thiamine include those being treated with hemodialysis or peritoneal dialysis, or individuals with malabsorption syndrome.</p>
Toxicity Symptoms	No adverse effects associated with thiamine from food or supplements have been reported. This does not mean that there is no potential from adverse effects resulting from high intakes. Because data on the adverse effects of thiamine are limited, caution may be warranted.

<u>Riboflavin or Vitamin B₂</u>	
Common Name	Riboflavin, Vitamin B ₂
Recommended Daily Intake [D.01.004, FDR]	1.6 mg intake for persons 2 years of age or older 0.55 mg intake for infants or children less than 2 years of age [Table 1 to Division 1, Part D, FDR]
Functions	<ul style="list-style-type: none"> • A factor in the maintenance of good health; • Helps in tissue formation; and • Helps the body to metabolize proteins, fats and carbohydrates, and is involved in numerous metabolic pathways.
Tolerable Upper Limit Intake (UL)	There is not sufficient data on which to base a UL for riboflavin.



Deficiency Symptoms	<p>Deficiency Disease Name: Ariboflavinosis</p> <ul style="list-style-type: none"> Symptoms include inflammation of the tongue (glossitis) and mouth, sore throat, seborrheic dermatitis, cracking of the tissue around the corners of the mouth (cheilosis), various eye disorders (inflamed eyelids and sensitivity to lights, reddening of cornea), confusion, and a decreased red blood cell count with normal cell size and hemoglobin content.
Toxicity Symptoms	No adverse effects associated with riboflavin consumption from food or supplements have been reported. This does not mean that there is no potential from adverse effects resulting from high intakes. Because data on the adverse effects of riboflavin are limited, caution may be warranted.

<u>Niacin</u>	
Common Name	Vitamin B ₃ , niacin, nicotinamide, niacinamide, nicotinic acid
Recommended Daily Intake [D.01.004, FDR]	23 NE intake for persons 2 years of age or older 8 NE intake for infants or children less than 2 years of age [Table 1 to Division 1, Part D, FDR]
Functions	<ul style="list-style-type: none"> A factor in the maintenance of good health; Helps normal growth and development; Promotes health of skin, nerves, and digestive system; and Involved in energy pathways and helps the body to metabolize proteins, fats and carbohydrates.
Tolerable Upper Intake Limit (UL)	<p>UL for Infants</p> <ul style="list-style-type: none"> 0-12 months: not possible to establish; source of intake should be formula and food only <p>UL for Children</p> <ul style="list-style-type: none"> 1-3 years: 10 mg/day of niacin 4-8 years: 10 mg/day of niacin 9-13 years: 20 mg/day of niacin <p>UL for Adolescents</p> <ul style="list-style-type: none"> 14-18 years: 30 mg/day of niacin <p>UL for Adults</p> <ul style="list-style-type: none"> 19 years or older: 35 mg/day of niacin <p>UL for Pregnancy & Lactation</p> <ul style="list-style-type: none"> 14-18 years: 30mg/day of niacin 19 years and older: 35 mg/day of niacin
Deficiency Symptoms	Deficiency Disease Name: Pellagra



	<ul style="list-style-type: none"> Symptoms include loss of appetite, changes in the digestive tract associated with vomiting, constipation or diarrhea, irritability, skin rashes on parts exposed to sun, dementia, inflamed swollen smooth tongue (red tongue), and neurological symptoms such as mental confusion, depression, loss of memory, apathy and fatigue. <p>Note: Extra niacin may be required by persons treated with hemodialysis or peritoneal dialysis, or those with malabsorption syndrome.</p>
Toxicity Symptoms	<p>There is no evidence of adverse effects from the consumption of naturally occurring niacin in foods.</p> <p>Adverse effects from niacin containing supplements may include flushing, gastrointestinal distress such as diarrhea, ulcer, irritation and vomiting.</p>

<u>Vitamin B₆</u>	
Common Name	Vitamin B ₆ , pyridoxal, pyridoxal-5-phosphate, pyridoxamine, pyridoxamine-5-phosphate, pyridoxine, pyridoxine-5-phosphate.
Recommended Daily Intake [D.01.004, FDR]	1.8 mg intake for persons 2 years of age or older 0.7 mg intake for infants or children less than 2 years of age [Table 1 to Division 1, Part D, FDR]
Functions	<ul style="list-style-type: none"> A factor in the maintenance of good health; Helps the body to metabolize proteins, fats and carbohydrates; Helps in the formation of tissues, antibodies and red blood cells; and Helps convert tryptophan to niacin.
Tolerable Upper Intake Limit (UL)	<p>UL for Infants</p> <ul style="list-style-type: none"> 0-12 months: not possible to establish; source of intake should be formula and food only <p>UL for Children</p> <ul style="list-style-type: none"> 1-3 years: 30 mg/day of vitamin B₆ as pyridoxine 4-8 years: 40 mg/day of vitamin B₆ as pyridoxine 9-13 years: 60 mg/day of vitamin B₆ as pyridoxine <p>UL for Adolescents</p> <ul style="list-style-type: none"> 14-18 years: 80 mg/day of vitamin B₆ as pyridoxine <p>UL for Adults</p> <ul style="list-style-type: none"> 19 years or older: 100 mg/day of vitamin B₆ as pyridoxine <p>UL for Pregnancy & Lactation</p> <ul style="list-style-type: none"> 14-18 years: 80mg/day of vitamin B₆ as pyridoxine 19 years and older: 100 mg/day of vitamin B₆ as pyridoxine
Deficiency Symptoms	<ul style="list-style-type: none"> Symptoms include seborrheic dermatitis, headaches, anemia,



	depression, confusion, muscle twitching, convulsions, nausea, vomiting, flaky skin, sore and smooth tongue, cracked corners of the mouth, irritation of sweat glands and kidney stones.
Toxicity Symptoms	<p>No adverse effects associated with vitamin B₆ from food have been reported. This does not mean that there is no potential for adverse effects resulting from high intakes. Because of data on the adverse effects of vitamin B₆ are limited, caution may be warranted.</p> <p>Symptoms resulting from high intakes of supplemental forms may include sensory neuropathy, nerve damage leading to numbness and muscle weakness, painful and disfiguring dermatological lesions, bloating, depression, fatigue, irritability and bone pain.</p>

<u>Folacin or Folate</u>	
Common Name	Folic acid, folate, folacin, pteroylmonoglutamate, pteroylmonoglutamic acid, Vitamin B ₉
Recommended Daily Intake [D.01.004, FDR]	<p>220 µg intake for persons 2 years of age or older 65 µg intake for infants or children less than 2 years of age [Table 1 to Division 1, Part D, FDR]</p>
Functions	<ul style="list-style-type: none"> • Helps to maintain good health; • Helps to produce red blood cells and prevent megaloblastic anemia; • Helps in protein metabolism and new cell division; and • Helps prevent neural tube defects when taken prior to becoming pregnant and during early pregnancy (for products providing at least 400 µg/day).
Tolerable Upper Intake Limit (UL)	<p>UL for Infants</p> <ul style="list-style-type: none"> - 0-12 months: not possible to establish for supplemental folate <p>UL for Children</p> <ul style="list-style-type: none"> - 1-3 years: 300 µg/day of folate from fortified foods or supplements - 4-8 years: 400 µg/day of folate from fortified foods or supplements - 9-13 years: 600 µg/day of folate from fortified foods or supplements <p>UL for Adolescents</p> <ul style="list-style-type: none"> - 14-18 years: 800 µg/day of folate from fortified foods or supplements <p>UL for Adults</p> <ul style="list-style-type: none"> - 19 years or older: 1000 µg/day of folate from fortified foods or supplements <p>UL for Pregnancy & Lactation</p> <ul style="list-style-type: none"> - 14-18 years: 800 µg/day of folate from fortified foods or supplements - 19 years and older: 1000 µg/day of folate from fortified foods or supplements



	The UL for folate applies to synthetic forms obtained from supplements and/or fortified foods.
Deficiency Symptoms	<ul style="list-style-type: none"> • Folate deficiency impairs cell division and protein synthesis; and • Symptoms include anemia, weakness, fatigue, difficulty concentrating, irritability, headache, palpitations, shortness of breath, suppression of immune system and frequent infections, smooth and red tongue, and depression and mental confusion. <p>Note: Research studies have focussed on the role of folate in preventing neural tube defects which involve impaired cell division as a result of disordered DNA and RNA synthesis in the developing fetus, often leading to spinal defects such as spina bifida. These defects can cause serious disabilities and mortality.</p> <p>It is recommended that all women capable of becoming pregnant consume 400 µg from supplements or fortified foods in addition to intake of food folate from a varied diet. It is assumed that women will continue consuming 400 µg from supplements or fortified food until their pregnancy is confirmed and they enter prenatal care.</p>
Toxicity Symptoms	<p>No adverse effects associated with folate from food or supplements have been reported. This does not mean that there is no potential from adverse effects resulting from high intakes. Because data on the adverse effects of folate are limited, caution may be warranted.</p> <p>Excessive intake of folate supplements may induce symptoms including diarrhea, irritability and precipitate, exacerbate or mask neurological complication in people with vitamin B₁₂ deficiency.</p>

<u>Vitamin B₁₂</u>	
Common Name	Vitamin B ₁₂ , cyanocobalamin
Recommended Daily Intake [D.01.004, FDR]	2 µg intake for persons 2 years of age or older 0.3 µg intake for infants or children less than 2 years of age [Table 1 to Division 1, Part D, FDR]
Functions	<ul style="list-style-type: none"> • Helps to maintain good health and to produce red blood cells; • Involved in the synthesis of genetic material, neurological function and in reforming the folate coenzyme; • Helps maintain nerve cells and to break down some fatty acids, amino acids and glycogen; and • Helps in treating pernicious anemia.
Tolerable Upper Intake Limit (UL)	There is not sufficient data on which to base a UL for vitamin B ₁₂ .
Deficiency Symptoms	Deficiency Disease Name: Pernicious anemia (macrocytic anemia)



	<ul style="list-style-type: none"> • Symptoms include disordered red blood cell synthesis and destruction of the myelin sheaths, leading to paralysis and, ultimately, death; • Other symptoms include sore and smooth tongue, loss of appetite, constipation, anemia, pallor of the skin associated with a gradual onset of anemia, lowered energy and exercise capacity, tingling and numbness, loss of concentration, disorientation, fatigue, shortness of breath and palpitations; and • A vitamin B₁₂ deficiency results in the same haematological changes that occur with folate deficiency because the vitamin B₁₂ deficiency results in a secondary folate deficiency. <p>Note: Because 10 to 30 percent of older people may malabsorb food-bound vitamin B₁₂. It is advisable for those older than 50 years to meet their Reference Daily Intake mainly by consuming foods fortified with vitamin B₁₂ or supplement containing vitamin B₁₂.</p>
Toxicity Symptoms	No adverse effects are associated with the consumption of the amounts of vitamin B ₁₂ normally found in foods or supplements. This does not mean that there is no potential from adverse effects resulting from high intakes. Because data on the adverse effects of vitamin B ₁₂ are limited, caution may be warranted.

<u>Pantothenic acid or Pantothenate</u>	
Common Name	Pantothenic acid, Vitamin B ₅
Recommended Daily Intake [D.01.004, FDR]	7 mg intake for persons 2 years of age or older 2 mg intake for infants or children less than 2 years of age [Table 1 to Division 1, Part D, FDR]
Functions	<ul style="list-style-type: none"> • Involved in energy, fatty acid and carbohydrate metabolism; • Helps maintain good health; and • Helps in tissue formation.
Tolerable Upper Intake Limit (UL)	There is not sufficient data on which to base a UL for pantothenic acid.
Deficiency Symptoms	<ul style="list-style-type: none"> • Deficiency is rare; and • Symptoms may include irritability, restlessness, fatigue, apathy, malaise, sleep disturbances, gastrointestinal complaints such as nausea and vomiting, and neurological symptoms such as numbness, paresthesias and muscle cramps.
Toxicity Symptoms	No adverse effects associated with pantothenic acid from food or supplements have been reported. This does not mean that there is no potential from adverse effects resulting from high intakes. Because data on the adverse effects of pantothenic acid are limited, caution may be warranted.



<u>Biotin</u>	
Common Name	Biotin, Vitamin H
Recommended Daily Intake [D.01.004, FDR]	30 µg intake for persons 2 years of age or older 8 µg intake for infants or children less than 2 years of age [Table 1 to Division 1, Part D, FDR]
Functions	<ul style="list-style-type: none"> • Helps to maintain good health; • Involved in energy metabolism; and • Helps the body to metabolize fats, proteins and glycogen.
Tolerable Upper Intake Limit (UL)	There is not sufficient data on which to base a UL for biotin.
Deficiency Symptoms	<ul style="list-style-type: none"> • Deficiency is rare; and • Symptoms may include dermatitis (rash, dry and scaly skin), conjunctivitis, alopecia (loss of hair around the scalp), central nervous system abnormalities, loss of appetite, nausea, depression, muscle pain and fatigue.
Toxicity Symptoms	No adverse effects of biotin in humans or animals were found. This does not mean that there is no potential from adverse effects resulting from high intakes. Because data on the adverse effects of biotin are limited, caution may be warranted.

Table 2: Minerals Nutrients in Foods, D.02.001 of the FDR

Note: Information in this table is taken in part from these references: [5], [6], and [8] to [14].

<u>Sodium</u>	
Common Name	Sodium
Reference Standard [B.01.001, FDR]	2400 mg [Table to B.01.001.1, FDR]
Functions	<ul style="list-style-type: none"> • Assists nerve transmission, maintains normal fluid and acid-base (electrolyte) balance, aids in muscle contraction; and • Maintain extracellular volume and plasma osmolality (concentration of substances in the blood).
Tolerable Upper Intake Limit (UL)	UL for Infants - 0-12 months: not determined for supplemental sodium UL for Children - 1-3 years: 1,500 mg/day - 4-8 years: 1,900 mg/day



	<ul style="list-style-type: none"> - 9-13 years: 2,200 mg/day <p>UL for Adolescents</p> <ul style="list-style-type: none"> - 14-18 years: 2,300 mg/day <p>UL for Adults</p> <ul style="list-style-type: none"> - 19-70 years: 2,300 mg/day - > 70 years of age 2,300 mg/day <p>UL for Pregnancy</p> <ul style="list-style-type: none"> - 14-50 years: 2,300 mg/day <p>UL for Lactation</p> <ul style="list-style-type: none"> - 14-50 years: 2,300 mg/day <p>Tolerable Upper Intake Levels for sodium are based on prevention of increased blood pressure.</p>
Deficiency Symptoms	<ul style="list-style-type: none"> • Symptoms include muscle cramps, mental apathy, loss of appetite; and • Hyponatremia (deficiency of sodium in the blood) may be caused by excessive sodium loss from the body, which occurs with impaired renal function, increased vasopressin release, or excessive consumption of water. Diuretic use is an infrequent cause of hyponatremia. It can result in Central Nervous System edema, lung congestion and muscle weakness.
Toxicity Symptoms	<ul style="list-style-type: none"> • Edema; • May worsen symptoms of asthma; and • Hypertension (high blood pressure) in sensitive individuals. <p>Note: Table salt (sodium chloride) has a greater effect on blood pressure than either sodium or chloride alone or in combination with other ions. Salt avoidance helps to prevent hypertension in salt-sensitive individuals, but for the majority of people with hypertension, salt restriction does not lower blood pressure. The most effective dietary treatment for hypertension is weight loss.</p>

<u>Potassium</u>	
Common Name	Potassium
Reference Standard [B.01.001, FDR]	3500 mg [Table to B.01.001.1, FDR]
Functions	<ul style="list-style-type: none"> • Required for normal cell function; and • Facilitation of reactions such as protein synthesis, fluid balance, nerve transmission, and muscle contraction.
Tolerable Upper Intake Limit (UL)	There was no evidence of chronic excess intakes of potassium in apparently healthy individuals and thus no UL was established.



Deficiency Symptoms	<ul style="list-style-type: none"> • A dietary deficiency of potassium is unlikely, but with a regular diet low in fresh fruits and vegetables, it is possible; • Symptoms include loss of appetite, muscle cramps, confusion and apathy, constipation and dehydration; • Severe deficiency characterized by hypokalemia. Symptoms include cardiac arrhythmias, muscle weakness and glucose intolerance; • Moderate deficiency is characterized by increased blood pressure, increased salt sensitivity, an increased risk of kidney stones and increased bone turnover; and • Inadequate intake may also increase the risk of cardiovascular disease, particularly stroke.
Toxicity Symptoms	<ul style="list-style-type: none"> • Potassium toxicity can result from the overuse of potassium salt, especially in an infant or a person with heart disease; it does not normally result from overeating foods high in potassium. Symptoms include muscular weakness, vomiting and heart failure; • Gastrointestinal discomfort and ulceration of the GI tract may result from excess consumption of some forms of potassium supplements but not with potassium from the diet; • Hyperkalemia resulting in cardiac arrhythmia; and • Excess consumption of supplemental potassium can lead to acute toxicity in healthy individuals.

<u>Calcium</u>	
Common Name	Calcium
Recommended Daily Intake [D.02.002, FDR]	1100 mg intake for persons 2 years of age or older 500 mg intake for infants or children less than 2 years of age [Table 1 to Division 2, Part D, FDR]
Functions	<ul style="list-style-type: none"> • Essential role in bone and tooth formation, vascular contraction and vasodilation, blood clotting, muscle contraction, nerve transmission, and glandular secretion; • Helps in the maintenance of bones and teeth, especially in infancy and childhood; and • Helps to prevent bone resorption and osteoporosis.
Tolerable Upper Intake Limit (UL)	UL for Infants <ul style="list-style-type: none"> - 0-12 months: not determinable due to lack of data UL for Children <ul style="list-style-type: none"> - 1-3 years: 2,500 mg/day - 4-8 years: 2,500 mg/day - 9-13 years: 2,500 mg/day UL for Adolescents



	<ul style="list-style-type: none"> - 14-18 years: 2,500 mg/day <p>UL for Adults</p> <ul style="list-style-type: none"> - 19 years or older: 2,500 mg/day <p>UL for Pregnancy & Lactation</p> <ul style="list-style-type: none"> - ≤18-50 years: 2,500 mg/day <p>The UL represents total intake from food, water, and supplements.</p>
Deficiency Symptoms	<ul style="list-style-type: none"> • Osteoporosis - loss of bone mass throughout the body - can lead to increased bone fractures and tooth loss; • Inability for muscles to relax after contraction due to disordered calcium metabolism; and • Urinary stone formation.
Toxicity Symptoms	<ul style="list-style-type: none"> • Kidney stones, hypercalcemia, milk-alkali syndrome, and renal insufficiency; and • Symptoms of overdose include constipation, urinary stone formation and kidney dysfunction, and interference with absorption of other minerals.

<u>Phosphorus</u>	
Common Name	Phosphorus
Recommended Daily Intake [D.02.002, FDR]	1100 mg intake for persons 2 years of age or older 500 mg intake for infants or children less than 2 years of age [Table 1 to Division 2, Part D, FDR]
Functions	<ul style="list-style-type: none"> • Bone and teeth building, cell growth, energy transfer, acid-base (electrolyte) balance and nucleotide synthesis.
Tolerable Upper Intake Limit (UL)	<p>UL for Infants</p> <ul style="list-style-type: none"> - 0-12 months: not determinable due to lack of data <p>UL for Children</p> <ul style="list-style-type: none"> - 1-3 years: 3,000 mg/day - 4-8 years: 3,000 mg/day - 9-13 years: 4,000 mg/day <p>UL for Adolescents</p> <ul style="list-style-type: none"> - 14-18 years: 4,000 mg/day <p>UL for Adults</p> <ul style="list-style-type: none"> - 19-70 years: 4,000 mg/day - > 70 years of age 3,000 mg/day <p>UL for Pregnancy</p>



	<ul style="list-style-type: none"> - ≤18-50 years: 3,500 mg/day <p>UL for Lactation</p> <ul style="list-style-type: none"> - ≤18-50 years: 4,000 mg/day <p>The UL represents total intake from food, water, and supplements.</p>
Deficiency Symptoms	<p>Deficiency Disease Name: Hypophosphatemia</p> <ul style="list-style-type: none"> • Deficiency is rare; • Symptoms may include, anorexia, anemia, muscle weakness, bone pain, muscle fibre degeneration, rickets, osteomalacia, general debility, increased susceptibility to infection, paresthesias, ataxia, confusion and death
Toxicity Symptoms	<ul style="list-style-type: none"> • Metastatic calcification; • Skeletal porosity; and • Interference with calcium absorption.

<u>Magnesium</u>	
Common Name	Magnesium
Recommended Daily Intake [D.02.002, FDR]	250 mg intake for persons 2 years of age or older 55 mg intake for infants or children less than 2 years of age [Table 1 to Division 2, Part D, FDR]
Functions	<ul style="list-style-type: none"> • A factor in the maintenance of good health; • Helps the body to metabolize protein, carbohydrates and fats; • Helps in the development and maintenance of bones and teeth; • Helps to maintain proper muscle function; • Bone mineralization, protein building, enzyme action, muscular contraction, (neuromuscular activity of the heart), nerve impulse transmission, maintenance of teeth, functioning of immune system; • Cofactor for enzyme systems; and • Important for calcium and vitamin C metabolism.
Tolerable Upper Intake Limit (UL)	<p>UL for Infants</p> <ul style="list-style-type: none"> - 0-12 months: not determinable due to lack of data <p>UL for Children</p> <ul style="list-style-type: none"> - 1-3 years: 65 mg/day - 4-8 years: 110 mg/day - 9-13 years: 350 mg/day <p>UL for Adolescents</p> <ul style="list-style-type: none"> - 14-18 years: 350 mg/day <p>UL for Adults</p>



	<ul style="list-style-type: none"> - 19-70 years: 350 mg/day - > 70 years of age 350 mg/day <p>UL for Pregnancy</p> <ul style="list-style-type: none"> - ≤18-50 years: 350 mg/day <p>UL for Lactation</p> <ul style="list-style-type: none"> - ≤18-50 years: 350 mg/day <p>The UL represents total intake from supplements only and does not include intake from food and water.</p>
Deficiency Symptoms	<ul style="list-style-type: none"> • Hypocalcemia (deficiency of calcium in the blood), characterized by irregular heart beat accompanied by weakness; muscle pain, neuromuscular hyperexcitability, disorientation, seizures, confusion, difficulty in swallowing, and hypertension; • Postmenopausal osteoporosis; and • In children, growth failure may result.
Toxicity Symptoms	<ul style="list-style-type: none"> • There is no evidence of adverse effects from the consumption of naturally occurring magnesium in foods; and • Adverse effects from magnesium containing supplements may include osmotic diarrhea.

<u>Iron</u>	
Common Name	Iron
Recommended Daily Intake [D.02.002, FDR]	14 mg intake for persons 2 years of age or older 7 mg intake for infants or children less than 2 years of age [Table 1 to Division 2, Part D, FDR]
Functions	<ul style="list-style-type: none"> • A factor in the maintenance of good health; • Component of hemoglobin and numerous enzymes; • Prevents macrocytic hypochromic anemia; and • Energy utilization of cells.
Tolerable Upper Intake Limit (UL)	<p>UL for Infants</p> <ul style="list-style-type: none"> - 0-12 months: 40 mg/day <p>UL for Children</p> <ul style="list-style-type: none"> - 1-3 years: 40 mg/day - 4-8 years: 40 mg/day - 9-13 years: 40 mg/day <p>UL for Adolescents</p> <ul style="list-style-type: none"> - 14-18 years: 45 mg/day



	<p>UL for Adults</p> <ul style="list-style-type: none">- 19 - 70 years: 45 mg/day- > 70 years of age 45 mg/day <p>UL for Pregnancy</p> <ul style="list-style-type: none">- ≤18-50 years: 45 mg/day <p>UL for Lactation</p> <ul style="list-style-type: none">- ≤18-50 years: 45 mg/day <p>The UL represents total intake from food, water, and supplements.</p>
Deficiency Symptoms	<ul style="list-style-type: none">• There are three levels of iron deficiency:<ul style="list-style-type: none">○ Depleted iron stores, but there appears to be no limitation in the supply of iron to the functional compartment;○ Early functional iron deficiency (iron deficient erythropoiesis) where the iron supply to the functional compartment is sub-optimal but not reduced sufficiently to cause measurable anemia; and○ Iron-deficiency anemia, where there is a measurable deficit in the most accessible functional compartment, the erythrocyte;• Important consequences of iron deficiency are impaired physical work performance, developmental delay, cognitive impairment, and adverse pregnancy outcomes;• Iron-deficiency anemia - pale skin, brittle fingernails, fatigue, poor temperature regulation, loss of appetite, impaired cognitive development and productivity, apathy;• Other symptoms include blue sclera, lowered immunity, reduced productivity and concentration, pica (eating of non-food material), pagophagia (craving for ice), abnormal temperature regulation ; and• In children, iron deficiency reduces cognitive performance irreversibly.
Toxicity Symptoms	<ul style="list-style-type: none">• Risk of adverse effects from dietary sources appears to be low;• Acute toxicity from overdoses of medicinal iron can occur in children;• Accidental iron overdose is the most common cause of poisoning deaths in children under six years of age, in the US;• The severity of iron toxicity is related to the amount of elemental iron absorbed. Symptoms range from gastrointestinal distress at lower levels around 20 mg/kg to systemic toxicity at higher levels around 60mg/kg;• Impaired zinc absorption if not taken with food;• People with hereditary hemochromatosis, chronic alcoholism, alcoholic cirrhosis, and other liver diseases are exceptionally sensitive to the effects of excess iron intake; and• Hemochromatosis: Symptoms of this genetic disorder include joint pain, fatigue, headache, irritability, lowered work performance and anemia. Iron accumulates in organs and joints, can lead to organ failure.



<u>Zinc</u>	
Common Name	Zinc
Recommended Daily Intake [D.02.002, FDR]	9 mg intake for persons 2 years of age or older 4 mg intake for infants or children less than 2 years of age [Table 1 to Division 2, Part D, FDR]
Functions	<ul style="list-style-type: none"> • A factor in the maintenance of good health; • Helps in tissue formation; • Helps the body to metabolize proteins, fats and carbohydrate; • Component of enzymes (structural and catalytic role), insulin, genetic material and proteins, and sperm; • Immune reactions, transport of vitamin A, taste perception, wound healing and fetus development; • Catalysis of various enzymes; • Maintenance of structural integrity of proteins; and • Regulation of gene expression.
Tolerable Upper Intake Limit (UL)	<p>UL for Infants</p> <ul style="list-style-type: none"> - 0-6 months: 4 mg/day - 7-12 months: 5 mg/day <p>UL for Children</p> <ul style="list-style-type: none"> - 1-3 years: 7 mg/day - 4-8 years: 12 mg/day - 9-13 years: 23 mg/day <p>UL for Adolescents</p> <ul style="list-style-type: none"> - 14-18 years: 34 mg/day <p>UL for Adults</p> <ul style="list-style-type: none"> - 19 - 70 years: 40 mg/day - > 70 years of age 40 mg/day <p>UL for Pregnancy</p> <ul style="list-style-type: none"> - ≤18 years: 34 mg/day - 19-50 years: 40 mg/day <p>UL for Lactation</p> <ul style="list-style-type: none"> - ≤18 years: 34 mg/day - 19-50 years: 40 mg/day <p>The UL represents total intake from food, water, and supplements.</p>
Deficiency Symptoms	<ul style="list-style-type: none"> • Overt deficiency is rare; • Symptoms of mild deficiency are diverse due to zinc's ubiquitous involvement in metabolic processes; • Other symptoms include acne-like rash, diarrhea, lack of appetite,



	<p>reduced sense of taste and smell, poor wound healing, hair loss, poor growth and sexual development in children and adolescents, impaired immune function, behavioural abnormalities; and</p> <ul style="list-style-type: none"> • Zinc deficiency occurs in the genetic disorder, acrodermatitis enteropathica.
Toxicity Symptoms	<ul style="list-style-type: none"> • High doses of zinc may cause vomiting, diarrhea, fever, exhaustion and kidney failure, dizziness; • Acute effects: epigastric pain, nausea, vomiting, loss of appetite, abdominal cramps, diarrhea, headaches; • Copper deficiency; and • Decreased HDL cholesterol.

<u>Iodide</u>	
Common Name	Iodide
Recommended Daily Intake [D.02.002, FDR]	<p>160 µg intake for persons 2 years of age or older 55 µg intake for infants or children less than 2 years of age [Table 1 to Division 2, Part D, FDR]</p>
Functions	<ul style="list-style-type: none"> • A factor in the maintenance of good health; • Component of the thyroid hormones; • Helps in the normal function of the thyroid gland; and • Prevents goiter and cretinism.
Tolerable Upper Intake Limit (UL)	<p>UL for Infants</p> <ul style="list-style-type: none"> - 0-12 months: not determinable due to lack of data <p>UL for Children</p> <ul style="list-style-type: none"> - 1-3 years: 200 µg/day - 4-8 years: 300 µg/day - 9-13 years: 600 µg/day <p>UL for Adolescents</p> <ul style="list-style-type: none"> - 14-18 years: 900 µg/day <p>UL for Adults</p> <ul style="list-style-type: none"> - 19 years or older: 1,100 µg/day <p>UL for Pregnancy & Lactation</p> <ul style="list-style-type: none"> - ≤18 years: 900 µg/day - 19-50 years : 1,100 µg/day <p>The UL represents total intake from food, water, and supplements.</p>
Deficiency Symptoms	<ul style="list-style-type: none"> • Can result in impaired cognitive development in children and goiter in adults;



	<ul style="list-style-type: none"> • Goiter - enlargement of the thyroid gland to increase capture of dietary iodide; • Cretinism – an iodine deficiency disease characterized by growth retardation, developmental delay and other abnormal features; and • Intellectual blunting is much more common in people living in iodine scarce regions.
Toxicity Symptoms	<ul style="list-style-type: none"> • Elevated thyroid stimulating hormone (TSH) concentration; • Symptoms include enlargement of the thyroid gland, and depressed thyroid activity; and • Individuals with autoimmune thyroid disease (goiter), previous iodine deficiency, or nodular goiter are distinctly susceptible to the adverse effects of excess iodine intake.

<u>Chloride</u>	
Common Name	Chloride
Recommended Daily Intake: [D.02.002, FDR]	3400 mg intake for persons 2 years of age or older 1000 mg intake for infants or children less than 2 years of age [Table 1 to Division 2, Part D, FDR]
Functions	In association with sodium, chloride <ul style="list-style-type: none"> • Maintains normal fluid and electrolyte balance; and • Important component of gastric juice, as hydrochloric acid
Tolerable Upper Intake Limit (UL)	UL for Infants <ul style="list-style-type: none"> - 0-12 months: not determined for supplemental sodium; source of intake should be from human milk (or formula) and food only. UL for Children <ul style="list-style-type: none"> - 1-3 years: 2,300 mg/day - 4-8 years: 2,900 mg/day - 9-13 years: 3,400 mg/day UL for Adolescents <ul style="list-style-type: none"> - 14-18 years: 3,600 mg/day UL for Adults <ul style="list-style-type: none"> - 19-70 years: 3,600 mg/day - > 70 years of age 3,600 mg/day UL for Pregnancy <ul style="list-style-type: none"> - 14-50 years: 3,600 mg/day UL for Lactation <ul style="list-style-type: none"> - 14-50 years: 3,600 mg/day



Deficiency Symptoms	<ul style="list-style-type: none"> Chloride deficiency is rarely seen given that most foods containing sodium also provide chloride, unless special medical products, low in chloride, are consumed. Excessive chloride depletion, marked by hypochloremia, results in hypochloremic metabolic alkalosis (a syndrome seen in individuals with significant vomiting) in which loss of hydrochloric acid is the primary form of chloride loss. Symptoms may include growth failure in children, lethargy, irritability, gastrointestinal symptoms, weakness, muscle cramps, mental apathy and loss of appetite. <p>Note: Chloride losses may occur in sodium-depleting conditions such as heavy sweating or chronic diarrhea and vomiting. This increases the urinary excretion of potassium that can lead to potassium deficiency.</p>
Toxicity Symptoms	<ul style="list-style-type: none"> The only known cause of high blood chloride concentration is dehydration due to water deficiency. Symptoms may include vomiting, and acid-base imbalance.

<u>Copper</u>	
Common Name	Copper
Recommended Daily Intake [D.02.002, FDR]	2 mg intake for persons 2 years of age or older 0.5 mg intake for infants or children less than 2 years of age [Table 1 to Division 2, Part D, FDR]
Functions	<ul style="list-style-type: none"> A factor in the maintenance of good health; Helps to produce red blood cells and connective tissue; Copper is required to mobilize iron from tissues; Copper plays an important role as a catalytic co-factor for metalloenzymes; and Component of enzymes in iron metabolism.
Tolerable Upper Intake Limit (UL)	<p>UL for Infants</p> <ul style="list-style-type: none"> 0-12 months: not determinable due to lack of data <p>UL for Children</p> <ul style="list-style-type: none"> 1-3 years: 1,000 µg/day 4-8 years: 3,000 µg/day 9-13 years: 5,000 µg/day <p>UL for Adolescents</p> <ul style="list-style-type: none"> 14-18 years: 8,000 µg/day <p>UL for Adults</p> <ul style="list-style-type: none"> 19 years or older: 10,000 µg/day



	<p>UL for Pregnancy & Lactation</p> <ul style="list-style-type: none"> - ≤18 years: 8,000 µg/day - 19-50 years : 10,000 µg/day <p>The UL represents total intake from food, water, and supplements.</p>
Deficiency Symptoms	<ul style="list-style-type: none"> • Overt copper deficiency is rare; • Severe copper deficiency is seen in Menkes' syndrome, a genetic disorder of impaired copper absorption; and • Symptoms may include anemia, bone abnormalities, neurological damage, decreased HDL, cardiac abnormalities and impaired immune function. <p>Note: Excess zinc interferes with copper absorption and can cause deficiency.</p>
Toxicity Symptoms	<ul style="list-style-type: none"> • Symptoms include nausea, vomiting, diarrhea, headaches, elevated heart rate, and copper accumulation in brain and liver that can cause organ damage and psychological symptoms; • Wilson's Disease is a genetic disorder that leads to copper overload in tissues (primarily in liver and brain) that can cause damage to the tissues.; and • Because copper is reactive, it is toxic to cells if allowed to accumulate to high levels.

<u>Fluoride</u>	
Common Name	Fluoride
Recommended Daily Intake	Not determinable due to lack of data.
Functions	<ul style="list-style-type: none"> • Inhibits the initiation and progression of dental caries and stimulates new bone formation.
Tolerable Upper Intake Limit (UL)	<p>UL for Infants</p> <ul style="list-style-type: none"> - 0-6 months: 0.7 mg/day - 7-12 months: 0.9 mg/day <p>UL for Children</p> <ul style="list-style-type: none"> - 1-3 years: 1.3 mg/day - 4-8 years: 2.2 mg/day - 9-13 years: 10 mg/day <p>UL for Adolescents</p> <ul style="list-style-type: none"> - 14-18 years: 10 mg/day <p>UL for Adults</p> <ul style="list-style-type: none"> - 19 years or older: 10 mg/day <p>UL for Pregnancy & Lactation</p>



	<ul style="list-style-type: none"> - ≤18 years: 10 mg/day - 19-50 years : 10 mg/day <p>The UL represents total intake from food, water, and supplements.</p>
Deficiency Symptoms	<ul style="list-style-type: none"> • Dental caries - decay of teeth due to the presence of acids. Fluorine encourages the formation of fluoroapatite crystals, which strongly resist acid, in teeth and bone.
Toxicity Symptoms	<ul style="list-style-type: none"> • Enamel and skeletal fluorosis

<u>Manganese</u>	
Common Name	Manganese
Recommended Daily Intake [D.02.002, FDR]	<p>2 mg intake for persons 2 years of age or older</p> <p>1.2 mg intake for infants or children less than 2 years of age</p> <p>[Table 1 to Division 2, Part D, FDR]</p>
Functions	<ul style="list-style-type: none"> • Involved in the formation of bone, as well as in enzymes involved in amino acid, cholesterol, and carbohydrate metabolism.
Tolerable Upper Intake Limit (UL)	<p>UL for Infants</p> <ul style="list-style-type: none"> - 0 - 12 months: not determinable due to lack of data <p>UL for Children</p> <ul style="list-style-type: none"> - 1-3 years: 2 mg/day - 4-8 years: 3 mg/day - 9-13 years: 6 mg/day <p>UL for Adolescents</p> <ul style="list-style-type: none"> - 14-18 years: 9 mg/day <p>UL for Adults</p> <ul style="list-style-type: none"> - 19 years or older: 11 mg/day <p>UL for Pregnancy & Lactation</p> <ul style="list-style-type: none"> - ≤18 years: 9 mg/day - 19-50 years : 11 mg/day <p>The UL represents total intake from food, water, and supplements.</p>
Deficiency Symptoms	<ul style="list-style-type: none"> • No deficiencies have been reported in human beings.
Toxicity Symptoms	<ul style="list-style-type: none"> • Elevated blood concentration and neurotoxicity; and • Nervous system disorders.



<u>Chromium</u>	
Common Name	Chromium
Recommended Daily Intake [D.02.002, FDR]	120 µg intake for persons 2 years of age or older 12 µg intake for infants or children less than 2 years of age [Table 1 to Division 2, Part D, FDR]
Functions	<ul style="list-style-type: none">• A factor in the maintenance of good health; and• Helps to maintain blood glucose levels.
Tolerable Upper Intake Limit (UL)	There is not sufficient data on which to base a UL for chromium.
Deficiency Symptoms	<ul style="list-style-type: none">• Diabetes-like condition marked by an inability to use glucose normally.
Toxicity Symptoms	<ul style="list-style-type: none">• Chronic renal failure

<u>Selenium</u>	
Common Name	Selenium
Recommended Daily Intake [D.02.002, FDR]	50 µg intake for persons 2 years of age or older 15 µg intake for infants or children less than 2 years of age [Table 1 to Division 2, Part D, FDR]
Functions	<ul style="list-style-type: none">• A factor in the maintenance of good health;• A factor in the maintenance of healthy body cells and tissues;• Selenium functions through selenoproteins, several of which are oxidant defence enzymes;• Antioxidant that works in conjunction with vitamin E to protect cell membranes; and• Defence against oxidative stress and regulation of thyroid hormone action, and the reduction and oxidation status of vitamin C and other molecules.
Tolerable Upper Intake Limit (UL)	UL for Infants - 0-6 months: 45 µg/day - 7-12 months: 60 µg/day UL for Children - 1-3 years: 90 µg/day - 4-8 years: 150 µg/day - 9-13 years: 280 µg/day UL for Adolescents - 14-18 years: 400 µg/day



	<p>UL for Adults</p> <ul style="list-style-type: none"> - 19 years or older: 400 µg/day <p>UL for Pregnancy & Lactation</p> <ul style="list-style-type: none"> - ≤18 years: 400 µg/day - 19-50 years : 400 µg/day <p>The UL represents total intake from food and supplements.</p>
Deficiency Symptoms	<ul style="list-style-type: none"> • Selenium deficiency seldom causes overt illness when it occurs in isolation. However, it leads to biochemical changes that predispose to illness associated with other stresses; • Predisposition to heart disease characterized by cardiac tissue becoming fibrous; • Keshan Disease, which results in an enlarged heart and poor heart function, occurs in selenium deficient children; • Kashin-Beck Disease, which results in osteoarthropathy; and • Myxedematous Endemic Cretinism, which results in mental retardation.
Toxicity Symptoms	<p>Toxicity Disease Name: Selenosis</p> <ul style="list-style-type: none"> • Symptoms include digestive system disorders, hair and nail brittleness and loss, skin lesions, garlic breath odour, fatigue, irritability and nervous system disorders.

<u>Cobalt</u>	
Common Name	Cobalt
Recommended Daily Intake	NA
Functions	<ul style="list-style-type: none"> • Cobalt, as cobalamin, is part of the vitamin B12 molecule; and • Functions as part of vitamin B12 in nerve function and blood formation.
Tolerable Upper Intake Limit (UL)	There is not sufficient data on which to base a UL for cobalt.
Deficiency Symptoms	NA
Toxicity Symptoms	NA

<u>Molybdenum</u>	
Common Name	Molybdenum
Recommended Daily	75 µg intake for persons 2 years of age or older



Intake [D.02.002, FDR]	15 µg intake for infants or children less than 2 years of age [Table 1 to Division 2, Part D, FDR]
Functions	<ul style="list-style-type: none"> • Cofactor for enzymes involved in catabolism of sulphur amino acids, purines and pyridines; and • Facilitation of enzymes and cell processes.
Tolerable Upper Intake Limit (UL)	<p>UL for Infants</p> <ul style="list-style-type: none"> - 0-6 months: Not determinable due to lack of data. - 7-12 months: Not determinable due to lack of data. <p>UL for Children</p> <ul style="list-style-type: none"> - 1-3 years: 300 µg/day - 4-8 years: 600 µg/day - 9-13 years: 1,100 µg/day <p>UL for Adolescents</p> <ul style="list-style-type: none"> - 14-18 years: 1,700 µg/day <p>UL for Adults</p> <ul style="list-style-type: none"> - 19 years or older: 2,000 µg/day <p>UL for Pregnancy & Lactation</p> <ul style="list-style-type: none"> - ≤18 years: 1,700 µg/day - 19-50 years : 2,000 µg/day <p>The UL represents total intake from food, water, and supplements.</p>
Deficiency Symptoms	NA
Toxicity Symptoms	<ul style="list-style-type: none"> • Enzyme inhibition; • Gout-like symptoms; • Reproductive effects as observed in animal studies; and • Individuals who are deficient in copper could be at increased risk of molybdenum toxicity.

<u>Tin</u>	
Common Name	Tin
Recommended Daily Intake	NA
Functions	Tin is recognized as a mineral nutrient as per D.03.001 of the FDR. It is not an essential element for humans.
Tolerable Upper Intake Limit (UL)	There is not sufficient data on which to base a UL for tin.
Deficiency Symptoms	NA



Toxicity Symptoms	NA
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<u>Vanadium</u>	
Common Name	Vanadium
Reference Daily Intake	NA
Functions	Vanadium is an ultra trace mineral recognized as a mineral nutrient as per D.03.001 of the FDR. It is not known to be essential in humans and is poorly absorbed from the gut. No biological function in humans has been identified.
Tolerable Upper Intake Limit (UL)	<p>UL for Infants</p> <ul style="list-style-type: none"> - 0 - 12 months: not determinable due to lack of data <p>UL for Children</p> <ul style="list-style-type: none"> - 1-3 years: not determinable due to lack of data - 4-8 years: not determinable due to lack of data - 9-13 years: not determinable due to lack of data <p>UL for Adolescents</p> <ul style="list-style-type: none"> - 14-18 years: not determinable due to lack of data <p>UL for Adults</p> <ul style="list-style-type: none"> - 19 years or older: 1.8 mg/day <p>UL for Pregnancy & Lactation</p> <ul style="list-style-type: none"> - ≤18 years: not determinable due to lack of data - 19-50 years : not determinable due to lack of data <p>The UL represents total intake from food, water, and supplements.</p>
Deficiency Symptoms	NA
Toxicity Symptoms	<ul style="list-style-type: none"> • Renal toxicity; • Mild gastrointestinal effects; and • Even though no biological function has been identified, there seems to be a link between vanadium compounds, anemia and changes to the leukocyte system.



<u>Silicon</u>	
Common Name	Silicon
Reference Daily Intake	NA
Functions	<p>Silicon is recognized as a mineral nutrient as per D.03.001 of the FDR. It is not an essential element for humans.</p> <p>May assist in bone, cartilage and collagen biosynthesis.</p>
Tolerable Upper Intake Limit (UL)	There is not sufficient data on which to base a UL for silicon.
Deficiency Symptoms	NA
Toxicity Symptoms	<ul style="list-style-type: none"> • Toxicity is rare when taken orally, but siliceous kidney stones have been reported in persons who chronically ingest antacids containing magnesium trisilicate.

<u>Nickel</u>	
Common Name	Nickel
Reference Daily Intake	NA
Functions	<ul style="list-style-type: none"> • Nickel is recognized as a mineral nutrient as per D.03.001 of the FDR. It is not an essential element for humans. No biological function in humans has been identified; • May serve as a co-factor of metalloenzymes; and • May facilitate iron absorption or metabolism in microorganisms.
Tolerable Upper Limit Intake (UL)	<p>UL for Infants</p> <ul style="list-style-type: none"> - 0 - 12 months: not determinable due to lack of data <p>UL for Children</p> <ul style="list-style-type: none"> - 1-3 years: 0.2 mg/day - 4-8 years: 0.3 mg/day - 9-13 years: 0.6 mg/day <p>UL for Adolescents</p> <ul style="list-style-type: none"> - 14-18 years: 1 mg/day <p>UL for Adults</p> <ul style="list-style-type: none"> - 19 years or older: 1 mg/day <p>UL for Pregnancy & Lactation</p> <ul style="list-style-type: none"> - ≤18 years: 1 mg/day - 19-50 years : 1 mg/day



	The UL represents total intake from food, water, and supplements.
Deficiency Symptoms	NA
Toxicity Symptoms	Decreased body weight gain as observed in animal studies.

3.0 LIST OF ACCEPTABLE VITAMIN COMPOUNDS AND MINERAL SALTS WHICH MAY BE USED FOR FORTIFICATION

To ensure that the source of vitamins and mineral nutrients added to foods meet appropriate specifications for identity and purity, a proposed list of permitted vitamin compounds and mineral salts is presented in Table 3. [15]

Table 3: List of Acceptable Nutrients for Fortification in Canada

Vitamin Nutrients	
Vitamin A	all <i>trans</i> retinol
	retinyl acetate
	retinyl palmitate
Beta-carotene	beta-carotene
Vitamin C	L-ascorbic acid
	calcium L-ascorbate
	6-palmitoyl-L-ascorbic acid (ascorbyl palmitate)
	sodium L-ascorbate
Vitamin D	vitamin D ₃ (cholecalciferol)
	vitamin D ₂ (ergocalciferol)
Vitamin E	D-alpha-tocopherol
	DL-alpha-tocopherol
	D-alpha-tocopheryl acetate
	DL-alpha-tocopheryl acetate
	DL-alpha-tocopheryl acid succinate
Vitamin K	phytomenadione (2-methyl-3-phytyl-1,4-naphthoquinone; phylloquinone)
Thiamine	thiamine hydrochloride
	thiamine mononitrate
Riboflavin	Riboflavin
	riboflavin-5'-phosphate sodium
Niacin	nicotinic acid amide (nicotinamide)
	nicotinic acid
Vitamin B ₆	pyridoxine hydrochloride
Folate	N-pteroyl-L-glutamic acid
Vitamin B ₁₂	Cyanocobalamin
	hydroxocobalamin
Pantothenic Acid	calcium D-pantothenate
	D-panthenol/DL-panthenol
Biotin	D-biotin
Mineral Substances	
Calcium	calcium carbonate



	calcium chloride
	tricalcium dicitrate (calcium citrate)
	calcium gluconate
	calcium glycerophosphate
	calcium L-lactate
	calcium hydroxide
	calcium oxide
	calcium dihydrogen phosphate (calcium phosphate, monobasic)
	calcium hydrogen phosphate (calcium phosphate, dibasic)
	tricalcium diphosphate (calcium phosphate, tribasic)
	calcium sulphate
	calcium pyrophosphate
Chromium	chromic chloride
	chromic sulphate
Copper	cupric citrate
	cupric gluconate (copper gluconate)
	cupric sulphate (copper sulphate)
Fluoride	sodium fluoride
Iodide	potassium iodide
	potassium iodate
	sodium iodide
Iron	ferrous citrate
	ferrous fumarate
	ferrous gluconate
	ferrous glycinate
	ferrous lactate
	ferrous sulphate
	ferric ammonium citrate
	ferric citrate
	ferric pyrophosphate (iron pyrophosphate)
	hydrogen reduced iron
	electrolytic iron
	carbonyl iron
	ferric phosphate (ferric orthophosphate, iron phosphate)
	sodium iron pyrophosphate (sodium ferric pyrophosphate, sodium ferric diphosphate)
	ferric saccharate
Magnesium	magnesium hydroxide carbonate
	magnesium chloride
	magnesium gluconate
	magnesium glycerophosphate
	magnesium hydroxide
	magnesium L-lactate
	magnesium oxide
	magnesium hydrogen phosphate (magnesium phosphate, dibasic; magnesium salt of orthophosphoric acid)
	trimagnesium phosphate (magnesium phosphate, tribasic; magnesium salt of orthophosphoric acid)



	magnesium sulphate
	magnesium citrate
	magnesium acetate
Manganese	manganese chloride
	manganese citrate
	manganese glycerophosphate
	magnesium sulphate
	manganese gluconate
Molybdenum	sodium molybdate dihydrate
	ammonium molybdate
Selenium	sodium selenite
	sodium selenate
Zinc	zinc acetate
	zinc chloride
	zinc citrate
	zinc gluconate
	zinc oxide
	zinc sulphate
Potassium	potassium carbonate
	potassium hydrogen carbonate (potassium bicarbonate)
	potassium chloride
	tripotassium citrate (potassium citrate)
	potassium gluconate
	potassium glycerophosphate
	potassium L-lactate
	potassium hydroxide
	potassium dihydrogen phosphate (potassium phosphate, monobasic)
	dipotassium hydrogen phosphate (potassium phosphate, dibasic)
	tripotassium phosphate (potassium phosphate, tribasic)
Sodium	sodium carbonate
	sodium hydrogen carbonate (sodium bicarbonate)
	sodium chloride
	trisodium citrate (sodium citrate)
	sodium gluconate
	sodium L-lactate
	sodium dihydrogen phosphate (sodium phosphate, monobasic)
	disodium hydrogen phosphate (sodium phosphate, dibasic)
	trisodium phosphate (sodium phosphate, tribasic)
	sodium hydroxide

This information is an updated version of the list presented in *Appendix K, Proposed Regulated List of Vitamin Compounds and Mineral Salts*, of Health Canada's document, *Addition of Vitamins and Mineral Nutrients to Foods, 2005, Health Canada's Proposed Policy and Implementation Plans*.

4.0 REGULATIONS AFFECTING THE ADDITION OF VITAMIN & MINERAL NUTRIENTS TO FOOD



4.1 Current Regulations

The current FDR permits addition of vitamin and mineral nutrients to food for the following purposes:

- to replace nutrients lost in the manufacturing process; to act as a public health intervention;
- to ensure the nutritional equivalence of substitute foods; or
- to ensure the appropriate vitamin and mineral nutrient composition of foods for special dietary purposes.

Section D.03.002 of the FDR stipulates which foods may or must be fortified, and specifies with which vitamin, mineral nutrient and/or amino acid. Subject to D.03.003 of the FDR (gluten-free, special-purpose, non-standardized foods which are not advertised), only foods listed in column 1 of the table in that section may be fortified. In other words, if a food is not listed in the table it may not have vitamins, minerals or amino acids added with the exception of those for which Interim Marketing Authorizations (IMAs) have been issued.

For information on foods to which vitamins, mineral nutrients and amino acids may or must be added as per the D.03.003 of the FDR, see Annex 7-1 of the *2003 Guide to Food labelling and Advertising*, available on the CFIA website at <http://www.inspection.gc.ca/english/fssa/labeti/guide/ch7-1e.shtml#1>.

4.2 Interim Marketing Authorizations (IMA)

In addition to the table in Division 3 of Part D, FDR, some other allowances have been made for nutrient addition to foods through the Interim Marketing Authorization. This process allows the addition of vitamins and minerals to certain foods and is listed on the Health Canada Website (http://www.hc-sc.gc.ca/fn-an/legislation/ima-amp/index_e.html). The IMA process bridges the time between the completion of the scientific evaluation supporting certain regulatory amendments (e.g., expansion of the list of foods to which certain vitamins and mineral nutrients may be added) and publication of the approved amendments in Canada Gazette, Part II. The criteria that must be met in order to request an IMA are set out in B.01.056, FDR.

4.3 Vitamins and Mineral Nutrients that are Also Food Additives

There are numerous vitamin and mineral nutrients from the table in Part D, Division 3, FDR which are also found in the list of permitted food additives in Part B, Division 16. If a nutrient is permitted as a food additive but the food is not in column I of the table in Division 3, Part D, in other words, that food is not allowed to be fortified, then no claim or representation, e.g. “excellent source of vitamin C”, may be made based on nutrients provided by food additives. However, in the Nutrition Facts Table, the total amount of the nutrient from all sources must be declared, i.e. both the indigenous nutrient and the nutrient content derived from the food additive. Two letters were sent to industry by the CFIA to clarify this issue and are available on the CFIA website at: <http://www.inspection.gc.ca/english/fssa/labeti/inform/19981230e.shtml> and <http://www.inspection.gc.ca/english/fssa/labeti/inform/19981127e.shtml>

4.4 Food for Special Dietary Use and Infant Formula

Division 24 of the FDR outlines the requirements for “food for special dietary use”, and defines it as a “food that has been specially processed or formulated to meet the particular requirements of a person a) in whom a physical or physiological condition exists as a result of a disease, disorder or injury, or b) for whom a particular effect, including but not limited to weight loss, is to be obtained by a controlled intake of foods.



Foods which meet this criteria would be: a formulated liquid diet, a meal replacement, a nutritional supplement, a gluten-free food, a food represented as a protein restricted diet, a low-amino acid diet, or a very low-energy diet.

Formulated liquid diets, meal replacements, nutritional supplements and foods represented for use in a very low-energy diet have very specific composition and labelling regulations set out in Division 24 of FDR. For example, the compositional requirements for meal replacements are detailed in B.24.200; in addition to amounts of protein, energy and fat, minimum and maximum levels per serving are specified for most of twelve vitamins and thirteen mineral nutrients.

Human milk substitutes and sole source nutrition for infants have specific requirements for addition of vitamin and mineral nutrients. Division 25 of the FDR pertains to these infant foods. Compositional requirements, including minimums and some maximums for vitamin and mineral nutrients are specified in B.25.054 and Table II to that Division. This table is accessible from the following website:
http://laws.justice.gc.ca/en/showdoc/cr/C.R.C.-c.870/bo-ga:l_B-gb:s_B_25_001/en#anchorbo-ga:l_B-gb:s_B_25_001

5.0 PROPOSED REGULATORY AMENDMENTS ^[15]

Addition of vitamins and minerals to food is a way to maintain and improve the nutritional quality of Canada's food supply to the health of Canadians against nutrient deficiencies and excesses. Regulating fortification would ensure that consumers are protected against both deficiencies and excessive vitamin and mineral intakes from food.

Health Canada commenced a policy revision in 1998 and published the proposed policy in 2004. The provision for discretionary fortification when the regulations are made and in force, would allow fortification of all foods except for a list of certain staple and standardized foods.

5.1 Risk Categories

In the proposed regulation for discretionary fortification, nutrients and their levels are permitted according to their risk. They are classified into 3 groups:

Risk Category A Nutrients: Those vitamin and mineral nutrients for which no Tolerable Upper Limit of Intake (UL) was set because of no reports of adverse effects, and no concern expressed; and those nutrients for which a UL was set but with a wide margin of safe intake; and those nutrients with a narrow margin of safety, but non-serious critical adverse effects: thiamine, riboflavin, pantothenate, biotin, vitamin B₁₂, beta-carotene, vitamin C, vitamin B₆, vitamin E, niacin.

Risk Category B Nutrients: Those nutrients with serious adverse effects, but with low risk of excessive intake at the proposed level of addition for discretionary fortification: calcium, folic acid, magnesium, vitamin D, potassium.

Risk Category C Nutrients (to be excluded from discretionary fortification): Those nutrients with a narrow margin of safety, and with serious adverse effects and/or with current levels of exposure to intakes above the UL by vulnerable subgroups: vitamin A as retinol, zinc, iron, copper, selenium, manganese, iodine, fluoride. Nutrients in this category are currently permitted or required to be added to a range of foods for purposes of restoration, mandatory fortification, nutritional equivalence of substitute foods, or to



make a special purpose food such as a meal replacement. New or further additions for these purposes would continue to be subject to regulatory requirements.

Other nutrients for which a risk category has not been assigned include choline, chromium, molybdenum, phosphorus, vitamin K. These nutrients are proposed to be excluded from discretionary fortification for a variety of reasons.

More detailed information is available through Health Canada's Website at http://www.hc-sc.gc.ca/fn-an/nutrition/vitamin/index_e.html

5.2 Proposed Minimum and Maximum Levels for Fortification

Levels of addition for discretionary fortification are indicated in *Appendix C of Health Canada's Proposed Policy and Implementation Plans*. The document is available on the Internet at http://www.hc-sc.gc.ca/fn-an/nutrition/vitamin/fortification_final_doc_app-ann_c_e.html.

If a nutrient is added, the minimum level of total nutrient (naturally occurring and added) in the food must be 5% of the Daily Value per reference amount of the food (i.e. the food will qualify for a "source" claim). Nutrients in Risk Category A may be added such that the total amount of the nutrient (naturally occurring and added) in the food is up to 20% of the Daily Value per reference amount of the food. If the food contains 20% of the Daily Value the food will qualify for an "excellent source" claim. For Risk Category B nutrients, the total amount of the nutrient (naturally occurring and added) permitted in the food after addition is up to 10% of the Daily Value per reference amount of the food. If the food contains 10% of the Daily Value the food will qualify for a "good source" claim.

The final draft of Health Canada's Proposal is available on their Website at: http://www.hc-sc.gc.ca/fn-an/nutrition/vitamin/fortification_final_doc_1_e.html

These regulations are not in effect; they have not yet been published in Canada Gazette. Until they are published in Canada Gazette II, they may not be implemented. For information on regulatory amendments see http://www.hc-sc.gc.ca/fn-an/legislation/acts-lois/fdr-rad/gazette2/index_e.html.

6.0 PROCESS CONTROL

Nutritional safety issues can arise when nutrition values declared on the label do not match with the actual nutrient contents in the final food. It may be hazardous to health when too little or too much of a specified nutrient is added. [16] For instance, the infant may be at risk of malnutrition if infant formula does not deliver the expected nutrient content during its shelf-life. Due to the high risk involved, Health Canada published *Good Manufacturing Practices (GMPs) for Infant Formula* in 2006 to address quality control procedures for infant formula. [17]

There are also other examples of nutritional safety issues arising when too much of a nutrient gets added to a product. For example, some vitamins that are added to fortified foods, such as vitamin A, are known to be toxic at high doses; and iron, a necessary dietary component, can cause gastrointestinal distress if too much is ingested from food. As a good manufacturing practice, controlling chemicals by keeping an inventory of all added ingredients could minimize the occurrence of this type of processing error. [18]



6.1 Good Manufacturing Practices (GMPs)

The addition of nutrients to a food for the purpose of fortification increases the number of control points that must be taken into account during manufacturing. Poor manufacturing control leading to excessively high levels of nutrients in the finished product could have important health implications for the consumer if intake for the nutrient reaches a toxic dose. By contrast, low levels of nutrients in the finished product could render it nutritionally ineffective. This could also have serious health implications if the target population is at high nutritional risk of inadequacy. Poor manufacturing control could also lead to other quality defects related to interactions of added nutrients with other components of the food. [18]

GMPs, based on the *Codex Recommended International Code of Practice – General Principles of Food Hygiene*, require that appropriate standards and practices be met with respect to product manufacturing and handling, design of premises, transportation and storage, maintenance of equipments, sanitation, personnel hygiene and training. [19]

From a nutritional safety perspective, GMPs are measures which manufacturers can adopt including but not limited to:

- Ensure that food ingredients, including food vitamins and mineral nutrients are of an appropriate level of quality and safety before use, and are stored properly to prevent contamination with other ingredients;
- Ensure that facilities used in food production are spacious enough to avoid overcrowding, and to allow proper and orderly storage of equipment, ingredients and other materials such as packaging and labelling;
- Ingredients in use must be identified or labelled and covered;
- Layout of facilities should permit the orderly flow of production materials and personnel;
- Ensure that temperatures, times, pressures, machine operation and other processing parameters are controlled at the specified levels;
- Correct labels must be used;
- Complaints should be reviewed and analysed for the root causes of the deviation;
- Control procedures should also include the examination or sampling of intermediate foods from processing lines and finished foods from final storage. The products should be analytically tested at appropriate time intervals for compliance with product specifications, and quality and safety requirements; and
- Establishment of record-keeping systems for recording the results of quality control activities, and the evidence used to establish overages.

Controlling nutrition hazards in the food industry is an essential part of GMPs. The following CFIA guidance documents are designed to help manufacturers or importers create their own controls to improve food safety and meet regulatory requirements by providing a foundation for the development of a system for ensuring food safety. They are written based on the *Codex Recommended International Code of Practice – General Principles of Food Hygiene*.

3. General Principles of Food Hygiene, Composition and Labelling (GPFHCL)
4. Good Importing Practices for Food (GIP)

Please visit the CFIA website at <http://www.inspection.gc.ca/english/fssa/fssae.shtml> for more details.

In some cases, consideration could be given to applying a food safety control system such as Hazard Analysis Critical Control Point (HACCP), to ensure that final food is fortified to the required level. For



more information on HACCP requirements, please visit the CFIA website at:

<http://www.inspection.gc.ca/english/fssa/polstrat/haccp/haccpe.shtml>

6.2 Nutrient Stability and Degradation

Nutrient stability under normal conditions of storage and use is one of the important factors in determining the effectiveness of a food fortification process. From a food manufacturing standpoint, nutrition stability during formulation, preparation, processing, transportation and storage is very crucial in determining the effective production of fortified foods. [20]

Compared with vitamins, minerals are more stable under extreme processing conditions. The primary mechanism of mineral loss is through leaching of water-soluble minerals. Regarding vitamins, their stability is affected by a number of factors such as temperature, moisture, oxygen, light, pH, minerals (especially iron and copper), vitamin-vitamin interactions, and other food components. However, given their chemical heterogeneity, vitamin losses in different foods vary considerably during both processing and storage of the final product. [21, 22]

For example, vitamin A is very susceptible to degradation because there are many double bonds in its chemical structure. It is particularly sensitive to atmospheric oxygen and low acidity, i.e. pH below 5.0. Significant losses of vitamin C may occur due to the release of ascorbate oxidase from the plant tissue as vegetable wilt or when they are cut. Significant losses of vitamin C may also occur in cooking, both through leaching into the cooking water and atmospheric oxidation. Like other water-soluble vitamins, vitamin B₁ is readily lost by leaching into cooking water. Furthermore, it is unstable to light, e.g. much of all of this can be lost when baked goods are exposed to sunlight in a shop window. This vitamin is also destroyed by sulphites (in sulphites-treated potato) and polyphenols (tannic acid in tea and betel nuts). [23]

With respect to multiple fortifications, the presence of iron and copper accelerates degradation of vitamins, especially vitamins C, A, and B₁, due to their multiple oxidation states. Fortification with several vitamins may also give rise to vitamin-vitamin interactions that may accelerate the rate of breakdown of some vitamins with the best known being those among vitamins C, B₁, B₂, B₁₂ and folic acid. [24] Nevertheless, the extent of these interactions is dependent on the nature of the food product as well as on factors such as temperature, moisture level, pH and light, during processing and storage of the final product.

In order to maintain the micronutrient levels throughout the product's shelf-life, the amount of vitamins added during processing needs to be higher than the amounts declared on the label in some cases. The difference between the declared and formulated vitamin levels, termed "overage", will be different for each food application. However, the overage level should not be so high as to cause a toxic response. The following are important points for the manufacturers of fortified foods to consider:

- extent to which food processes and distribution systems could affect nutrition retention;
- strategies for minimizing the losses caused by nutrient instability;
- decision on whether a nutrient statement or content claim can be made on labels and advertising based on the amount of nutrients through the product's shelf-life; and
- evaluation of the choices and supply of nutrients based on nutrient stability data.

To minimize nutrient degradation and losses, proper processing technology needs to be implemented at the manufacturing level. Some strategies for stabilizing nutrient content include the application of protective coating for the individual nutrient; the addition of antioxidants; the control of temperature, moisture, and pH; and protection from air, light, and incompatible metals during processing and storage. The degree of nutrient degradation in food and the length of the shelf-life will govern the level of overage. [20]



6.3 Evaluation Standard of Declared Nutrient Values

As part of their duties, CFIA inspectors will inspect companies to evaluate that good practices are in place to promote declared nutrient value accuracy. During this inspection, the Evaluation Standard for Nutrition Labelling will be used. The Evaluation Standard for Nutrition Labelling consists of two parts. Part I, Evaluation Standard for the Process, focuses on the methods used by the manufacturer to determine nutrient values and on the manufacturer's ability to identify and control all facets of the manufacturing process, from planning and specification setting to processing and delivery that may negatively affect the nutrient profile of the product. Part II, Evaluation Standard for the Label, focuses on the technical aspects of the Nutrition Facts table and any nutrient content claims and health claims made on the label or advertisement for a product.

To improve or evaluate their own process controls, manufacturers are encouraged to review Part I of the Evaluation Standard for Nutrition Labelling for criteria in the following areas. By establishing proper control procedures in the following areas, the potential of nutrition hazards in the finished product can be reduced.

- Control of operation (product formulation, process design, incoming material control, product preparation/blending, process control, labelling control, deviation control and corrective action)
- Equipment
- Personnel
- Transportation and Storage
- Records

This document may be found on the CFIA website at:

<http://www.inspection.gc.ca/english/fssa/labeti/nutrikit/sectje.shtml>

For information on nutrition labelling, please refer to the CFIA website at:

<http://www.inspection.gc.ca/english/fssa/labeti/nutrition-pagee.shtml>

Canadian Labelling Requirements are also set out in the *2003 Guide to Food Labelling and Advertising* (GFLA). The GFLA is available on the CFIA website at

<http://www.inspection.gc.ca/english/fssa/labeti/guide/toce.shtml>

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PART VI

PHYSICAL HAZARDS SECTION



Canadian Food
Inspection Agency

Agence canadienne
d'inspection des aliments



Physical Hazards

1.0 INTRODUCTION

Illness and injury can result from hard foreign objects in food. These physical hazards can be introduced anywhere along the food chain from the field source up to and including the consumer. They can be inherent in the product, of field origin or derived raw materials or packaging. They can originate from many different sources, e.g.: on the processing line from plant equipment or employees. They can be accidental or be deliberately introduced to the food, i.e. tampering.

In general, there are three health concerns usually associated with physical hazards (often referred to as extraneous material):

- 1) Physical injury to the lips, inside the mouth, teeth, tongue, throat, oesophagus, stomach, colon
- 2) Choking
- 3) Product Tampering

Many types of extraneous material may be present in foods. Extraneous material that is associated with food may include bone fragments, hair or feathers from animal products. Stones, rocks and dirt are commonly found in foods that are grown close to the soil like fruits and vegetables. Metal is a common physical hazard that can be introduced anywhere along the food chain from field to consumer, but is most commonly associated with processing activities such as cutting, slicing, or grinding operations. Extraneous material can be introduced by anything that comes in contact with the food, e.g.: from the person that handles the food or during transportation or storage. Jewelry and personal items are common physical contaminants that may be present due to poor food handling. [1] Extraneous material which originates from packaging or containers, e.g.: glass, would be included in this area of concern.

Examples of types of extraneous material include:

- plastic
- glass pieces, fragments, particles
- wood
- industrial rubber
- metal pieces or shavings, wire, fragments, particles, injection needles, snap off knife blades, meat hooks or mesh gloves
- fragments of equipment, e.g.: belt lacing, sheared off bolts, nuts, nails, washers, pump parts, rubber, tool parts
- stones
- shell fragments
- pit fragments
- cleaning equipment: sponges, cloth, bristles, tissue fragments
- packaging material
- metal twist ties, elastic bands, string
- “quik” locks (the plastic closure tags used to close bakery products)
- infestations, insect parts, rodent droppings, organic filth
- medications
- band-aid, finger cots (rubber or latex sock used to cover a finger), glove or glove fragments
- tartrate crystals (wine diamonds)
- struvite (mineral deposits in canned fish products)
- anything else foreign to the food product such as pens, pencils, eyeglasses, keys, paper clips, staples, jewelry



- live infestations
- bone fragments

This section of the Reference Database for Hazard Identification contains information on extraneous material including guidelines that relate to the safety and cleanliness of food, factors in determining risk and the control of physical hazards. Table 1 lists the injury risk of extraneous materials.

2.0 EXTRANEEOUS MATERIAL GUIDELINES

2.1 Unavoidable and Avoidable Extraneous Material

Unavoidable and avoidable extraneous materials are two categories used to differentiate extraneous material in food.

Unavoidable extraneous material may occur in food as a by-product of the processing system or as something inherent to the product itself. Items such as stems in blueberries, microscopic airborne debris, dirt on potatoes, or minute insect fragments in figs are common examples of unavoidable extraneous matter.

Avoidable extraneous material is generally less tolerated than Unavoidable because it is preventable. It consists of foreign matter which should not be present if proper GMPs are followed. Avoidable extraneous material may come in many different forms such as small glass fragments, pieces of plastic, chunks of rubber, pieces of jewellery, feather barbules, animal debris or any other unrelated foreign material.

Health Canada has developed a guidance document for determining the general cleanliness of foods. The document, Health Protection Branch Guidelines for the General Cleanliness of Food – An Overview (Extraneous Matter Overview) includes information on foreign matter associated with objectionable conditions or practices in manufacturing, processing, storing, transporting and handling of food. This document is available on the Health Canada website at: http://www.hc-sc.gc.ca/fn-an/res-rech/analy-meth/microbio/volume1/emo-mea_01_e.html. These guidelines are designed to limit extraneous material in specific foods. The CFIA uses the guidelines to interpret relevant sections of the *Food and Drugs Act* (FDA) and to make decisions on the necessary follow up actions. Extraneous material may be evaluated on a case by case basis depending on whether appropriate guidelines are available.

Harmful or injurious extraneous material is often assessed in priority. Health Canada evaluates injurious extraneous material in food and it considers 2.0 mm or greater as the threshold size for consideration as a health risk. [2] Besides size, the risk associated with extraneous material is further evaluated through an assessment of shape, hardness, material, source, target consumer groups, quantity, etc.

2.2 Choking Hazards

Potential choking hazards are evaluated individually on a case-by-case basis, based on different characteristics including size, shape, ingredients, consistency, method of consumption, previous fatalities, medical opinion, etc. Of special concern is product in which a potential choking hazard seems to be associated with the product design.

Industry should take steps to eliminate or minimize the presence of extraneous matter in food. Prior to release, industry is encouraged to evaluate the product design carefully with a view to ensuring that the design properties themselves do not contribute to a potential choking hazard.



3.0 FACTORS IN DETERMINING RISK

Food companies including retailers, manufacturers, distributors, and importers, should be aware of the risk associated with the food products they distribute. Even though Health Canada considers extraneous material 2 mm in size or greater as the threshold for consideration as a health risk, a number of factors are evaluated when risk is assessed. Factors in determining the potential risk of physical injury to consumers include but are not limited to:

- target audience for the food
- type of product
- method of consumption
- size of the extraneous material
- hardness of the extraneous material
- sharpness of the extraneous material
- shape of the extraneous material
- type of extraneous material
- ease of discovery

Extraneous materials found in high risk products including infant foods and beverages (due to the method of consumption) are considered most hazardous, and should be addressed immediately. Table 1 summarizes the injury risk of extraneous materials that are based on Health Canada’s Field Compliance Guide 90-2. [2]

Table 1: Injury Risk of Extraneous Materials

Injury Risk	Commodity	Size of Extraneous Material	Violation
High	Infant Foods	Any size (including small particles less than 2 mm)	Section 4(a) of the <i>Food and Drugs Act</i> (FDA), which states “no person shall sell an article of food that has in or on it any poisonous or harmful substances”
	Beverages	2 mm or larger in size in any one dimension	
Moderate	All other foods (except infant foods or beverages)	2 mm or larger in size in any one dimension	
Low	All other foods (except infant foods)	Less than 2 mm in size in all dimensions	

4.0 CONTROL OF PHYSICAL HAZARDS

The key to controlling physical hazards in food is prevention. Extraneous material control is an important part of any product control system and is a built-in component of successful programs such as HACCP and GMP. Extraneous material can also serve as an indicator of other non-visual problems within an establishment, i.e. evidence of rodent activity indicates poor sanitation or pest control. In other words, sound extraneous material control usually reflects positively on other aspects of plant operations.

Control of physical contamination begins with the identification of raw material ingredients or packaging components that are at risk. An effective control program must include a commitment from vendors and suppliers. Proper maintenance of the buildings, facilities, grounds and processing equipment will help to further reduce the risk of introducing extraneous material into the finished product. [3]



Once hazards have been identified, a control program can be designed to manage and reduce these risks. Tools of the overall program include the implementation of an effective HACCP System, which consists of a prerequisite program and a HACCP plan. Information regarding HACCP may be found in the CFIA website at <http://www.inspection.gc.ca/english/fssa/polstrat/haccp/haccpe.shtml>

Another means of controlling physical hazards is to be able to find them and remove them if, and when, they occur. Some common strategies employed for the control of physical hazards include [3], [4], [5]:

- Physical exclusion of the hazard, e.g.: screens, filters and sieves, etc.
- Effective detection and elimination systems
- Proper equipment design, selection, calibration and maintenance
- Effective facility maintenance
- On-line visual inspection
- Detection methods include metal detectors, x-ray machines, optical systems, magnets
- Employee training program
- Good Manufacturing Practices
- Eliminate potential sources of extraneous material within the establishment
- Screening assessment of raw materials
- End product screening
- Consumer feedback or complaint analysis

Examples: [1], [4]

- A filter or sieve can be used to remove physical objects. The sieve plate allows small particles to pass and removes larger objects.
- A water bath can be used to remove debris such as rocks, stones, and dirt from fruits and vegetables. Heavy objects like stones and rocks fall to the bottom of the bath where they can be removed.
- When metal is a concern, a metal detector can be used. A calibrated metal detector can identify a food that contains a metal object so that food can be examined more closely.
- Glass problems can be minimized through strict container controls and an efficient glass breakage policy on and around the processing line. Other controls include visual examination of empty glass containers, or cleaning a container with water or compressed air and inverting the container to remove any shards.
- Light fixtures should be protected.
- Good food handler training is needed since the food handler is an important source of physical hazards. Food handlers should be aware of the physical hazards that could be on their clothing or hands (such as jewelry and personal items such as artificial fingernails) and other items that could end up in food.



Some companies, under their GMPs, do not allow metallic pens or other loose items in the production area.

- An effective sanitation program includes good procedures for cleaning and sanitizing equipment. Effective sanitation also helps to reduce the possibility of physical hazards in the food.
- Properly and regularly maintain equipment in the food facility to avoid sources of physical hazards such as foreign materials that can come from worn out equipment
- Inspect raw materials and food ingredients for field contaminants (e.g.: Stones in cereals) that were not found during the initial receiving process
- Effective pest control can prevent pests from entering the production area and contaminating products during storage.

For information on methods for the analysis of extraneous material in foods, including glass, magnetic metal particles and heavy filth, etc., please refer to Health Canada's Compendium of Analytical Methods, Volume 4 at http://www.hc-sc.gc.ca/fn-an/res-rech/analy-meth/microbio/volume4/index_e.html

While important in itself, extraneous material control often provides a useful visual indicator of the overall sanitation level of the establishment. Obvious problems involving physical contamination usually reflect potential microbiological concerns and an overall lack of attention to the kind of detail needed for the consistent production and handling of safe and wholesome food.

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PART VII

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Acts and Regulations Administered by the Canadian Food Inspection Agency
<http://www.inspection.gc.ca/english/reg/rege.shtml>

Canadian Agricultural Products Act
<http://laws.justice.gc.ca/en/C-0.4>

Dairy Products Regulations
<http://laws.justice.gc.ca/en/C-0.4/SOR-79-840>

Egg Regulations
<http://laws.justice.gc.ca/en/C-0.4/C.R.C.-c.284>

Fresh Fruit and Vegetable Regulations
<http://laws.justice.gc.ca/en/C-0.4/C.R.C.-c.285>

Honey Regulations
<http://laws.justice.gc.ca/en/C-0.4/C.R.C.-c.287>

Maple Products Regulations
<http://laws.justice.gc.ca/en/C-0.4/C.R.C.-c.289>

Organic Products Regulations
<http://canadagazette.gc.ca/partII/2006/20061221-x6/html/extra-e.html>

Processed Egg Regulations
<http://laws.justice.gc.ca/en/C-0.4/C.R.C.-c.290>

Processed Products Regulations
<http://laws.justice.gc.ca/en/C-0.4/C.R.C.-c.291>

Consumer Packaging and Labelling Act (as it relates to food)
<http://laws.justice.gc.ca/en/C-38>

Consumer Packaging Labelling Regulations
<http://laws.justice.gc.ca/en/C-38/C.R.C.-c.417>

Fish Inspection Act
<http://laws.justice.gc.ca/en/F-12>

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<http://laws.justice.gc.ca/en/F-12/C.R.C.-c.802>



Food and Drugs Act

<http://laws.justice.gc.ca/en/F-27>

Food and Drug Regulations

<http://laws.justice.gc.ca/en/F-27/C.R.C.-c.870>

Interim Marketing Authorization

http://www.hc-sc.gc.ca/food-aliment/friia-raaii/food_drugs-aliments_drogues/ima-amp/e_index.html

Health of Animals Act

<http://laws.justice.gc.ca/en/H-3.3/>

Hatchery Exclusion Regulations

<http://laws.justice.gc.ca/en/H-3.3/SOR-91-4>

Hatchery Regulations

<http://www.inspection.gc.ca/english/reg/consultation/1023e.shtml>

Health of Animals Regulations

<http://laws.justice.gc.ca/en/C.R.C.-c.296>

Meat inspection Act

<http://laws.justice.gc.ca/en/M-3.2>

Meat Inspection Regulations, 1990

<http://laws.justice.gc.ca/en/M-3.2/SOR-90-288>

Meat Hygiene Manual of Procedures

<http://www.inspection.gc.ca/english/anima/meavia/mmopmmhv/mane.shtml>

2.0 CANADIAN FOOD INSPECTION AGENCY (CFIA)

Canadian Food Inspection Agency

<http://www.inspection.gc.ca/english/toce.shtml>

Food

<http://www.inspection.gc.ca/english/fssa/fssae.shtml>

Common Causes of Foodborne Illnesses

<http://www.inspection.gc.ca/english/fssa/concen/causee.shtml>

Specific Products and Risks

<http://www.inspection.gc.ca/english/fssa/concen/specife.shtml>



Allergies and Sensitivities

<http://www.inspection.gc.ca/english/fssa/labeti/allerg/allerge.shtml>

Recall

<http://www.inspection.gc.ca/english/fssa/rearapp/rearappe.shtml#rp>

Labelling

<http://www.inspection.gc.ca/english/fssa/labeti/labetie.shtml>

Reference Listing of Accepted Construction Materials, Packaging Materials and Non-Food Chemical Products

<http://www.inspection.gc.ca/english/ppc/reference/cone.shtml>

Hazard Analysis Critical Control Point (HACCP)

<http://www.inspection.gc.ca/english/fssa/polstrat/haccp/haccpe.shtml>

HACCP Generic Models

<http://www.inspection.gc.ca/english/fssa/polstrat/haccp/modele.shtml>

FSEP Manual

<http://www.inspection.gc.ca/english/fssa/polstrat/haccp/manue/tablee.shtm>

Quality Management Program (QMP)

<http://www.inspection.gc.ca/english/anima/fispoi/qmp/qmppgqe.shtml>

On-Farm Food Safety Recognition

<http://www.inspection.gc.ca/english/fssa/polstrat/reco/recoe.shtml>

3.0 HEALTH CANADA

Health Canada

http://www.hc-sc.gc.ca/index_e.html

Food and Nutrition

http://www.hc-sc.gc.ca/fn-an/index_e.html

Food Safety

http://www.hc-sc.gc.ca/fn-an/securit/index_e.html

Guidelines

http://www.hc-sc.gc.ca/fn-an/legislation/guide-ld/index_e.html

Analytical Methods (Compendium of Analytical Methods)

http://www.hc-sc.gc.ca/fn-an/res-rech/analy-meth/index_e.html



Advisories, Warnings and Recalls

http://www.hc-sc.gc.ca/fn-an/advisories-avis/index_e.html

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www.agric.gov.ab.ca/

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<http://www.agric.gov.ab.ca/app21/seltopcat?cat1=Food+Safety>

Manitoba Agriculture, Food and Rural Initiatives

<http://www.gov.mb.ca/agriculture/>

Food Safety and Quality

<http://www.gov.mb.ca/agriculture/food.html>

Ontario Ministry of Agriculture, Food and Rural Affairs

<http://www.omafra.gov.on.ca/>

Food

<http://www.omafra.gov.on.ca/english/food/index.html>

Food Safety Links

<http://www.omafra.gov.on.ca/english/infores/foodsafe/safety.html>

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Fish and Fisheries Products Hazards and Controls Guidance, U.S. Food and Drug Administration, Centre for Food Safety and Applied Nutrition

<http://www.cfsan.fda.gov/~comm/haccp4.html>

[Hazard Characterization for Pathogens in Food and Water: Guidelines](http://www.who.int/foodsafety/publications/micro/en/pathogen.pdf), World Health Organization

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[Meat and Poultry Hazards and Controls Guide](http://www.fsis.usda.gov/OPPDE/rdad/FSI...ultry_Hazards_Controls_Guide_10042005.pdf), U.S. Department of Agriculture

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Food Allergy, Medline Plus

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FoodRisk.org, Joint Institute of Applied Nutrition and Food Safety, University of Maryland
<http://www.foodrisk.org/>

Food Safety Network, University of Guelph
www.foodsafetynet.ca

[Good Manufacturing Practices \(GMPs\) for the 21st Century - Food Processing](#) Section Two:
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<http://www.cfsan.fda.gov/~dms/gmp-toc.html>

Official Standards List - Codex Alimentarius
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