



Peterborough  
Public Health



# Food Handler Course Manual



## Food Handler Training and Certification Course

This manual and the associated course material have been developed and distributed by Peterborough Public Health (PPH), Food Safety Program.

The information contained in this manual is intended as a guide. Where compliance with the Ontario Food Premises Regulation (O. Reg. 493/17) is an issue, always refer to the regulation.

Chapters 1, 4, and 5 written by: **Matt Faris**, BAsC, CPHI(C)

Chapters 2 and 3 written by: **Julie Ingram**, BSc, BAsC, CPHI(C)

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- *Food Safety: A Guide for Ontario’s Foodhandlers*  
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# Chapter 1: *Introduction*

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## Introduction

Food is an essential component of life and a basic human need. We rely upon food to survive, which is reflected by a large-scale food service industry in Canada. This industry makes up a big part of the Canadian economy and employs over one million people.

Since disease and illness can be spread through food, special standards must be met and upheld in the food service industry to prevent foodborne illness. In essence, this course is designed to teach you about food safety hazards and what you can do to avoid them.

By the end of this chapter you should be able to:

- identify a “food premises” in Ontario;
- understand the health unit’s role in food safety;
- identify the primary piece of legislation used by the health unit;
- identify the specific regulation that applies to food premises in Ontario; and
- understand food premises inspection frequency and legislation enforcement.

## The Role of the Public Health Unit

The primary focus of public health is to protect and improve the health and wellbeing of the entire community. In Ontario, there are currently 34 official health agencies which are most commonly referred to as ‘Public Health Units’ (PHUs). Each PHU is governed by a local ‘board of health’. These boards are primarily comprised of elected representatives from local municipal councils. Each PHU is individually responsible for delivering a wide range of programs and services to the population within their jurisdiction. Public health programs and services address:

- **Food Safety**
- Chronic Disease Prevention and Well-Being
- Healthy Environments
- Healthy Growth and Development
- Immunization
- Infectious and Communicable Diseases Prevention and Control
- Safe Water
- School Health
- Substance Use and Injury Prevention





The goal of the Food Safety program is **to prevent or reduce the burden of foodborne illness**. In hopes of achieving this goal, each PHU is mandated to:

- Inspect food premises to ensure standards are being met
- Educate the public and food premise operators on food safety
- Conduct surveillance of foodborne illness
- Investigate reports of foodborne illness and food safety complaints or concerns

A **food premise** is any place where food is manufactured, processed, prepared, stored, handled, displayed, distributed, transported, sold or offered for sale.

## Public Health Legislation (Provincial)

Food premises inspections in Ontario are conducted by Public Health Inspectors (PHIs) under the authority of the **Health Protection and Promotion Act (HPPA)**. The HPPA is provincial legislation and requires every board of health in Ontario to inspect the food premises within their jurisdiction. The **Food Premises Regulation** falls under the authority of the HPPA. It lists the minimum standards that must be followed by every food premises within Ontario.

### The Food Premises Regulation covers areas such as:

- Hot and cold holding temperatures
- Employee hygiene
- Premises maintenance
- Cleaning and sanitizing of utensils
- Food storage

See the appendix for a copy of the Ontario Food Premises Regulation, O. Reg. 493/17.



## Municipal By-laws

Municipal councils have the authority to enact local by-laws. By-laws are created to address local issues that are not addressed in Provincial or Federal legislation.

By-laws may cover areas such as:

- Licensing
- Garbage control
- Sewage disposal
- Building and property standards
- Zoning

In 2012 and 2013, the County and City of Peterborough passed by-laws that address the need for **Mandatory Food Handler Certification** in high and moderate-risk food premises. The by-laws require that at least **one**

certified food handler be on-site at all times of operation, in a supervisory capacity. This by-law applies to all moderate- and high-risk food premises in the County and City of Peterborough.

The Food Premises Regulation was revised in 2018 to include a similar requirement:

*“32. Every operator of a food service premise shall ensure that there is at least one food handler or supervisor on the premise who has completed food handler training during every hour in which the premise is operating.”*

## Inspection of Food Premises

### Frequency

Routine compliance inspections of food premises are performed by Public Health Inspectors on behalf of the board of health. Each food premise is placed in one of the following risk categories:

- **High** – inspected at least once every four months
- **Moderate** – inspected at least once every six months
- **Low** – inspected at least once every year (or, not less than once every two years for low-risk premises that offer for sale only pre-packaged non-hazardous food)



This risk ranking is primarily based upon:

- The type of food being served
- The ways in which the food is handled, stored and prepared
- Onsite food safety practices

### Other Food Safety Legislation:

The Canadian Food Inspection Agency (CFIA) is responsible for the inspection of food at the Federal level. The CFIA enforces the Food and Drugs Act and its accompanying regulations. The CFIA is multifaceted and regulates things such as:

- Manufacturing plants
- Labeling requirements
- Import and Export of foods
- Food recalls
- Agricultural products
- Meat production
- Dairy production

In Ontario, the Ministry of Agriculture, Food and Rural Affairs (OMAFRA) enforce Provincial and Federal food safety legislation.

- The population that is being served

The requirements for food premises inspection frequencies and risk assessments are outlined in the Ontario Food Safety Protocol. These requirements are outlined in the table below.

	Minimum # of Yearly Inspections	Examples	Risk Factors Considered
<b>High-risk food premises</b>	3	full service restaurants, long term care facilities, hospitals, daycares, banquet facilities	<ul style="list-style-type: none"> <li>• Extensive food preparation/serving</li> <li>• Vulnerable population served</li> <li>• Operator compliance with regulations and commitment to food safety practices</li> </ul>
<b>Moderate-risk food premises</b>	2	fast-food establishments, bakeries, hot-dog carts, high-school cafeterias	<ul style="list-style-type: none"> <li>• Fewer preparation steps</li> <li>• Vulnerable population served</li> <li>• Food safety processes in place to reduce likelihood of foodborne illness</li> <li>• Generally healthy population served</li> </ul>
<b>Low-risk food premises</b>	Either once per year <i>or</i> once every two years. <i>(Please see Frequency section above.)</i>	convenience stores, bars that do not prepare food	<ul style="list-style-type: none"> <li>• Any potentially hazardous food is pre-packaged</li> <li>• No food preparation</li> </ul>

### **Enforcement**

Public Health Inspectors are designated as provincial offences officers for the purpose of enforcing the HPPA and the Food Premises Regulation. The HPPA grants Public Health Inspectors with powers deemed necessary for its enforcement.

Examples include:

#### **Power of Entry – HPPA (41)**

A Public Health Inspector may enter any premises, during normal working hours, without a warrant to carry out the duties under this act. This includes: routine compliance inspections and re-inspections, complaint investigations and food-borne illness outbreak investigations.

#### **Obstruction – HPPA (42)**

No person shall hinder or obstruct a Public Health Inspector lawfully carrying out a power, duty or direction under the HPPA.

#### **Power of Seizure – HPPA (19)**

A Public Health Inspector may seize any substance, thing, plant or animal other than man for the purpose of preventing a health hazard. Food may be destroyed if a Public Health Inspector is of the opinion that the food poses a threat to the public’s health.



**A health hazard means:**

- a condition of a premises,
- a substance, thing, plant or animal other than man, or
- a solid, liquid, gas or combination of any of them, that has or that is likely to have an adverse effect on the health of any person.



## *Power to Order – HPPA (13)*

A Public Health Inspector may order a person to take or refrain from taking any action with respect to a health hazard. This order must be made upon reasonable and probable grounds that a health hazard exists. The actions specified in the order must be necessary to decrease or eliminate the health hazard.

## **Routine Inspections**

When a Public Health Inspector is inspecting a food premise, they are looking to ensure that the minimum standards set out in the Food Premises Regulation are being met. Specific examples from the regulation include:

### **Potentially hazardous foods are maintained at the required temperatures.**

Example: Cooked poultry is stored or held for service outside the danger zone, at 4°C or below, or 60°C or higher (O. Reg. 493/17 Subsection 27(1)).

### **Food is protected from contamination and adulteration.**

Example: Food displayed for sale or service is protected from contamination by enclosed containers. (O. Reg. 493/17 Section 26).

### **Food contact surfaces can be readily cleaned and sanitized.**

Example: Any article or equipment that comes in direct contact with food is of sound and tight construction, kept in good repair, suitable for their intended purpose, and made of material that can be readily cleaned and sanitized. (O. Reg. 493/17 Section 8).

### **Ensuring good personal hygiene is being practised by all employees.**

Example: The food handler is clean and wearing clean outer garments while working with food. Food handlers wash their hands after hands are contaminated, before commencing or resuming work, including after using the washroom. (O. Reg. 493/17 Section 33 (1)).

### **Cleaning and sanitizing of multi-service utensils to prevent harmful bacteria from spreading.**

Example: Multi-service utensils must be cleaned and sanitized after each use. (O. Reg. 493/17 Section 21).

### **Ensuring that owner/operators are maintaining the food premises.**

Example: All floors, walls and ceilings are readily cleanable, kept clean and in good repair. (O. Reg. 493/17 Section 7).

### **Ensuring presence of a trained food handler**

Example: During all operating hours, operators must ensure there is at least one food handler or supervisor on site who has completed food handler training (O. Reg. 493/17 Section 32).

### **Posting results of inspections by the public health unit**

Example: Operators ensure the results of any inspection conducted by a public health inspector are posted in accordance with the inspector's request (O. Reg. 493/17 Section 6).



Public Health Inspectors will fill out an inspection report during their visit. Any corrections that need to be made will be noted in this report and a time to comply will be set based on how critical the offence is. The facility will then be re-inspected to ensure that the appropriate corrections have been completed. Tickets may be written where an offence is not corrected, is continually repeated, or is serious in nature. Ticket fines are pre-set and range from \$55.00 to \$465.00. More serious offences or repeat offenders may be dealt with by summoning the owner or operator to court. In this instance a Judge or Justice of the Peace can levy a fine of up to \$25,000 per day.



Please keep in mind that Public Health Inspectors aren't only in your premise to enforce the legislation, but to educate as well. Do not hesitate to ask any food safety questions you may have during an inspection. You can also call the health unit to speak with your inspector or correspond through e-mail.

## Conclusion

In this chapter you have learned that food safety laws exist at all three levels of government: Federal, Provincial, and Municipal. The legal requirements surrounding food safety are in place to ensure that high standards are being met along every step of food production. Food safety laws exist to protect the public's health by preventing foodborne illness.

## Chapter 1: *Review Questions*

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1. Give three (3) examples of food premises.

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2. What is the goal of the health unit's Food Safety program?

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3. What is the name of the Act that governs public health in Ontario?

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4. What regulation lists the minimum standards that must be maintained by food premises in Ontario?

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5. What risk category does the food premise where you work or volunteer (if applicable) fit into?

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# Chapter 2: Foodborne Illness and Food Safety Hazards

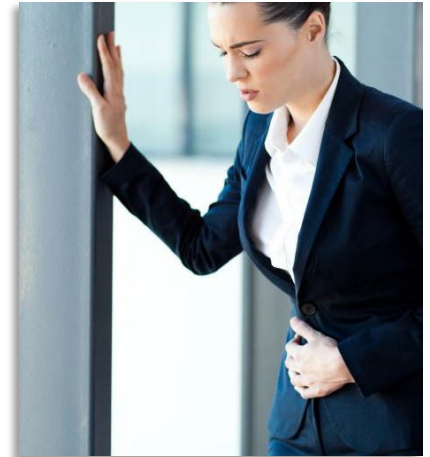
## Introduction

When you become sick from food or drink that you have consumed, it's called foodborne illness. There are three different types of foodborne illness:

1. **Foodborne Infection** – illness resulting from biological contamination of food by bacteria, parasites, protozoa, or viruses.
2. **Foodborne Intoxication** – illness resulting from toxins that are either naturally occurring in the food or produced by microorganisms found within the food.
3. **Food Poisoning** – illness resulting from chemical contamination of food.

By the end of this chapter you should be able to:

- explain what foodborne illness is;
- identify the three groups of people who are most susceptible to foodborne illness;
- state the four groups of food safety hazards and provide an example and prevention method for each;
- understand what a biological hazard is and the ways in which microorganisms can make you sick; and
- list the factors which affect the growth of microorganisms.



## Foodborne Illness

### *Foodborne Illness in Canada*

Many people have had a foodborne illness without knowing what made them sick. In 2013, the Public Health Agency of Canada published a report estimating that every year, 1 in 8 Canadians, or 4 million people, become sick with a foodborne illness acquired within Canada (*Estimates of Food-borne Illness in Canada, May 2013*). Foodborne illness is typically underreported. Most people infected do not become seriously ill and they will recover in a short period of time without seeking medical attention. These cases of foodborne illness are not identified by the medical community and therefore, are not reported to local public health agencies.

### *Who Becomes Sick with Foodborne Illness?*

Whether or not someone becomes sick from eating contaminated food depends on:

- what type of contaminant caused the illness,
- the person's health status before the illness, and
- the amount of contaminant that the person consumed.

Anyone has the potential to become infected, however there are certain groups of people who are more susceptible to foodborne illness including the **very young**, the **elderly** and people with **weakened immune systems**. For these populations, foodborne illness may cause severe symptoms and may be fatal.



## *Incubation Period*

The period of time between a person consuming contaminated food and developing symptoms of foodborne illness is called the **incubation period**. The incubation period can range from minutes to months. Typically, it is not the last meal that you ate causing the illness.

## *Symptoms of Foodborne Illness*

There are a variety of symptoms associated with foodborne illness. Common symptoms include:

- fever,
- stomach cramping,
- headache,
- nausea,
- vomiting, and
- diarrhea.

In some cases, a foodborne illness can cause more serious health effects including: kidney damage, meningitis, paralysis, or miscarriage. Although symptoms typically clear up within a week, some health effects may persist and occasionally result in lifelong debilitation, or death.

## *Consequences of Foodborne Illness*

The most serious consequence of foodborne illness is the suffering that people endure when they are ill, or the loss of life if death is the result of illness. Foodborne illness also places a financial burden on society as a whole due to:

- medical costs;
- investigation costs;
- damaged reputation;
- loss of business;
- reduced hours or job loss;
- lawsuits; and
- increased insurance costs.

## *Causes of Foodborne Illness*

There are many different food safety hazards that can cause food to become contaminated. There are four groups into which food safety hazards can be classified:

- Chemical Hazards
- Allergens
- Physical Hazards
- Biological Hazards

## **Chemical Hazards**

Some chemicals are intentionally added to food. According to Health Canada, “a food additive is any chemical substance that is added to food during preparation or storage and either becomes a part of the food or affects its characteristics for the purpose of achieving a particular technical effect.”





Generally, intentional food additives are not harmful as long as the appropriate amount is added and they are used correctly. A food additive may cause someone to become ill if they are sensitive, allergic, or if too much is added. Common food additives include:

- sulphites (used to maintain colour and give a longer shelf life),
- MSG or monosodium glutamate (used to boost flavour), and
- tartrazine or FD & C Yellow #5 (used as a yellow food colouring agent).

Other chemicals may contaminate food through their addition during growth, transportation, storage, or preparation. The addition of chemicals may be for an intended purpose, but can also be accidental. Chemical hazards include pesticides, cleaners, sanitizers, toxic metals, and many others. When someone becomes ill from consuming food or drink contaminated with chemicals, it is referred to as food poisoning.

### ***Pesticide Products***

In today's world, many pesticides are used during food production, especially on fruits and vegetables. These chemicals should not be consumed with food. It's important that all produce is washed before consumption. This will also help to remove any biological contaminants that are found on produce. Health Canada recommends using clean, cool, running water along with a dedicated scrub brush to wash your fruits and vegetables.

Pesticides may also be used in a food premises as part of a pest management program. It's highly recommended that food premises use licensed individuals to apply pesticides within the facility. If you choose to apply pesticide products yourself, ensure that you use approved products and that food is in storage when pesticides are being applied.

### ***Cleaning and Sanitizing Chemicals***

In any kitchen or food preparation area, a variety of chemicals are used, including: cleaners, sanitizers and degreasers. All of these chemicals have the ability to make people sick if they make their way into food. These chemicals may contaminate food due to improper storage, inadequate labeling, and/or misuse. Some methods to prevent this type of chemical contamination include:

- Have a separate, dedicated storage area for all chemicals used in your food premises. This area should be away from all food storage and preparation areas, preferably in a separate, lockable room or cupboard. If this is not possible, a good alternative is to store chemicals under the dish sink.
- Ensure that all chemicals are clearly labeled so that they can be easily identified.
- Keep food covered whenever possible in order to prevent chemical contaminants from entering the food.
- Follow manufacturer's directions when using or diluting any type of cleaner or sanitizer to ensure that you are not using too much.



### ***Heavy Metals***

Normal usage of most metal cookware will not result in the contamination of food. Food poisoning from toxic metals can be caused by acidic foods being improperly stored or cooked in metal containers. The acid in the food can cause the metal to dissolve, resulting in the addition of the metal to the food. Lead, copper, tin, zinc,

iron, and cadmium are all possible sources of metal food poisoning. Some ways that food can be contaminated with toxic metals include:

- Copper beverage lines – water will not dissolve the copper lines but acidic beverages such as fruit juice or carbonated drinks may cause the copper to dissolve.
- Cadmium in shelving units – if meat products are stored directly on shelves containing cadmium, the metal can be absorbed into the meat.
- Lead in paint and glazes – painted or glazed dishware may contain lead.
- Metal containers – avoid galvanized (zinc-coated) containers and other metal containers for preparation and storage of acidic foods; food-grade containers must be used.

## Food Allergies

### *Food Allergies in Canada*

An allergic reaction is the response of a person's immune system to a substance that the body views as a threat. That substance is called an allergen. When a person has a food allergy, their immune system reacts to a specific protein in that food and that protein is the allergen. Health Canada reports that an estimated 5% to 6% of young children and 3% to 4% of adults have physician-diagnosed food allergies. Food premises owners, operators and employees must be aware of this and need to know how to respond when a customer indicates that they have a food allergy.

### *Development of an Allergic Reaction*

The first time a person consumes a food or beverage that contains the protein to which they are allergic, the body mistakenly identifies it as being harmful and creates antibodies to get rid of it. Upon future exposures, the body recognizes the protein as an enemy and releases the antibodies, as well as chemicals such as histamine. This leads to a reaction of the person's immune system which may adversely affect: the respiratory system, gastrointestinal tract, cardiovascular system, and the skin. These effects create the symptoms associated with allergic reactions.

An allergic reaction to food may begin within minutes or several hours after exposure to the allergen. In severe cases, a person may go into anaphylactic shock.

Anaphylaxis is the most serious type of allergic reaction and when untreated, often leads to death. Anaphylaxis begins within minutes of exposure to the allergen and can progress to fatal shock within 10 to 15 minutes. Due to the severity of this reaction, people with an anaphylactic allergy should carry a syringe of epinephrine, like an EpiPen®. Epinephrine is the drug form of the hormone adrenaline. It helps to reverse the symptoms of an allergic reaction by opening a person's airways, improving a person's blood pressure and increasing their heart rate. Epinephrine can help to keep a person in anaphylactic shock alive, until trained medical professionals can attend to them.

### *Symptoms of an Allergic Reaction*

Someone can be exposed to a food allergen through consumption or direct contact. It may only require a tiny amount of residual protein in order to cause the reaction. There are a variety of symptoms associated with allergic reactions including, but not limited to:

- runny nose,
- sneezing,
- coughing,
- watery eyes,



- throat itchiness and/or swelling,
- headaches,
- nausea,
- vomiting,
- diarrhea,
- tightness in the chest,
- hives, and
- difficulty breathing.

### ***Food Intolerance***

Some people may have an intolerance to a food, which is quite different from an allergy. Intolerance is a reaction of the body’s gastrointestinal system due to an inability to digest the food. For example, many people are intolerant to dairy products. These people often lack the enzyme lactase, which is needed to digest lactose – a sugar in milk. Intolerances are usually isolated to the gastrointestinal tract and include symptoms such as abdominal cramping, bloating, flatulence and diarrhea. Unlike allergies, food intolerances are not life threatening.

### ***Common Food Allergens***

It is important to recognize that any food can cause an allergic reaction, but some foods are more often associated with allergic reactions than others. The Canadian Food Inspection Agency identifies the following foods and additives as being most frequently associated with allergic reactions:

- Eggs
- Peanuts
- Sesame seeds
- Sulphites
- Wheat & triticale
- Milk
- Fish
- Crustaceans and Molluscs
- Soybeans
- Mustard
- Tree nuts (almonds, Brazil nuts, cashews, hazelnuts, macadamia nuts, pecans, pine nuts, pistachios, walnuts)

There are specific requirements regarding the labeling of these allergens on food items. In 2012, the Canadian Food Inspection Agency’s enhanced labeling regulations came into effect. Manufacturers are now required to clearly identify food allergens on product labels either within the list of ingredients or by a “contains” statement. These rigid labeling requirements make it easier for consumers to avoid foods that they are allergic to.

### ***Handling Allergies in Food Premises***

Avoidance is the best method of preventing allergic reactions. When people are shopping and cooking for themselves, avoidance is easier than when they are relying on someone else to prepare their meal, for instance, at a restaurant. If you are working in a food premises, it is important to be aware of the risk of food allergies. Correct and complete ingredient lists are critical when a person with a food allergy dines out. You should always maintain active ingredient lists of the menu items at your facility. There are many other key things that food handlers can do to prevent and control food allergies:

- Keep ingredient lists from prepackaged food.
- Present ingredient lists upon request.
- Know your facility’s plan for handling food allergies and communicate with your manager when catering to a customer who has a food allergy.
- If you are a server, be prepared to answer questions from customers with allergies.
- Be honest with customers – if you are unsure of what is in a food, say so.
- Avoid contamination of different foods with one another (i.e. using the same tongs for two different foods) in order to prevent the spread of allergens from one food to the next.
- Use substitution whenever possible. For example, use vegetable oil versus peanut oil.
- If a person is having an allergic reaction, call emergency services (911) immediately.

## Have a Food Allergy Policy

Management in food premises should have a policy about communicating ingredient information to their customers. The policy should be based on making sure customers are kept safe and are given the right information. It also needs to work with the way the food premises are run and be something employees can easily follow.

You don't need to give away your recipes. You can just give the complete and accurate list of ingredients. You can also have the customer tell you what they're allergic to and check it against the recipe.

Employees need to know that these policies should always be followed and check with the manager and/or chef with any questions they are unsure of.

## Allergy Chart

This is an example of an allergy chart that could be used to indicate priority allergens in your menu items. The disclaimer at the bottom of the page should be added to let your customers and staff know that this chart only points out common food allergens and not all ingredients in menu items.

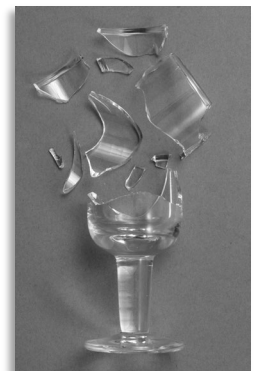
### Common Food Allergens and Sensitivity Chart

Item	Menu Item #1	Menu Item #2	Menu Item #3	Menu Item #4	Menu Item #5	Menu Item #6
Eggs	X		X			
Milk/Milk Products		X		X		
Mustard	X					
Peanuts		X			X	
Fish	X		X			X
Crustaceans and Molluscs		X				
Sesame Seeds	X				X	X
Soy				X		
Sulphites		X				X
Wheat and Triticale	X			X	X	

## Physical Hazards

### Examples of Physical Hazards in Food

Most of us have a personal story, or know someone who has a story about finding something in food that shouldn't have been there. This "something" is often a physical hazard – a solid item or object that accidentally finds its way into food. Physical food hazards include pieces of bone, metal shavings, bandages, fingernails, hair, broken glass, staples or just about any other item or object that accidentally gets into food. There are a variety of risks associated with consuming physical hazards ranging from cuts and broken teeth to choking and suffocation.



### Prevention of Physical Hazards in Food



There are many ways that food handlers can prevent the introduction of physical hazards into food, including:

- Keep can openers in good repair and clean and sanitize them regularly like any other utensil used in food preparation.
- Use a glove or finger cot over a bandage to provide a double barrier and keep the bandage in place. Note: you may want to avoid the use of latex gloves since latex is a common allergy to many people.
- Do not wear false fingernails or nail polish when working with food.
- Wear headgear to adequately confine your hair.
- Do not use a glass or cup to scoop ice; use a commercial, food-grade plastic or metal scoop with a handle. Ensure to store the scoop outside of the ice bin in a sanitary manner.
- Do not use staples or paperclips in the kitchen, especially to close take-out bags and containers.
- Use caution when removing and reapplying twist ties, bread tags, and other package closing devices.
- Wear minimal jewellery or none at all.
- Keep food covered whenever possible in order to prevent physical contaminants from entering the food.

## Biological Hazards

### *Types of Biological Hazards in Food*

Biological hazards are living organisms that are commonly found in our environment. Some biological hazards can be seen with the naked eye, but most are microscopic. Microorganisms are found in food, water, animals, the air, soil, and the human body. It is important to keep in mind that 99% of all microorganisms are harmless. Biological hazards are the most difficult to control within a food premises. Effective control methods include: temperature control, cleaning and sanitizing, prevention of cross-contamination, and frequent handwashing. There are five types of biological hazards commonly associated with foodborne illness: fungi, parasites, viruses, protozoa and bacteria. Biological hazards may be found naturally on food, be introduced from another food, or introduced by the food handler.

The biological hazards that are most concerning are the disease-causing organisms called pathogens. Unlike spoiled food, there is no physical indication that a food contains pathogens. Food that is unsafe to consume due to the presence of pathogens may look, smell and taste completely normal.

### *Fungi*

Yeasts and moulds are types of fungi commonly used in the production of food. For example, yeast is used in the production of bread and different moulds are used to ripen and flavor cheeses. However, yeasts and moulds may also cause the spoilage of food. You usually have some physical sense of these spoilage microorganisms because the food will smell “off”, be slimy, or may have a strange colour. Yeasts usually spoil food without making people sick. Moulds spoil food but may also make people seriously ill due to the production of poisonous substances called mycotoxins. You cannot tell by looking at mould whether it produces a toxin or not, so food that has become mouldy should be thrown out. Two examples of toxins that are produced by mould include:

- Aflatoxin, which is associated with nuts, peanuts, and peanut butter; and
- Ochratoxin A, which is associated with grain, coffee, and wine.





## Parasites

Parasites, or the eggs of parasites, may be found in food. They can survive in food but do not grow in it because they need a human or animal host in order to grow. Parasites live and grow on or in the host, using the host's nutrients for survival. Humans can get a parasitic infection from:

- consuming contaminated water or food washed with contaminated water,
- consuming undercooked meat from an animal infected with a parasite, and
- cross-contamination of food and drink items.

The symptoms of a parasitic infection vary depending on the type of parasite. Weight loss is a common symptom since the parasite is feeding off of the human's body. Other symptoms include: abdominal or stomach pain, diarrhea, and muscle aches. Two examples of foodborne parasitic infections are:

- Trichinosis (pork tapeworm), which is spread through the consumption of raw or undercooked pork or wild game.
- Anisakiasis (parasitic roundworm), which is spread through the consumption of undercooked marine fish and raw fish items such as sushi, sashimi, ceviche or salmon.

The best way to control the spread of parasites is thorough cooking and reheating food to adequate internal temperatures, which will kill any parasites and eggs found in the food.

## Protozoa

Protozoa are single-cell organisms that may be free-living or parasitic in nature. There are many different kinds of protozoa but the ones that cause foodborne illness are parasitic and seek the digestive tracts of people and animals. Two examples of foodborne infections caused by protozoa are:

- Giardiasis (giardia parasite – “beaver fever”), which is most often spread through ingestion of contaminated water or eating undercooked food contaminated with the parasite.
- Cryptosporidiosis (cryptosporidium parasite), which is most often spread through contaminated water.

Cooking and reheating food to adequate internal temperatures is the best way to control the transmission of protozoa to humans from contaminated food. If water is suspected to be contaminated with protozoa, the water should be filtered through a one micron absolute filter or brought to a rapid boil for at least one minute before it is used for human consumption or food preparation.



*Campylobacter spp.* is one of the leading causes of foodborne illness acquired within Canada. Like the other infection-producing organisms mentioned above, people usually become infected with *Campylobacter* organisms by consuming raw or undercooked poultry, meat, or other foods that have been cross-contaminated. One unique thing about this organism is that the infectious dose is very low; only a few hundred organisms must be consumed in order to cause illness whereas many other infection-producing organisms have to be consumed by the thousands. Once the bacteria are consumed, they will continue to grow and replicate in the victim's intestinal tract, causing damage to the lining of the intestine. The most common symptom of a *Campylobacter* infection is profuse diarrhea that is often bloody.

## Viruses

Viruses are found in almost every life form including humans, animals, plants, and fungi. Like parasites, viruses can survive in food but they do not grow and replicate in it because they require a living cell for this. Viruses that cause foodborne illness are called enteric viruses, which means they enter the body through the intestinal tract.

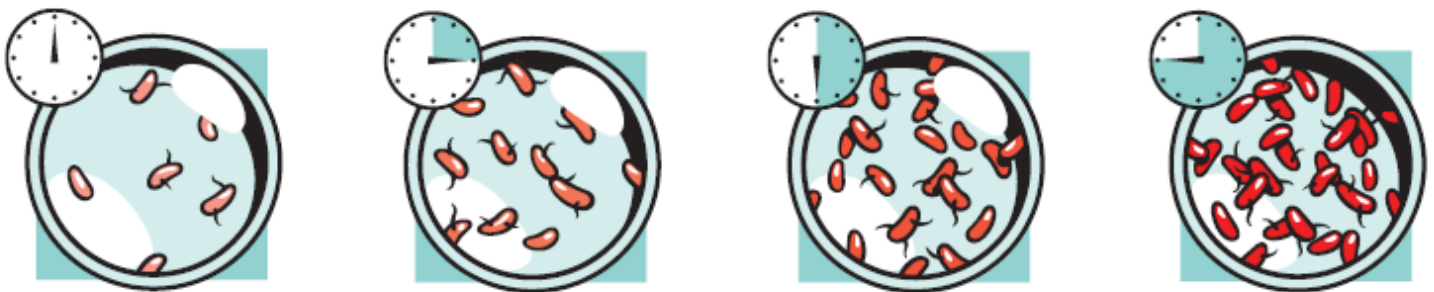
Symptoms usually come on suddenly and last for 1 or 2 days, but a person may continue to feel unwell for many days after the initial symptoms disappear. There is often no treatment available for viral infections.

Viruses are extremely contagious and a person who is infected with a virus may be capable of transmitting it to others, even though they have no symptoms. The most common way that viruses find their way into food is through contact with contaminated human hands. Frequent and thorough handwashing as well as adequate cooking are important methods to prevent foodborne illness from viruses. Two viruses that cause foodborne illness are the Hepatitis A virus and Norovirus (Norwalk virus). Both of these viruses are shed with fecal matter from an infected human and transmitted to food, usually from contaminated hands.

One example of a toxin-producing bacteria is *Staphylococcus aureus*. Humans are the source of this bacterium; it is found on our skin, hair and in our mucous. Food handlers who carry *Staphylococcus* and handle food without washing their hands contaminate food by direct contact. When food contaminated with this organism is not kept adequately hot or cold, the organism will produce the staphylococcal toxin while it grows and replicates in the food. This toxin, like many others, is resistant to heat and cannot be destroyed by typical cooking temperatures. When the food is consumed, the toxin is also consumed, which leads to the intoxication illness, typically within a few hours.

## Bacteria

Humans are continuously exposed to bacteria because they are found everywhere in our environment. Some bacteria, such as those naturally found in the human body, are beneficial and protective to humans. The non-beneficial, pathogenic bacteria are responsible for causing many foodborne illnesses. Pathogenic bacteria are interesting because they can make people sick by creating an infection in the body, intoxicating the body, or causing a toxin-mediated infection.



## Infection-Producing Bacteria

Infection-producing bacteria multiply on the food and/or in the stomach and intestines of the infected person. Common infection-producing bacteria include:

- *Salmonella spp.*, most commonly found in poultry, eggs, and unpasteurized milk;
- *Campylobacter spp.*, most commonly found in poultry, meat, and untreated water; and
- *Shigella spp.*, most commonly found in human feces.

### *Toxin-Producing Bacteria*

Toxin-producing bacteria produce toxins while growing and multiplying on food or in the human body. Your body does not react to the bacterium itself but to the toxin it creates. The incubation period for an intoxication is generally much shorter than it is for an infection. Symptoms from intoxications vary and may be gastrointestinal and/or neurological in nature. Symptoms range from vomiting, diarrhea, and abdominal cramps to muscle paralysis, difficulty speaking, and changes in blood pressure.

### *Toxin-Mediated Infections*

There are some bacterial agents that produce a combination of an infection and intoxication. This type of illness is referred to as a toxin-mediated infection. It is the result of consuming bacteria, which then produce a toxin while reproducing in the victim's intestinal tract.

### *Controlling the Growth of Bacteria*

Temperature control is one of the most important methods for preventing the growth of bacterial pathogens that cause foodborne illness. Adequate cooking and reheating to the appropriate internal temperature will kill bacteria. However, most toxins produced by bacteria are not destroyed by typical cooking and reheating temperatures and so, the growth of bacteria must be controlled in order to prevent the toxins being produced in the first place. Bacterial growth can be prevented by keeping food appropriately cold or hot, which will keep it out of the **danger zone**. The danger zone is the range of temperatures between 4°C (40°F) and 60°C (140°F), where pathogenic microorganisms grow rapidly.

### *Spore-Forming Bacteria*

Some types of bacteria are spore-formers. A spore is the resting stage of a live bacterium and acts like a protective shield. When spore-forming bacteria encounter conditions that are unsuitable for growth and replication, such as extreme heat, dryness or chemicals, they form a spore to protect themselves. When conditions become more suitable, they germinate back to the active bacterial form to resume growth and replication. Spores cannot be destroyed by typical cooking temperatures or by most chemical sanitizers.

When you hear about foodborne illness related to *E. coli*, the illness is often due to a subtype called *E. coli* O157:H7. This particular strain of *E. coli* produces a Shiga toxin, which causes a toxin-mediated infection. Various subtypes of *E. coli* are naturally found in the intestinal tracts of humans and animals. The subtype *E. coli* O157:H7 is found in the intestinal tract of warm-blooded animals, but not humans. Humans may be exposed to this organism by consuming raw or undercooked ground meat products, contaminated vegetables and sprouts, or contaminated water. When *E. coli* O157:H7 is consumed by humans, it produces the Shiga toxin in the intestinal tract. This toxin can cause severe damage to the lining of the intestines, resulting in bloody diarrhea. In severe cases, the illness may progress to kidney failure. When untreated, children may develop hemolytic uremic syndrome (HUS), a disease of the kidneys. HUS can be treated but in some cases leads to death or chronic kidney disease requiring a lifetime of dialysis.

*Clostridium perfringens* is one type of spore-forming bacterium commonly encountered in the food industry. *C. perfringens* spores are naturally found in the soil, which is how they contaminate food supplies. This agent is commonly associated with raw meat, poultry, and spices. Outbreaks are often linked to gravy or food mixtures containing these products. *C. perfringens* spores cannot be destroyed by heat. When the cooked food is improperly hot-held or slowly/improperly cooled, the environment becomes favourable and the spores will germinate to the active or live bacterial form. These bacteria can rapidly grow and multiply on the food. If the food is served without adequate reheating, the bacteria will produce a toxin in the person's intestinal tract resulting in a toxin-mediated infection.

# Factors Affecting the Growth of Microorganisms

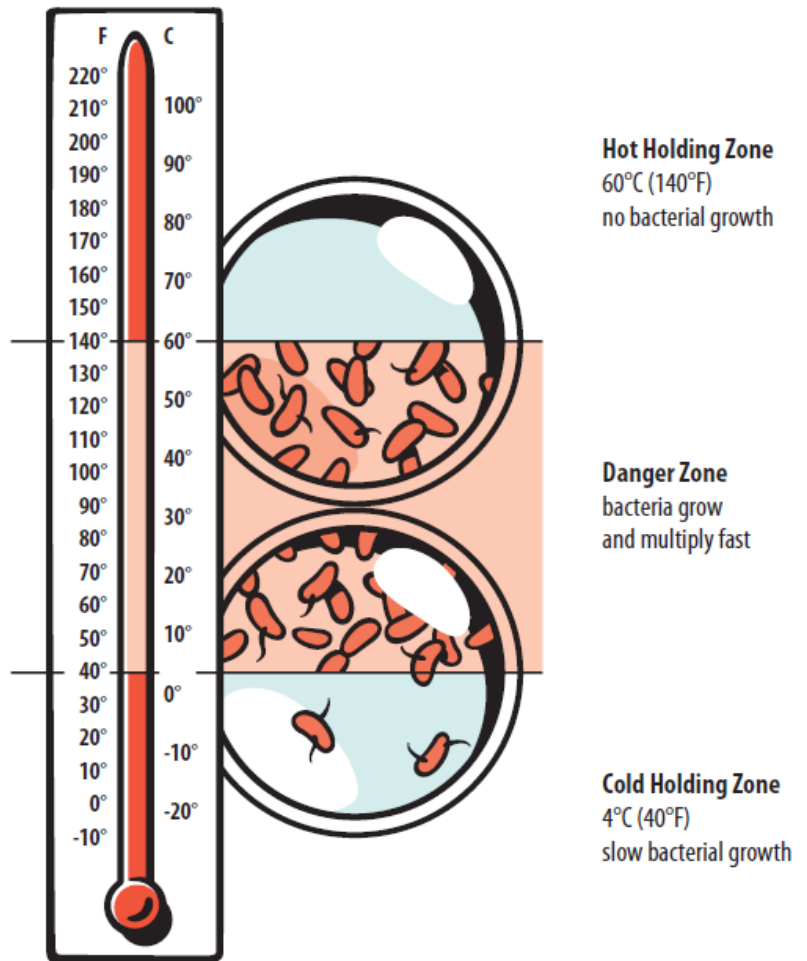
## Growth of Microorganisms

Different microorganisms require different conditions to grow, reproduce and survive. Viruses and parasites can survive in food, but they generally do not grow or reproduce in it since they require a host organism. Fungi can grow in food under a wide range of environmental conditions. Pathogenic bacteria can also grow in or on food but require specific factors to grow and reproduce.

## Growth Factors for Pathogenic Bacteria

In order to grow and reproduce in or on food, pathogenic bacteria require the following factors:

- **Food Source** – bacteria need a source of nutrients to grow. Foods that are high in protein (i.e. meat, eggs) can readily support the growth of bacteria, however carbohydrates are a suitable food source as well.
- **pH** – this is a measure of how acidic or alkaline a substance is. Most pathogenic bacteria prefer food with a pH close to that of pure water (7/neutral), or slightly acidic. Most foods that we eat have a pH between 3 and 7.
- **Temperature** – the ideal temperature range for bacterial growth is between 4°C and 60°C, which is the temperature danger zone. At or below 4°C, bacterial growth is either prevented or significantly reduced. At or above 60°C, bacterial growth is prevented.
- **Time** – with good growth conditions (i.e. availability of the factors within this list), bacteria can multiply rapidly, doubling in number as fast as every ten minutes. In a few hours, one bacterium can become millions of bacteria. Therefore, when these factors are present, it is important to limit time spent in the danger zone as much as possible. Potentially hazardous food can only be left in the danger zone for a maximum of two hours.
- **Oxygen** – some bacteria require oxygen to grow, some will only grow in the absence of oxygen, and others can grow either with or
- **Moisture** – most bacteria require water for growth and survival.



An easy way to remember these six growth factors is with the acronym **FAT TOM**:

- F** – food (protein/carbohydrates)
- A** – acidity
- T** – time
- T** – temperature
- O** – oxygen
- M** – moisture



## Potentially Hazardous Foods

A potentially hazardous food may be any food that has a source of nutrients, a high moisture content, and a relatively neutral pH. The Food Premises Regulation defines a “potentially hazardous food” as:

*“food in a form or state that is capable of supporting the growth of infectious or toxigenic micro-organisms and which requires time and temperature control to limit such growth”*

Some potentially hazardous foods are:

- meat, fish, poultry, and eggs;
- dairy products;
- any food mixture containing a potentially hazardous food;
- cooked pasta, potatoes, rice and vegetables; and
- some raw vegetables and fruit, including:  
bean sprouts, garlic in oil, and cut melon.



The time and temperature of potentially hazardous foods needs to be monitored closely in order to prevent the growth of bacteria and the production of toxins. Potentially hazardous foods must not spend more than two hours in the temperature danger zone (4°C to 60°C).

## Conclusion

In this chapter you have learned that there are many different ways in which foods can become unsafe. We discussed the four groups of food safety hazards: chemical, allergens, physical, and biological. Biological hazards cause the majority of foodborne illnesses in Canada. Proper time and temperature control will prevent the growth of disease-causing microorganisms and is critical during every stage in the flow of food.



## Chapter 2: Review Questions

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1. What is foodborne illness?

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2. What three (3) groups of people are most prone to the severe consequences of foodborne illness?

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3. Fill out the chart below. List the four (4) groups of food safety hazards. For each group, provide a specific example and prevention method.

Type of Hazard	Example	Prevention Method

4. Describe the three (3) basic ways in which bacteria may cause foodborne illness.

Infection:

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Intoxication:

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Toxin-Mediated Infection:

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5. List the six factors affecting the growth of microorganisms.

<b>F</b>	
<b>A</b>	
<b>T</b>	

<b>T</b>	
<b>O</b>	
<b>M</b>	

# Chapter 3: *The Flow of Food*

## Introduction

The “flow of food” refers to the process beginning from when food arrives at your establishment until it is served to the public, and all of the steps between. At each stage in the flow of food, there are various risks and hazards that have the ability to compromise food safety. A key element of safe food handling is to be mindful of these risks and prevent them from happening.

By the end of this chapter you should be able to:

- understand proper use and calibration of a probe thermometer;
- identify and explain the temperature danger zone;
- list what needs to be observed during purchasing and/or receiving of food;
- identify storage requirements for refrigerators, freezers, and dry storage areas;
- explain how to thaw foods safely;
- describe safe food handling techniques during preparation and serving;
- identify minimum temperatures for cooking, hot-holding, and reheating;
- provide methods to cool hot food quickly and explain why it’s important to do so; and
- explain the basic concepts of HACCP.

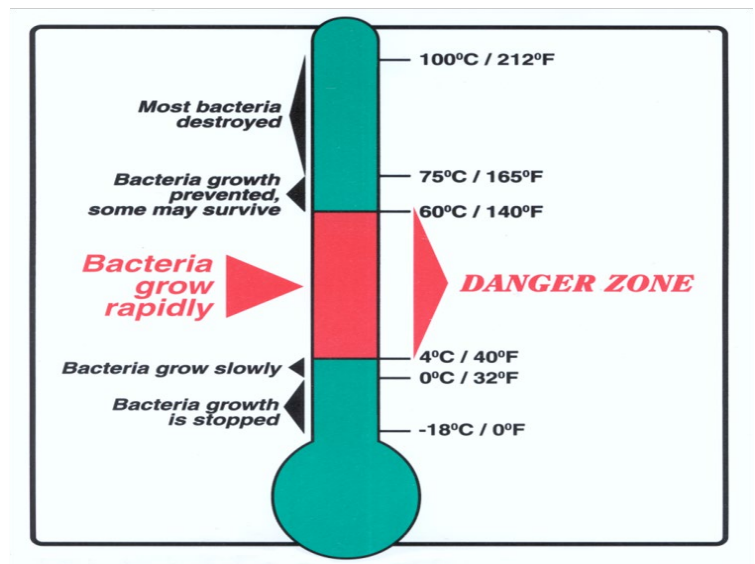
## Temperature Control During the Flow of Food

Temperature control is critical at every stage in the flow of food. Potentially hazardous foods must not spend longer than two hours within the danger zone. Limiting time in the danger zone will minimize bacterial growth and prevent foodborne illness. Keep in mind that while foods may only be in the danger zone for a short period of time during each stage, it’s the accumulated time that needs to be less than two hours. Time-temperature abuse is one of the leading factors contributing to foodborne illness outbreaks in Canada.

Keep hot food hot and cold food cold to prevent foodborne illness and bring food through the danger zone as quickly as possible!

## Thermometers

It is hard to prevent temperature abuse without knowing what the temperature of something is in the first place. Thermometers are used to measure temperature and there are various types used in the food industry. Thermometers are designed to measure air, surface, or internal temperatures. The most important temperature in food safety is the internal temperature of food.



## Thermometers in Temperature Controlled Units

The Food Premises Regulation requires accurate indicating thermometers in all temperature controlled units including refrigerators, freezers, and hot-holding display cases. These thermometers allow for monitoring to ensure that appropriate temperatures are being maintained. They should be secured in a visible location that is not likely to experience constant fluctuations in temperature. Avoid securing them to the door or near the fan.



## Probe Thermometers

When you are cooking, reheating, or hot-holding hazardous foods, you must check the internal temperature with an accurate probe thermometer. A good probe thermometer will have a dial with a series of temperatures ranging from approximately -20°C (-4°F) to 110°C (230°F), which will be suitable to cover freezing, cold-holding, hot-holding, cooking, and reheating temperatures. An example of a commonly-used thermometer is a bi-metallic thermometer (see pictures below).

You should always follow the instructions provided with your thermometer as there may be specifications as to how far the stem must be inserted into the food and/or the length of time to leave the stem in the food. When checking internal temperatures, it is important to:

- clean and sanitize the stem of the thermometer before and after inserting it into food;
- take the temperature in the thickest part of the item or as close to the centre as possible;
- check the temperature in more than one spot;
- avoid bone, fat, and gristle as they may skew the temperature reading; and
- always use a **calibrated** probe thermometer.



## Calibrating a Thermometer

The purpose of calibrating a thermometer is to ensure that it's providing you with an accurate temperature. A thermometer can lose its accuracy through continuous use, extreme temperature changes, or by being dropped. The act of calibration involves **checking** the temperature reading for accuracy and **adjusting** the temperature if it's found to be inaccurate.

The "ice-point" method is the best method to calibrate a probe thermometer, which relies on the fact that the freezing point of water is 0°C (32°F).

There are three steps required in order to calibrate a probe thermometer using the ice-point method:

1. Fill a container with crushed ice and add enough cold water to fill in any air gaps. Stir the mixture for about 10 seconds.
2. Insert the stem of the thermometer into the centre of the mixture, ensuring that the probe is submerged. Make sure that the tip of the probe does not touch the sides or bottom of the container. Wait until the temperature indicating needle stops moving.
3. If the dial reads 0°C (32°F), then the thermometer is accurate and no change is required. If it doesn't, turn the calibration nut located under the dial until the indicating needle reads 0°C (32°F).



**Now your thermometer is calibrated!**

Different thermometers are calibrated in different ways. Read and follow the instructions that came with your thermometer to learn if and how it can be calibrated. If your thermometer cannot be calibrated, it is not suitable for use in a food premises and needs to be replaced.

Probe thermometers can also be calibrated using the boiling-point method, which uses the idea that water boils at 100°C (212°F). However, this method is not as reliable as the ice-point method because the boiling point of water changes depending on your elevation above sea level. The ice-point method is also a safer calibration technique.

Ideally, a probe thermometer should be calibrated at the beginning of each shift. It's a good idea to **document** the dates and times that you calibrate your thermometer in a log book.

## The Flow of Food

There are nine stages in the flow of food:

- Purchasing and Receiving
- Storage
- Thawing
- Preparation
- Cooking
- Hot-Holding
- Cooling
- Reheating
- Serving



A single item may go through all or some of these stages. The flow of food may follow these stages in a step-like format or may jump from stage to stage.

### *Purchasing and Receiving*

Food premises owners and operators are responsible for purchasing food products from an approved supplier. Ensuring a safe food supply is the first step in the prevention of foodborne illness. When purchasing food:

- Choose a reliable supplier who obtains their products from an approved source.
- Make sure the supplier is inspected either by the local health unit, other provincial agency, or the Canadian Food Inspection Agency.
- Confirm that the supplier uses temperature controlled vehicles and/or equipment to deliver products.
- Determine if the supplier trains their employees in food safety and sanitation.
- If the supplier packages their own products, ensure that they use appropriate materials that are food-safe, sturdy, and leak proof.
- Certain food products have rigorous specifications when used within a food premises.
- **Milk and Milk Products** – must be pasteurized or made from pasteurized milk, with the exception of certain cheeses (see section 43 of the Food Premises Regulation).
- **Eggs** – must be graded and food premises (with the exception of egg processing stations) are not allowed to use, or have within their facility, grade C eggs at any time.
- **Meat and Meat Products** – must be inspected and identified with the government inspection stamp or identification tag.



When food is delivered to a facility, there is usually a lot of pressure on the receiver to “check the count”. While this is important, there are other things that you need to check.

The most important thing to check is the temperature of the food coming off the truck. Ensure that all frozen products are received in a frozen state and that all refrigerated products are received at 4°C (40°F) or colder. When you are receiving the food at your facility, you are the customer and have the right to the highest quality and safest food. When receiving food:

- Check cans for dents and bloating.
- Check packages for leaks and tears.
- Check expiry/best before dates.
- Look for signs that frozen food has been thawed and re-frozen (i.e. large ice crystals), which would be a sign of temperature abuse.
- Check produce for spoilage, insects, or excessive dirt.
- Check meat products for freshness (bright colour, no odour).
- Check fish products for freshness (clear eyes, elastic flesh, no ‘fishy’ odour).
- Look at the overall cleanliness of the delivery truck.



When you are receiving food, you have every right to refuse the delivery if you identify temperature abuse, mishandling, or suspect for any other reason that the safety of the food is compromised. Tell the driver your reasons for refusing the delivery and document your observations.

If everything is okay with the shipment, document any observations you made while receiving, especially temperatures. Having thorough records and documents will help to protect yourself and the establishment should an issue arise. Also, make sure that you receive an invoice when you accept the delivery. Invoices for any food for use in a food premise should be kept onsite for at least one year after purchase date, as per the Food Premises Regulation. Invoices are important for proof of supplier, and may be requested by your inspector.

### *Storage*

Once you have completed receiving the shipment, you must get the products into storage right away. When sitting in your receiving area after being delivered, products are in the temperature danger zone. So, if it takes thirty minutes until you have a chance to put the products into storage, that’s thirty minutes gone from your allotted two hours in the danger zone. You should put away any food requiring freezing or refrigeration first.

Foods that do not need to be refrigerated or frozen can be stored in a dry storage area. Dry storage areas should be well ventilated and are recommended to be kept at room temperature (21°C or 70°F) or slightly cooler, with a 50% relative humidity.

**Refrigerated** food must be stored at 4°C (40°F) or colder.

**Frozen** food must be maintained in a frozen state.

There are certain requirements that are common for all food storage areas, such as:

- Food storage areas must only be used for that purpose; do not store non-food items with food.
- Keep all food storage areas clean and well maintained.
- All food must be labeled to identify what the product is and either the date it was prepared or a date by which it needs to be used.
- Rotate your stock using **First In, First Out (FIFO)**. Older products must be kept toward the front so that they will be used before newer products, which are kept in behind.

- Store food in appropriate containers and ensure that all food in storage is covered to protect it from contamination.
- All food and shelving must be kept off of the floor. This will facilitate cleaning, and help to deter pests.
- Ensure that all cold storage units have an accurate indicating thermometer in a visible location. Check and record the temperature of cold storage units on a regular basis (every four hours is recommended).
- Food storage areas must be constructed of smooth, non-permeable, and readily cleanable materials.



Always store raw meat, poultry, seafood, and eggs **below** ready-to-eat foods and produce in order to prevent **cross-contamination**. Better yet, if your facility has the space and equipment, use designated fridges for separate storage of raw and ready-to-eat products.

Keep in mind that it is possible for one raw product to cross-contaminate another raw product. Store the raw products with the highest cooking temperature on the lowest shelf in the refrigerator.

**Cross-contamination** refers to the transfer of pathogens from raw food to ready-to-eat food, often through contaminated hands, surfaces, utensils, or directly from the food itself (dripping or direct contact).

### Thawing

You must **never** thaw foods on the countertop, as the outside of the food will quickly reach room temperature. By the time the centre is thawed, the outside surface has been in the danger zone for well over the allotted two hours. This is not an appropriate thawing method due to the opportunity for excessive bacterial growth, the production of toxins, and contamination of kitchen surfaces.

Use thawing techniques that do not allow food to enter the temperature danger zone, or minimize the time spent in it. There are four methods that allow food to be thawed safely:

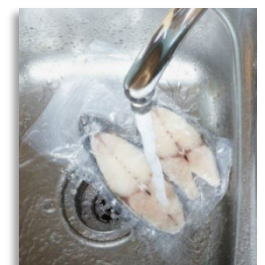
#### 1. Thaw food in a refrigerator at 4°C (40°F) or colder.

- This is the safest method of thawing, as the food never enters the danger zone.
- Thaw items on the lowest shelf of the refrigerator with a drip tray in order to prevent cross-contamination.
- This method for thawing is rather slow, taking about 10 hours per kilogram (5 hours per pound).



#### 2. Thaw food in a sink with clean, cold, running water.

- Ensure to clean and sanitize the sink before and after using this method.
- Use caution so that water does not splash onto other foods, surfaces, or utensils.
- Keep the water cold to ensure the surface of the product stays cold.
- Keep the water running in order to conduct cold away from the food and assist with the thawing process.
- Allow for about 2 hours per kilogram (1 hour per pound).



### 3. Thaw food in a microwave.

- Use the “defrost” setting of the microwave.
- This method will allow food to enter the danger zone and will actually initiate the cooking process so, only use this method when cooking will immediately follow.

### 4. Thaw food as part of the continuous cooking process.

- In essence, this means to cook from frozen.
- It will work well for smaller portions of food or food intended to be cooked from frozen.
- Be sure to take an internal temperature when cooking from frozen because although the food may look cooked on the outside, the inside may not be hot enough.



## *Food Preparation*

There are many risks associated with this stage including cross-contamination and temperature abuse. Generally speaking, you prepare food within the danger zone, so it's important to limit the time that preparation takes, by working with small batches and pre-chilling ingredients. During preparation, you run the risk of contaminating ready-to-eat foods and kitchen surfaces with raw products, so it's important to use appropriate preparation techniques.

- Wash your hands before starting to work with food, whenever you change tasks, or at any other time that your hands may be contaminated (see chapter 4).
- Make sure that all equipment, utensils, and contact surfaces are clean and sanitized (see chapter 5).
- Use extreme care to prevent cross-contamination; prepare raw meat, poultry, and fish separate from produce and ready-to-eat foods.
- Use separate cutting boards and utensils for raw and ready-to-eat foods.
- Launder any cleaning and sanitizing cloths after each use and store them in a manner that will prevent contamination.
- Make sure to thoroughly wash all fruits and vegetables in a clean and sanitized sink before use.
- Discard any leftover batters.



## *Cooking*

Cooking is a key stage in the flow of food because it is the “kill step”. All of the other stages just control the growth of microorganisms, but cooking foods to specific internal temperatures will actually kill them. That being said, you are already aware that typical cooking temperatures will not destroy many toxins or spores, which emphasizes the importance of temperature control during all stages in the flow of food.

Specific cooking temperatures have been removed from the regulation to provide food premises with the flexibility to prepare potentially hazardous foods in different ways, including: fermentation, pickling or applying a lower cooking temperature for a longer period of time. If a food premises wishes to prepare foods in an alternative way, they must first consult with their public health inspector and develop written, evidence-based, safe preparation procedures.

Otherwise, the safe internal cooking and re-heating temperatures (see chart below) are expected to be followed. These temperatures must be held for at least 15 seconds. Use a probe thermometer to check the final cooking temperature.

Type of Food	Internal Cooking Temperature	Internal Reheating Temperature
Whole Poultry	82°C (180°F)	82°C (180°F)
Poultry (ground / pieces)	74°C (165°F)	74°C (165°F)
Food Mixtures (with egg, meat, poultry, fish, or another hazardous food)	74°C (165°F)	74°C (165°F)
Ground Meat (not containing poultry)	71°C (160°F)	71°C (160°F)
Pork & Pork Products (whole / pieces)	71°C (160°F)	71°C (160°F)
Fish and Seafood	70°C (158°F)	70°C (158°F)

*Ontario Ministry of Health and Long-Term Care*

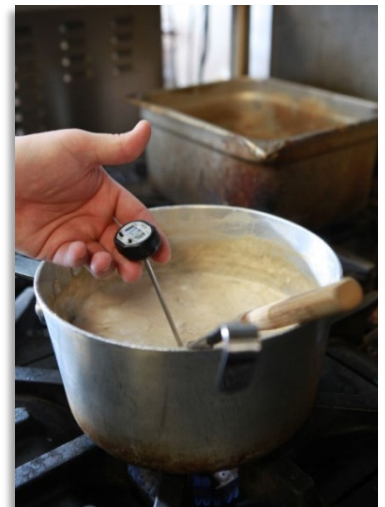
Other jurisdictions may have different requirements so, you need to check and comply with local laws, not just for cooking but for all areas of food safety.

For convenience and simplicity, remember that 74°C (165°F) is a safe internal cooking temperature for all foods, except for whole poultry.

Notice in the table above that there is no internal cooking temperature specified for whole cuts of beef such as steak and roasts. In Ontario, it is up to the customer how well they would like their whole beef cooked. Pathogenic bacteria on beef are generally found on the outside of the meat. So, as long as the outside of the meat is exposed to high temperatures, the bacteria are killed and whole beef is relatively safe to eat even if it is served rare. However, to be on the safe side, consider cooking whole beef cuts to 71°C (158°F) which would be considered medium-well to well-done. Although there is no regulated internal cooking temperature for whole beef, there is one for ground beef. The grinding process distributes the pathogenic bacteria from the surface of the beef all throughout the ground product. You need to reach the required internal temperature for ground meat (other than poultry) of 71°C (158°F) to make sure that the pathogens in the centre are killed as well as the ones on the outside.

Some other tips for cooking food safely are:

- Always use a calibrated probe thermometer to measure internal cooking temperatures.
- It is safest to cook stuffing separately from whole poultry, but if you prefer to stuff the bird, make sure that the centre of the breast meat reaches at least 82°C (180°F) and the stuffing reaches 74°C (165°F).
- Cooking should be a continuous process; do not partially cook foods and finish the process later.
- Avoid overloading cooking equipment as the heat may not penetrate the food evenly.
- Do not use hot-holding equipment like a steam-table to cook or reheat food. Hot-holding equipment is made to keep 'hot food hot', not to cook or re-heat.





## Hot-Holding

If cooked food is not going to be served or cooled immediately, it needs to be held hot at 60°C (140°F) or above. This will keep the cooked item out of the danger zone and prevent further growth of microorganisms. Buffet restaurants commonly use this practice. Hot-holding must only be done after the food has been cooked or reheated to the required internal temperature. **Hot-holding is not a cooking or re-heating step.** Typical equipment used for hot-holding includes: steam tables, warming trays, heat lamps, and chaffing pans. The equipment listed above is designed for hot-holding, it must not be used for cooking or reheating.

As an example, let's say you are hot-holding cooked chicken breasts. The CCP is hot-holding at 60°C (140°F) or above. You check the temperature and determine it is only 45°C (113°F).

Your corrective action will be one of two things:

- if the chicken breasts have been holding for less than two hours, you can reheat them to an internal temperature of 74°C (165°F), and then return them to the unit; or
- if they have been holding for more than two hours, they must be discarded due to the potential for high levels of bacterial growth and toxin production.

You should use a probe thermometer to measure the internal temperature of the food while being hot-held. Take the temperature every two hours and document your observations in a temperature logbook. If the temperature falls below the required 60°C (140°F), you need to take action before the food can be served.

## Cooling

When you cool food, you are going back down through the danger zone. Food needs to be cooled as quickly as possible; the faster the food is cooled, the less time it spends in the danger zone.

If a food is allowed to cool slowly, any microorganisms that were not killed during cooking (e.g. spores) or that are reintroduced to the food after cooking will have the opportunity to grow.

Slow cooling of potentially hazardous foods is one of the leading causes of foodborne illness.

Do not put hot foods directly into a refrigerator to cool. This practice does not allow the foods to cool quickly enough and may increase the air temperature in the refrigerator, jeopardizing the safety of any other potentially hazardous foods. Use one or more of the following techniques to rapidly cool food before putting it in the refrigerator.

### 1. Use shallow containers or pans.

- Transfer food from large, deep containers to smaller, shallow pans that are able to conduct heat.
- Using shallow pans creates a larger surface area allowing more heat and steam to escape.



### 2. Use an ice-water bath for large containers.

- If you have a pot with a large quantity of food that needs to be cooled, an ice water bath with frequent stirring will help to rapidly cool the food.
- Fill a clean, sanitized sink with a mixture of ice and water. Place the pan into the mixture and frequently stir the food to help steam escape and facilitate cooling.





### 3. Cut up and debone large pieces of meat.

- Cutting up and/or deboning meat will reduce the quantity and mass while increasing the surface area of the product, which will facilitate cooling.



### 4. Use an ice wand.

- An ice wand is a utensil that you freeze, then place into a quantity of food that is usually liquid-based.
- Stirring the food with the ice wand will assist with rapid cooling.
- Remember that it is a utensil and needs to be cleaned and sanitized as such (see chapter 5).



## Reheating

Food needs to be reheated to the internal temperature that it was cooked to in the first place. The exception to this requirement is for whole poultry, which may be reheated to an internal temperature of 74°C (165°F) after initially cooking to 82°C (180°F). The temperature must be reached for at least 15 seconds and the process must not take any more than two hours. Remember, do not use equipment that is designed for hot-holding to reheat food because it will not reheat hot enough or fast enough.

For simplicity, reheat all potentially hazardous foods to 74°C (165°F) for 15 seconds, within 2 hours.

Foods must be adequately reheated because:

- all bacteria may not have been killed during the initial cooking stage,
- the food may not have been cooled quickly enough or stored at a low enough temperature, and
- pathogens may have been reintroduced during cooling or storage.

Foods should only be reheated once. Therefore, reheat leftovers in small batches to minimize waste. Cooked foods, if cooled properly, may only be saved for reheating for approximately three days in the refrigerator and three to six months in the freezer. See the appendix for Health Canada's food storage guidelines.

## Serving

Some food premises use wait-staff to serve food to customers while others are set up for customers to serve themselves. Regardless of which service method is used, any leftover food that has been served or displayed needs to be thrown out. During service, steps must be taken to ensure that utensils and food do not become contaminated.

Here are some tips for safe serving by wait staff.

- Grip eating utensils by the handle so as not to contaminate the part that will go into someone's mouth or directly touch food.
- Do not handle cups, glasses, and mugs by the rim.
- Use a utensil whenever possible to serve food (e.g. waxed paper or tongs); avoid directly touching the food with your hands.
- Never use a glass to scoop ice; a glass may chip and cause physical contamination of the ice, or the outside of the glass



and/or your fingers may come into contact with the ice, risking biological contamination. Use a metal or plastic scoop with a handle and be sure to store it outside of the ice bin.

- Don't put your thumb on top of a plate to hold it. Instead, hold plates underneath and place your thumb on the rim.

Here are some tips for safe serving in self-service establishments.

- Provide adequate serving utensils to reduce the risk of different foods contaminating each other (risk for people with allergies) and to reduce the temptation for your customers to use their hands.
- Protect food on display with sneeze guards or other shields.
- Assign staff to monitor self-serve areas for cleanliness and temperature control.
- Check and record holding temperatures at least every two hours.
- Never add new food to old food.

## Hazard Analysis and Critical Control Point (HACCP) System

HACCP is a food safety system that helps to identify chemical, physical, and biological hazards, as well as other risks, during every stage in the flow of food.

### *HACCP Used to Prevent Foodborne Illness*

HACCP is a system that is used to create safe foods. HACCP uses a series of principles to identify, monitor, and control potential hazards at each stage in the flow of food. When a control measure is identified that can prevent, eliminate, or reduce a hazard, it is called a critical control point (CCP). CCPs often involve some type of time-temperature control.

In the 1960s, NASA asked Pillsbury to develop food for astronauts that was tasty and safe to eat in a zero gravity environment. HACCP was originally developed to complete that project.

*Canadian Food Inspection Agency*

In order to be successful, the HACCP system requires a written plan that is unique to each specific operation or menu item. The HACCP system can be quite demanding and requires time and commitment from food premises owners, operators, and employees. However, since it results in safe food, the extra time is worthwhile.

One key component of a HACCP plan is monitoring. CCPs need to be actively monitored and documented. If a CCP is not met, a corrective action needs to be carried out. All temperatures that you measure and actions that you take need to be documented as part of the HACCP plan.

### *Principles of the HACCP System*

The HACCP system is comprised of seven principles, which need to be sequentially implemented in order to develop and use a HACCP plan.

#### **1. Conduct a hazard analysis.**

- Identify potential chemical, physical, and biological hazards that could occur for this item during its flow through your establishment.

#### **2. Identify the critical control points.**

- Determine the steps at which hazards can be prevented, eliminated, or controlled.

### 3. Establish critical limits.

- A critical limit is a minimum standard that must be met at each CCP. The critical limit may reflect the time, temperature or another requirement, such as pH level, that must be met to keep the food safe. This limit must be measurable and comply with any associated legislation.

### 4. Establish critical control point monitoring requirements.

- Monitoring involves a scheduled measurement or observation to ensure that each CCP stays within the established critical limits.

### 5. Take corrective action when required.

- When monitoring determines that a critical limit for a CCP has not been met, it needs to be corrected. Corrective actions may be as simple as continuing to cook the item until the adequate internal temperature is achieved or more complex like discarding the food item.
- Corrective actions need to ensure that the risk of a health hazard to the public is eliminated.

### 6. Establish recordkeeping and/or documentation procedures.

- A successful HACCP system must have effective record keeping procedures in place. Use blank forms and clipboards, notebooks, flowcharts, and temperature logs in order to maintain records. Records should include observations of the critical limits that have been monitored as well as documentation of any corrective actions that have been taken. The person who completed the recording should sign the record.

### 7. Verify that the HACCP system is working.

- This system can be verified through auditing of the process and records as well as random sampling of “finished” food items for microbial analysis.

For an example of a HACCP plan, please refer to the appendix.

## Conclusion

In this chapter you have learned various methods to avoid the hazards associated with each stage in the flow of food. Handwashing plays a key role at each stage and is a basic, yet crucial aspect of food handler hygiene.

## Chapter 3: *Review Questions*

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1. How do you calibrate a probe thermometer using the ice-point method?

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2. What is the range of temperatures for the temperature danger zone and why are we concerned about it?

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3. List four (4) things to observe when purchasing and/or receiving food.

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4. What temperature must food be stored at in a refrigerator? In a freezer?

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5. What are the safe methods to thaw frozen food?

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6. What is a good minimum internal cooking temperature for most foods?

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7. What is “hot-holding” and what is the temperature requirement?

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8. Why must hot food be cooled quickly if it’s not going to be served immediately?

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9. What are the safe methods to cool hot food quickly?

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10. What does HACCP stand for and how is it used during the flow of food?

H \_\_\_\_\_

A \_\_\_\_\_

C \_\_\_\_\_

C \_\_\_\_\_

P \_\_\_\_\_

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# Chapter 4: Food Handler Hygiene

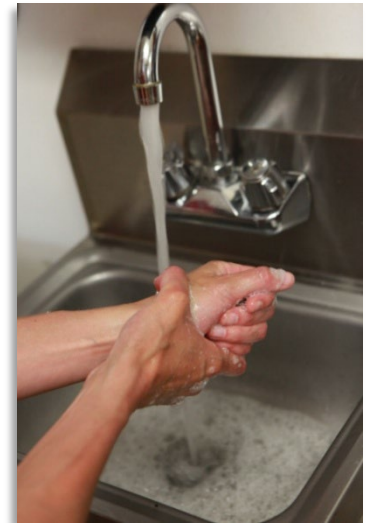
## Introduction

People are commonly implicated as the **source** of microorganisms that cause foodborne illness. There are large populations of bacteria and fungi living on and within us at all times. When our immune system is working properly these microorganisms either benefit us in some way or have no effect at all. A food handler that feels perfectly **healthy** can still make other people very sick if they contaminate food with their microorganisms.

It should come as no surprise that a **sick** food handler may also spread their ailment to others through food. Many foodborne illness outbreaks have been linked to a food handler who was experiencing a bacterial, viral, or parasitic illness at the time of food preparation.

By the end of this chapter you should be able to:

- list the six steps of proper handwashing;
- describe the requirements for handwash sinks in a food premise;
- describe the appearance of a food handler exhibiting good “personal cleanliness”;
- list actions that must be avoided when handling food; and
- explain why it’s important for a food handler to remain absent from work while they are experiencing vomiting and/or diarrhea.



The table below provides a few examples of microorganisms that originate from humans and can be spread from person-to-person through food.

Microorganism	What kind of microorganism?	How is it transferred through food?	What are the symptoms?	How long can the carrier transfer it for?
Norovirus (Norwalk virus)	Virus	Food is contaminated with particles of fecal matter or vomit from a carrier.	Diarrhea, vomiting, nausea, stomach pain, fever, head and body aches.	The virus can be found in feces prior to symptom onset and can continue to be shed for 2 or more weeks after symptoms clear up.
<i>Staphylococcus aureus</i>	Bacteria	Food is contaminated with bacteria from the skin, mucous or saliva of a carrier. The bacteria produce a toxin in the food. (Present in approx. 25% of healthy people.)	Nausea, vomiting, stomach pain, diarrhea.	If a carrier has it as part of their natural flora, it can be transferred for their lifetime.

Microorganism	What kind of microorganism?	How is it transferred through food?	What are the symptoms?	How long can the carrier transfer it for?
<i>Shigella spp.</i>	Bacteria	Food is contaminated with particles of fecal matter from a carrier.	Diarrhea, stomach pain, fever.	Sick individuals can transmit the bacteria during active illness (approx. 1 week). Healthy carriers can transmit the bacteria forever.
Hepatitis A	Virus	Food is contaminated with particles of fecal matter from a carrier.	Nausea, stomach pain, vomiting, dark urine, jaundice (yellowing) of skin and eyes.	Carrier can transmit illness weeks before symptoms are experienced and weeks after symptoms clear up.

The examples listed above are all microorganisms that come directly from a food handler. Food handlers can also **transfer** microorganisms from one food or surface to another, resulting in cross-contamination. Personal hygiene practices in the kitchen, especially hand hygiene, are essential to safe food preparation.

## Personal Hygiene Practices

### Hand Hygiene

Proper hand hygiene is crucial for safe food preparation. Food preparation utensils are used only for their intended purpose, however our hands are used to assist with food preparation and everything else we do on a daily basis. Improper hand hygiene leads to contaminated surfaces and food in the kitchen. Washing your hands properly is the most effective thing you can do to protect yourself and others from a number of infectious diseases, including many foodborne illnesses. There are numerous times that you need to wash your hands when preparing food, such as:

- **Before starting or resuming work**
- **After going to the washroom**
- After cleaning dishes, utensils or kitchen surfaces
- Before taking clean dishes and utensils from the dishwasher
- After taking a break
- After taking out the garbage
- After handling raw foods
- After licking your fingers to flip through a book
- After touching your face, hair, or body
- After sneezing or blowing your nose
- After handling money



The list could go on and on. As a simple rule of thumb: hands must be washed before and after any food preparation task, or as they become contaminated.

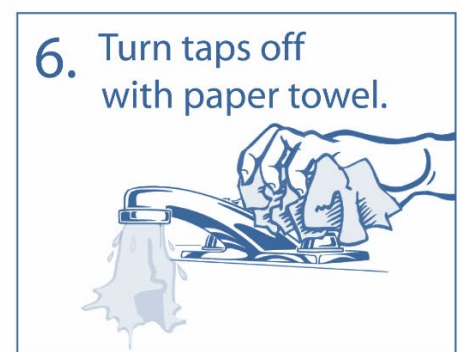
## Handwashing in a Food Premises

All food premises in Ontario are required to have a separate, designated handwash sink that's conveniently located for staff in each food preparation area. This sink is not to be used for anything except for handwashing. A handwash sink in a food preparation area must be supplied with: potable (drinkable) hot and cold running water, liquid soap from a dispenser, and single-service paper towels.

The following six-step procedure has been shown to remove the vast majority of contaminants from hands:

## The Six Steps of Proper Handwashing

1. Wet your hands with warm running water.
2. Dispense liquid soap onto your hands.
3. Rub your hands together for 15-20 seconds to make a soapy lather. Lathering must be done away from the stream of running water. Be sure to wash: the palms and backs of your hands, between fingers and thumbs, around wrists, finger tips, and under your nails.
4. Rinse well under warm running water. Use caution to avoid touching the sides of the sink with your hands. Be careful not to contaminate nearby surfaces with spray.
5. Use paper towel to dry your hands (not a reusable towel or your apron).
6. Turn off the tap with the paper towel.



Fingernails should be kept short and clean. A personal nail-brush in the kitchen will help to effectively clean under your nails. Nail polish should not be worn when working with food as it can chip off and hide dirt lurking under the nail. False fingernails are not appropriate for kitchen work; they make effective handwashing difficult and could fall off into foods being prepared.

Glove use is **not a substitute** for proper handwashing. If gloves are used, they need to be changed as regularly as bare hands need to be washed. Furthermore, hands need to be washed before gloves are put on and after removal. People often forget that gloved hands can pick up any contaminants that bare hands can. Use a new pair of disposable gloves between different tasks. Do not attempt to clean and re-use disposable gloves.

Gloves should be used when you have a cut on your hand. The cut should be covered with gauze or a bandage before putting a glove on. The glove will ensure that the bandage stays in place and will provide an extra barrier of protection between your wound and the food being prepared.

Hand sanitizers are also **not a substitute** for proper handwashing in a food premise. Handwashing removes grease and soil from hands, which rinse-free sanitizers do not. Hand sanitizers present a potential chemical hazard. It's recommended that rinse-free sanitizer is not used by food handlers, but if it is, hands must be washed prior to use and it must be allowed to dry before food preparation is resumed.

### ***"No-Touch" Techniques***

Food handlers should avoid directly touching food whenever possible. Utensils like tongs, spoons, scoops and forks should be used to avoid hand contact. Food handlers must be especially careful to avoid direct contact with foods that are ready-to-eat, or require no further cooking. Disposable plastic gloves **may** be used as an effective no-touch technique but remember, gloves are **not a substitute** for handwashing (see above). Hands should be washed before and after using gloves.



### ***Uniforms, Clothing and Aprons***

The Food Premises Regulation requires employees to “wear clean outer garments” when handling food or utensils that come into contact with food. Dark coloured outer clothing is not recommended as it may hide potential contaminants and soil. Once your apron, Chef’s jacket or kitchen uniform, becomes contaminated it must be changed to avoid contaminating your hands, kitchen surfaces, and food.

### ***Hair***

Most people have had the unpleasant experience of finding someone else’s hair in their food. Finding hair in food is not only gross, it also presents biological and physical contamination of food. Food handlers are required to “wear headgear that confines the hair”. Hair-nets, beard-nets and baseball caps are all examples of hair-confining headgear. Confining your hair will prevent hair from getting into food and discourage hand-to-hair and hand-to-face contact. Food handlers (including servers), must “*take reasonable precautions to ensure that food is not contaminated by hair*”.

A food handler is defined in the Food Premises Regulation as “*any person who, is employed in a food premise, and handles or comes in contact with any utensil or with food during its preparation, processing, packaging, service, storage or transportation*”.

### ***Cell Phones and Electronic Devices***

Cell phones, portable media players, and tablets are becoming commonplace in food premises. These devices can be very useful when searching for recipes or ingredients. Unfortunately, these tools are also covered with microorganisms from continuous use in different environments (think “toilet texting”). Some of the microorganisms most commonly found on these devices are bacteria that originate in fecal matter, on skin, and in soil. It is very important to wash your hands after using any electronic device.

## *Tasting Food*

Food often needs to be tasted during preparation. When you're tasting food, you need to make sure the microorganisms in your mouth and on your fingers don't end up in the food. You can:

- Use a clean spoon or fork to taste food, but be careful not to eat over the food item. After tasting, put the utensil with the dirty dishes to be cleaned and sanitized.
- Ladle food into a bowl and then taste it with a separate spoon. After tasting, put the bowl and spoon with the dirty dishes to be cleaned and sanitized.



## *Other Important Personal Hygiene Practices*

Your nose, mouth, skin, and hair host many different microorganisms, some of which can make other people very ill. Be mindful of your actions in the kitchen. Our hands often touch surfaces, come up to our face, and fingers go into our mouth without a conscious thought.

Touching, picking, or blowing your nose will contaminate your hands. If your hands come into contact with your nose you must wash them immediately.

If you feel a sneeze or cough coming on, try to contain it with a paper towel and if possible, by ducking your head below food preparation surfaces. Microorganisms can still travel through the paper towel to your hands, so make sure to wash them thoroughly.

## **Food Handlers and Illness**

When you're sick your body is producing and shedding more microorganisms than it normally does. If you have any of the following symptoms you must not prepare or serve food in a food premises:

- Diarrhea
- Vomiting
- Fever
- Sore throat
- Persistent coughing and sneezing

If you have any of these symptoms or have been diagnosed with a communicable disease that can be passed through food, let your manager know.

If you are ill with diarrhea or vomiting, you can be shedding so many pathogens that even thorough handwashing may not be effective. Wait at least 24 hours after your symptoms clear up before returning to work. However, if you have a **confirmed foodborne illness**, you may be legally required to stay away from work for longer than 24 hours and you must consult with your local Public Health Unit. Generally, after 24 hours without symptoms, pathogens will continue to be shed by your body, but the numbers will be much lower. Remember that some pathogens may be shed through our feces weeks before and weeks after we feel any symptoms, highlighting the importance of handwashing at all times.



## Conclusion

In this chapter you have learned that humans carry disease-causing microorganisms when they are both healthy and ill. Humans can also transfer microorganisms from one source to another, such as: foods, kitchen surfaces, and utensils. The final component of safe food handling is the continuous cycle of cleaning, sanitizing, and food premises maintenance.

## Chapter 4: *Review Questions*

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1. List the six steps of proper handwashing.

- |           |           |
|-----------|-----------|
| (1) _____ | (4) _____ |
| (2) _____ | (5) _____ |
| (3) _____ | (6) _____ |

2. Identify the requirements of a handwash sink in a food premise.

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3. Describe the appearance of a food handler exhibiting good personal cleanliness.

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4. List some actions that must be avoided when handling food.

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5. Why must someone with diarrhea and/or vomiting be excluded from handling food? How long should they be excluded?

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# Chapter 5: *Cleaning, Sanitizing and Food Premises Maintenance*

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## Introduction

Well-maintained food premises will be clean, sanitary, and free of any condition that can make food unsafe. Key components of a well-maintained food premises will include: cleaning, sanitizing, general housekeeping, garbage disposal, and pest control.

By the end of this chapter you should be able to:

- understand the difference between cleaning and sanitizing and describe how to do both;
- describe how to sanitize equipment and surfaces “in-place” using a bleach solution;
- describe the five (5) steps of manual dishwashing with three sinks;
- understand the difference between the two (2) main types of mechanical dishwashers; and
- list some general methods to prevent/control a pest infestation.

## Cleaning and Sanitizing

Cleaning and sanitizing are two very different actions. **Cleaning** refers to the physical removal of food or soil from a surface. **Sanitizing** follows cleaning and reduces the number of microorganisms to safe levels. Generally, cleaning and sanitizing follow these 3 steps:

- 1) Wash
- 2) Rinse
- 3) Sanitize



### *How to Clean*

Proper cleaning involves using an appropriate chemical and friction to remove soil from a surface. Examples of cleaning include: washing dishes with soap and a scrub brush, or cleaning the floor a detergent and mop. Food contact surfaces require a thorough rinse after cleaning to remove any remaining chemical. Follow these steps to clean food contact surfaces:

- 1) Scrape any remaining food off of the surface.
- 2) Use a brush, cloth, or sponge to scrub the surface with hot soapy water.
- 3) Rinse the surface with hot water.

At this point the surface will look clean, but beware: unsafe levels of microorganisms may still exist. So, the next step is to sanitize.

### *How to Sanitize*

A food contact surface is any surface that comes into direct contact with food during storage, preparation, or serving.

The concentration of chemical sanitizing solutions will decrease with use, temperature fluctuations, and time. Use test strips or reagent-kits regularly to ensure that proper chemical concentrations are being maintained.

Sanitizing, when done properly, will kill the vast majority (99.9%) of microorganisms. In order for sanitizing to be effective, you must ensure that:

- surfaces to be sanitized are cleaned first;
- either a chemical or very hot water is used to sanitize;
- the items you are sanitizing are in contact with the hot water or chemical solution for the appropriate length of time (discussed below);
- test strips or a test reagent kit is used to check for proper concentration of the sanitizing chemical on a regular basis (discussed below); and
- a thermometer is used to check the temperature of the water you are sanitizing with (discussed below).

### *Sanitizing Food Contact Surfaces*

Food contact surfaces need to be sanitized after each use. A piece of equipment that has been in continuous use for the same task needs to be sanitized at least every 2 hours (e.g. a meat slicer being used for one type of meat). Food contact surfaces include: plates, eating utensils, cups, tongs, spatulas, cutting boards, knives, wooden spoons, pots and pans, etc. Food contact surfaces may be sanitized:

- manually in a dishwashing sink,
- mechanically in a dishwasher, or
- manually “in-place”.

Single-service articles, such as plastic eating utensils or storage containers, are to be discarded after a single use.

### *Sanitizing with Hot Water (No Chemical)*

Hot water alone can be used to sanitize surfaces after cleaning. The table below provides the required times and temperatures for each different hot water sanitizing method.

Sanitizing Method – Hot Water ONLY			
	Manual (In-Sink)	Mechanical (Dishwasher)	In-Place
<b>Sanitizing Process</b>	Fully submerge in a 2 or 3-compartment sink.	Use a high-heat mechanical dishwasher.	Use a steady stream of hot water or steam.
<b>Water Temperature</b>	77°C * (170°F)	82°C (180°F)	82°C (180°F)
<b>Contact Time</b>	45 seconds minimum	10 seconds minimum	10 seconds minimum

\*Generally speaking, it’s not practical to manually sanitize using hot water alone. It would be very difficult to maintain the water at the required temperature of 77°C and could easily burn hands. A chemical is usually used to sanitize in a sink set-up.

### Sanitizing with a Chemical

There are 3 chemical sanitizers specifically mentioned in the Food Premises Regulation. Alternative sanitizing agents can be used as long as they are approved by Health Canada or the Canadian Food Inspection Agency for their intended use and test strips or reagent kits must be used to ensure appropriate chemical concentration. If a food premises wishes to use an alternative sanitizing agent they must first consult with their Public Health Inspector. When using chemicals to sanitize you must use test strips or a test reagent kit to ensure you are using the proper concentration of the chemical. The table below provides the required chemical concentrations (in parts per million – ppm), contact times, and water temperatures for the three recognized sanitizers.



		Sanitizing Method – with Chemical		
		Manual (In-Sink)	Mechanical (Dishwasher)	In-Place (Spray Bottle)
<b>Chlorine</b>	Concentration	100 ppm*	100 ppm	Typically 100 ppm
	Temperature (minimum)	24°C (75°F)	24°C	Follow manufacturer’s directions
	Contact Time (minimum)	45 seconds	45 seconds	Follow manufacturer’s directions
<b>Quaternary Ammonium (“Quats”)</b>	Concentration	200 ppm	200 ppm	Typically 200 ppm
	Temperature (minimum)	24°C	24°C	Follow manufacturer’s directions
	Contact Time (minimum)	45 seconds	45 seconds	Follow manufacturer’s directions
<b>Iodine</b>	Concentration	25 ppm	25 ppm	Typically 25-50 ppm
	Temperature (minimum)	24°C	24°C	Follow manufacturer’s directions

	Contact Time (minimum)	45 seconds	45 seconds	Follow manufacturer's directions
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\*Typically prepared by adding roughly 1 teaspoon (just less than 5mL) of unscented, household bleach (5-6% chlorine) to 2 litres of water. Always test solution with test strips to ensure you are not using too strong or too weak a solution. Never mix household bleach with any other cleaners or sanitizers.

As you can see from the table above, regardless of which **chemical** sanitizing method you are using, the temperature must always be at least 24°C and the contact time at least 45 seconds.



## Manual Dishwashing (In-Sink)

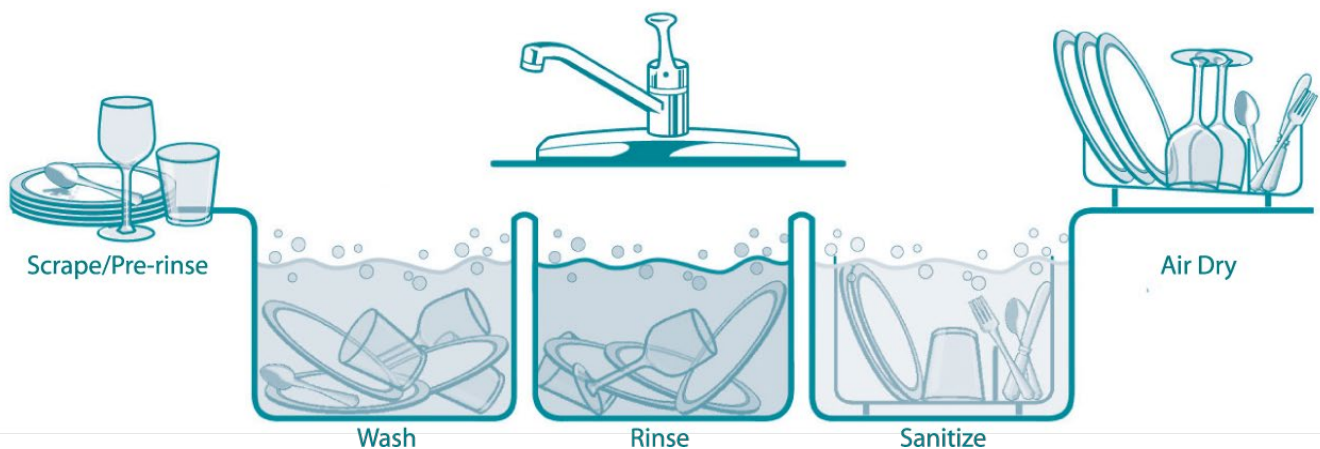
		Manual Sanitizing (In-Sink)
<b>Chlorine</b>	Concentration	100 ppm*
	Temperature (minimum)	24°C
	Contact Time (minimum)	45 seconds
<b>Quaternary Ammonium (“Quats”)</b>	Concentration	200 ppm
	Temperature (minimum)	24°C
	Contact Time (minimum)	45 seconds
<b>Iodine</b>	Concentration	25 ppm
	Temperature (minimum)	24°C
	Contact Time (minimum)	45 seconds

\*Typically prepared by adding roughly 1 teaspoon (just less than 5mL) of unscented, household bleach (5-6% chlorine) to 2 litres of water. Always test solution with test strips to ensure you are not using too strong or too weak a solution. **Never mix household bleach with any other cleaners or sanitizers.**

### 3-Compartment Sink Method

This method can be used to clean and sanitize food preparation utensils and multi-service articles. A multi-service article means “any container or eating utensil that is intended for repeated use in the service or sale of food”. This would include dishes or eating utensils that are repeatedly used by the public. The 3-compartment sink method involves a sequence of 5 steps.

1. **Scrape** – Remove any large pieces of food or debris.
2. **Wash (Sink 1)** – Use a scrub brush, sponge, or cloth along with hot soapy water and friction to loosen and remove leftover food and oil from the surface.
3. **Rinse (Sink 2)** – Rinse the article to remove the remaining soap and food particles.
4. **Sanitize (Sink 3)** – Sanitize in the third sink by fully submerging the article for at least 45 seconds in either hot-water\* or a chemical solution. Use a thermometer to ensure the sanitizing solution is a minimum of 24°C. Use a test-kit to ensure the proper concentration of chemical is being maintained.
5. **Air Dry** – Allow articles to fully air dry before putting them into storage.



## 2-Compartment Sink Method

This method can only be used where both washing and rinsing can effectively take place in one sink. Multi-service articles are **not** to be cleaned and sanitized using this method. This method is used for pots, pans, and other food preparation utensils and involves a sequence of 4 steps.

1. **Scrape** – Remove any large pieces of food or debris.
2. **Wash & Rinse (Sink 1)** – Use a scrub brush, sponge or cloth along with hot soapy water and friction to loosen and remove leftover food and oil from the surface. Rinse the article under running water to remove remaining soap and food particles.
3. **Sanitize (Sink 2)** – Sanitize in the second sink by fully submerging the article for at least 45 seconds in either hot-water\* or a chemical solution. Use a thermometer to ensure the sanitizing solution is a minimum of 24°C. Use a test-kit to ensure the proper concentration of chemical is being maintained.
4. **Air Dry** – Allow articles to fully air dry before putting them into storage.



## Mechanical Dishwashing (Dishwasher)

		Mechanical Sanitizing
<b>Chlorine</b>	Concentration	100 ppm
	Temperature (minimum)	24°C
	Contact Time (minimum)	45 seconds
<b>Quaternary Ammonium (“Quats”)</b>	Concentration	200 ppm
	Temperature (minimum)	24°C
	Contact Time (minimum)	45 seconds
<b>Iodine</b>	Concentration	25 ppm
	Temperature (minimum)	24°C
	Contact Time (minimum)	45 seconds

Commercial mechanical dishwashers sanitize utensils using either high heat or a chemical rinse. It's important to routinely check your mechanical dishwasher to ensure that it is working properly and that there is an adequate supply of required chemicals. Both high- and low-temperature machines are required to maintain a wash water temperature between 60°C (140°F) and 71°C (160°F). They must also be equipped with easily visible thermometers to ensure that proper wash and/or sanitizing temperatures are being achieved. Follow the manufacturer's printed directions for the maintenance and operation of your mechanical dishwasher. Ensure that any required repairs are completed quickly by a competent individual.

Be careful not to overload your dishwasher by stacking and overlapping dishes and utensils. Every surface of every article must be exposed to the hot water or chemical in order to be effectively sanitized. Anything that can hold water (like bowls and cups) should be placed face down, to avoid collecting dirty wash water.

### *High-Temperature Mechanical Dishwashers*

High heat mechanical dishwashers sanitize dishes with hot water. These machines must reach at least 82°C (180°F) for a minimum of 10 seconds to effectively sanitize. Before loading the machine, ensure that it is reaching the required temperature during the sanitizing rinse cycle.



### *Low-Temperature Mechanical Dishwashers*

Low heat mechanical dishwashers use chemicals to sanitize dishes at the end of a wash cycle. You must use test strips to ensure that the proper amount of chemical sanitizer is being fed into the machine. The required chemical concentrations are: chlorine at 100 ppm, quaternary ammonium at 200 ppm, or iodine at 25 ppm.

## **In-Place Cleaning and Sanitizing**

There are often food contact surfaces within a food premise that are too big to fit in a sink or dishwasher. Examples of such items include: oversized cutting boards, large mixer bowls, countertops, and deli food slicers. To clean and sanitize these items you still need to:

1. **Wash** with hot soapy water.
2. **Rinse** with clean hot water.
3. **Sanitize** with heat (hot water/steam) or a chemical sanitizer.

A chlorine (bleach) sanitizer can be easily prepared by adding roughly ½ teaspoon of unscented, household bleach (5-6% chlorine) to 1 litre of water. This should create a 100 ppm chlorine solution. Use test strips to ensure that the proper concentration of sanitizer is being used.

Spray or wipe the entire surface with this solution. Allow it to sit for a minimum of 45 seconds and then wipe dry with a clean cloth or allow to air dry. Please note: any chlorine sanitizing solution stronger than 200 ppm requires a potable water rinse step afterwards.

		In-Place Sanitizing
<b>Chlorine</b>	Concentration	Typically 100 ppm Follow manufacturer's directions
	Temperature (minimum)	Follow manufacturer's directions
	Contact Time (minimum)	Follow manufacturer's directions
<b>Quaternary Ammonium ("Quats")</b>	Concentration	Typically 200 ppm Follow manufacturer's directions
	Temperature (minimum)	Follow manufacturer's directions
	Contact Time (minimum)	Follow manufacturer's directions
<b>Iodine</b>	Concentration	Typically 25 ppm Follow manufacturer's directions
	Temperature (minimum)	Follow manufacturer's directions
	Contact Time (minimum)	Follow manufacturer's directions

### *Storage after Cleaning and Sanitizing*

Now that your utensils, dishes and cookware have been cleaned and sanitized, it's important to keep them that way. Regularly clean and sanitize any storage surface that comes into contact with sanitized utensils. Ensure that utensils and dishware are dry before they are put away. Ideally, dishes and utensils should be allowed to air-dry. If this is not possible, you must ensure that you are using a clean cloth that is only being used for drying sanitized dishes. Make sure to thoroughly wash your hands before handing sanitized utensils.

**Note:** If you are using a commercial chemical for in-place sanitizing, follow the manufacturer's directions for preparation and use.

## General Cleaning and Maintenance

### *Floors*

Floor coverings in food premises must be tight, smooth, and non-absorbent. Kitchen floors get dirty fast, so it's important to do a thorough sweep and mop at the end of every shift, or more often when required. Be diligent and ensure you are thoroughly cleaning under shelving units, fridges, freezers, work-tables, and all other equipment. The grime that can accumulate on a kitchen floor is often made up of oil, grease, and food debris offering an ideal environment for pests.

### *Walls and Ceilings*

Walls and ceilings, like floors, must be kept clean and in good repair. They must be cleaned on a regular basis or as they become soiled.

Carpeting may be used in areas where food is served if it is maintained in a clean and sanitary condition.



## Equipment

Equipment, furniture, and appliances need to be maintained in a clean and sanitary condition. The inside of fridges, freezers, stovetops, and other surfaces that don't come into direct contact with food need to be cleaned and sanitized as they become dirty or contaminated. Hand-contact surfaces, such as fridge door handles, should be cleaned and sanitized on a daily basis, or more frequently as required.

When equipment is no longer in good repair or does not allow for adequate cleaning and sanitizing, it must be replaced. This also applies to food contact surfaces, such as cutting boards with deep crevices or cracked ceramic dishware.

## Handwashing Sinks

Handwashing sinks quickly become unsanitary. Think about how often you need to wash your hands while preparing food and how many microorganisms you're removing each time. Designated handwash sinks must be cleaned and sanitized on a daily basis, or more often if required.

## Washrooms

Employee and public washrooms must be kept clean, sanitary, and in good repair at all times. Sinks, urinals, and toilets should be cleaned and sanitized at least once per working day, but more often if necessary.

## Garbage

The Food Premises Regulation states that *"garbage and wastes, including liquid wastes, shall be collected and removed from a food premise as often as is necessary to maintain the premise in a sanitary condition"*. Food waste should be removed from the kitchen on a daily basis. Garbage that has been removed from preparation areas and is awaiting pickup must either be stored in a separate room within the premises, or in a storage container located outside of the premises. Storage containers for garbage must be made of materials that prevent the garbage from getting out and pests from getting in.



## Making a Cleaning Schedule

By now you should be aware that there's a lot of general cleaning, sanitizing, and maintenance that needs to be done on a regular basis. The maintenance of a food premises often falls through the cracks, with kitchen surfaces being cleaned or fixed only when they've become an obvious problem. Keeping up with a regular cleaning and maintenance schedule will save you time, money, and help to ensure that you are preparing food in a safe environment. When developing a cleaning schedule you should include:

- each job that needs to be done;
- who will do the job;
- the chemicals or tools needed to do the job; and
- how often the job must be done (hourly, daily, weekly).

Refer to the appendix for an example of a food premises cleaning schedule.



## Pest Control

Insects and rodents are more than just a nuisance in a food premise. Pests can contaminate food supplies, food contact surfaces, and cause structural damage to buildings.

### *Integrated Pest Management (IPM)*

An Integrated Pest Management (IPM) program is a system of prevention and control. It is designed to deny pests entry into your food premises and to control any existing pest problems you may have. A successful IPM program will include:

- Keeping pests out of your food premise by pest-proofing the building.
- Denying pests food, water, and shelter by maintaining your premises in a clean and sanitary manner.
- Working with a licensed pest control company.



### *Pest-Proofing a Building*

One key component of a successful IPM program is to keep pests from entering your facility. There are a number of ways to accomplish this:

- Fill in any holes within your premises by caulking, cementing, or using steel wool.
- Use screens to cover doors, windows, and vents.
- Keep the outside of the building, especially the foundation, in good repair.
- Ensure that there are proper seals around doors and windows.
- Avoid leaving doors open when not in use.
- Inspect food deliveries for signs of pest infestations.
- Store garbage outside of your premise in appropriate containers.
- Avoid clutter inside and outside of your food premise.

### *Sanitation and Housekeeping*

Maintaining your facility in a clean and sanitary manner will help to prevent a pest infestation by denying pests access to food and water. Recall these general housekeeping and maintenance principles for food premises:

- Ensure that shelves and equipment are at least 15 cm off of the floor to allow for easy cleaning.
- Store all food and other supplies at least 15 cm off of the floor.
- Use food storage containers with tight-fitting lids for your dry goods, including bags of flour, corn starch, sugar, and grains.
- Clean spills and splashes of food as soon as possible.
- Sweep and wet-mop at the end of every shift.
- Ensure stock is rotated using the FIFO principle.
- Repair leaky plumbing to ensure that pests do not have easy access to water.

### *Licensed Pest Control Companies*

Licensed pest control companies are appropriate for dealing with active pest infestations and preventing them from developing. Licensed companies will use a variety of techniques including sanitation, non-chemical controls, building maintenance, and chemical treatment. Work with your pest control company to arrange for an appropriate inspection system, treatment plan, and follow-up.

## Conclusion

In this chapter you have learned about the importance of the continuous cycle of cleaning, sanitizing, and premises maintenance. We discussed proper cleaning and sanitizing techniques for various kitchen surfaces and utensils. We also discussed pest control management and the importance of general housekeeping. An unsanitary facility inhibits safe food handling.

We began the course with a discussion about the legislation surrounding food safety in Ontario. As you now know, the **legislation** (chapter 1) dictates the minimum food safety standards that must be maintained by food premises in Ontario. Ultimately, these minimum standards are required to protect the public's health and **prevent foodborne illness** (chapter 2). The legislation dictates mandatory food safety techniques during every stage of the **flow of food** (chapter 3), including **food handler hygiene** (chapter 4), **cleaning, sanitizing, and food premises maintenance** (chapter 5).

## Chapter 5: Review Questions

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1. What does cleaning mean and how is it generally performed?

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2. What does sanitizing mean and how is it generally performed?

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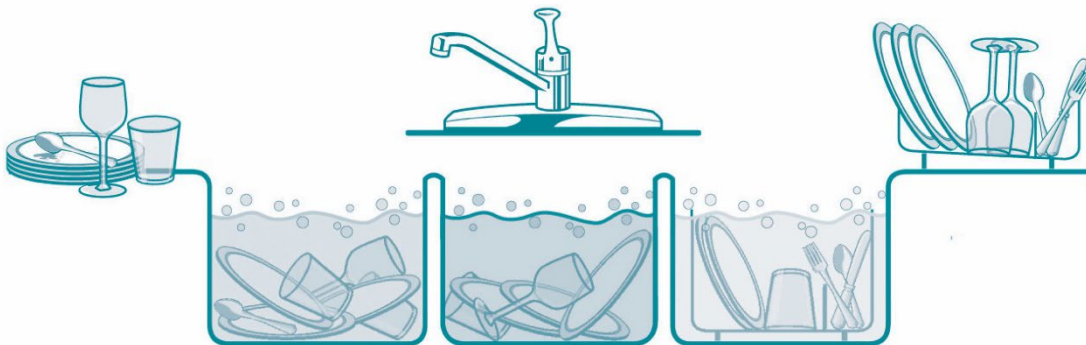
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3. Label the five (5) steps of manual dishwashing in a three-compartment sink.



4. List the two (2) main types of mechanical dishwashers and explain how each sanitizes.

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5. Explain the three (3) steps involved when cleaning and sanitizing kitchen equipment or surfaces “in-place” when using a household chlorine bleach solution.

Wash:

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Rinse:

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Sanitize:

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6. Describe some general measures that can be taken to control an existing pest problem or reduce the likelihood of getting one.

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# Appendix 1



Health Protection and Promotion Act  
[ONTARIO REGULATION 493/17](#)  
**FOOD PREMISES**

Consolidation Period: From January 1, 2020 to the [e-Laws currency date](#).  
Last amendment: [471/19](#).  
Legislative History: [471/19](#).  
This is the English version of a bilingual regulation.

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## **PART I**

### **Interpretation and Application**

#### **Interpretation**

1. (1) In this Regulation,

“*corrosion-resistant material*” means any material that maintains its original surface characteristics after,  
(a) repeated exposure to food, soil, moisture or heat, or  
(b) exposure to any substance used in cleansing and sanitizing; (“matériau résistant à la corrosion”)

“*domestic hen*” means a hen of the domestic chicken belonging to the species *Gallus Domesticus*; (“poule domestique”)

“*eggs*” means raw eggs in the shell; (“oeufs”)



*“equipment”* means any appliance, apparatus or device that is or may be used in the operation or maintenance of a food premise, including vending machines, but does not include utensils or multi-service articles; (*“équipement”*)

*“farmers’ market food vendor”* means the operator of a stall or other food premise that is located at a central location at which a group of persons who operate stalls or other food premises meets to sell or offer for sale to consumers products that include, without being restricted to, farm products, baked goods and preserved foods, and at which the majority of the persons operating the stalls or other food premises are producers of farm products who are primarily selling or offering for sale their own products; (*“vendeur d’aliments dans un marché de producteurs”*)

*“farm products”* means products that are grown, raised or produced on a farm and intended for use as food and include, without being restricted to, fruits and vegetables, mushrooms, meat and meat products, dairy products, honey products, maple products, fish, grains and seeds and grain and seed products; (*“produits agricoles”*)

*“food contact surface”* means the surface of counters, equipment and utensils with which food may normally come into contact; (*“surface de contact avec des aliments”*)

*“food handler”* means any person who,  
(a) is employed in a food premise, and  
(b) handles or comes in contact with any utensil or with food during its preparation, processing, packaging, service, storage or transportation; (*“préposé à la manutention des aliments”*)

*“food handler training”* means food safety training provided by a local board of health, agency of a board of health or through a program that the Ministry has recognized as being equivalent to the food safety training standards established by the Ministry; (*“formation des préposés à la manutention des aliments”*)

*“food service premise”* means any food premise where meals or meal portions are prepared for immediate consumption or sold or served in a form that will permit immediate consumption on the premises or elsewhere; (*“lieu de restauration”*)

*“Grade ‘C’ eggs”* means eggs that are graded Canada C in accordance with the Egg Regulations (Canada), made under the Canada Agricultural Products Act (Canada); (*“oeufs de catégorie C”*)

*“handwashing station”* means a hand basin with hot and cold running water that is located in close proximity to a soap dispenser and either a mechanical hand dryer or a single-service towel dispenser; (*“poste de lavage des mains”*)

*“low-risk food”* means food that is not potentially hazardous food; (*“aliments à faible risque”*)

*“manufactured meat product”* means food that is the product of a process, that contains meat as an ingredient and that is customarily eaten without further cooking, and includes meat that is processed by salting, pickling, fermenting, canning, drying or smoking or otherwise applying heat or to which edible fats, cereals, seasonings or sugar have been added; (*“produit carné”*)

*“mobile food premise”* means a trailer, cart or vehicle-mounted food premise or other itinerant food premise which is capable of being readily moved and in which food is prepared and offered for sale to the public; (*“dépôt d’aliments mobile”*)

*“multi-service article”* means any container or utensil that is intended for repeated use in the service or sale of food; (*“article à usage multiple”*)

*“official method”* means a method used by a public health laboratory centre established under section 79 of the Act for the laboratory examination of food; (*“méthode officielle”*)

“*potentially hazardous food*” means food in a form or state that is capable of supporting the growth of infectious or toxigenic micro-organisms and which requires time and temperature control to limit such growth; (“aliments potentiellement dangereux”)

“*pre-packaged foods*” means food that is packaged at a premise other than the premises at which it is offered for sale; (“aliments préemballés”)

“*registered egg station*” means a registered egg station within the meaning of the Egg Regulations (Canada) made under the Canada Agricultural Products Act (Canada); (“poste d’oeufs agréé”)

“*registered processed egg station*” means a registered processed egg station within the meaning of the Processed Egg Regulations (Canada) made under the Canada Agricultural Products Act (Canada); (“poste agréé d’oeufs transformés”)

“*sanitizing*” means treatment designed to reduce the level of microorganisms to a level that will not compromise the safety of food products, and “*sanitize*” has a corresponding meaning; (“désinfection, désinfecter”)

“*servicing*” includes self-service; (“service”)

“*single-service article*” means any container or eating utensil that is to be used only once in the service or sale of food; (“article à usage unique”)

“*single-service towel*” means a towel that is to be used only once before being discarded or laundered for reuse; (“serviette jetable”)

“*utensil*” includes kitchenware, tableware, glasses, cutlery or other similar items used in the handling, preparing, processing, packaging, displaying, serving, dispensing, storing, containing or consuming of food. (“ustensile”)

(2) A reference in this Regulation to the medical officer of health or the public health inspector means the medical officer of health or the public health inspector, as the case may be, of the board of health in the health unit in which the food premise referred to is situated.

## **Application**

2. (1) No person shall operate or maintain a food premise to which this Regulation applies except in accordance with this Regulation.

(2) This Regulation applies to all food premises **except**,

(a) boarding houses that provide meals for fewer than 10 boarders;

(b) subject to subsection (3), food premises owned, operated or leased by religious organizations, service clubs or fraternal organizations where the religious organization, service club or fraternal organization,

(i) prepares and serves meals for special events, or

(ii) conducts bake sales; and

(c) farmers’ market food vendors.

(3) If a religious organization, service club or fraternal organization prepares and serves a meal for a special event to which the general public is invited that includes potentially hazardous food originating from a food premise that is not inspected under the Act, the exemption in clause (2) (b) applies only if the following conditions are met:

1. Patrons attending the special event must be notified in writing as to whether or not the food premise has been inspected in accordance with this Regulation. The notice shall be posted in a conspicuous place at the entrance to the food premise at which the special event meal is held.

2. The operator must keep a list of all persons who donate potentially hazardous food for the special event meal and must provide a copy of that list to a public health inspector on request. The list must contain each donor’s name, address and telephone number, in full.

### **Sale of pre-packaged, low-risk food or hot beverages**

3. Food premises that sell or offer for sale only hot beverages or pre-packaged, low-risk food items, or both, are exempt from the provisions of clauses 7 (3) (b) and (c) and Parts IV and V if,
- (a) the food premise uses only single-service articles; and,
  - (b) any eating or drinking area in the premise is not greater than 56 square metres in area.

### **Low-risk or pre-packaged foods only**

- 3.1 The following food premises are exempt from the provisions of clause 7 (3) (c) and of sections 18 and 32:
- 1. Food premises that do not prepare food and that distribute only low-risk food items, pre-packaged food items, or a combination of low-risk food items and pre-packaged food items.
  - 2. Food premises that prepare only low-risk food items and serve only,
    - i. low-risk food items,
    - ii. pre-packaged, ready-to-eat food items, or
    - iii. a combination of low-risk food items and pre-packaged, ready-to-eat food items. O. Reg. 471/19, s. 1.

## **PART II Mobile Food Premises**

### **Mobile food premises**

4. (1) In every mobile food premise,
- (a) food shall be prepared within the premise and served to the public by persons working within the premise;
  - (b) only single-service articles shall be used to serve the food;
  - (c) separate holding tanks shall be provided for potable water and waste water; and
  - (d) every waste tank and water supply tank shall be equipped with an easily readable gauge for determining the waste or water level in the tank.
- (2) Clauses (1) (c) and (d) do not apply to mobile food premises that sell only pre-packaged or non-hazardous food.

## **PART III Operation and Maintenance**

### **Commencement of operations**

5. A person who gives notice of an intention to commence to operate a food premise to the medical officer of health under subsection 16 (2) of the Act shall include his or her name, contact information and the location of the food premise in the notice.

### **Results of inspections to be posted**

6. Every operator of a food premise shall ensure that the results of any inspections conducted by a public health inspector are posted in accordance with the inspector's request.

### **Operation and maintenance**

7. (1) Every food premise shall be operated and maintained such that,
- (a) the premises are free from every condition that may,
    - (i) be a health hazard,
    - (ii) adversely affect the sanitary operation of the premises, or
    - (iii) adversely affect the wholesomeness of food therein;
  - (b) no room where food is prepared, processed, packaged, served, transported, manufactured, handled, sold, offered for sale or displayed is used for sleeping purposes;
  - (c) the floor or floor coverings are tight, smooth and non-absorbent in rooms where,
    - (i) food is prepared, processed, packaged, served, transported, manufactured, handled, sold, offered for sale or displayed,
    - (ii) utensils are cleaned, or
    - (iii) washing fixtures and toilet fixtures are located;

- (d) the walls and ceilings of rooms and passageways may be readily cleaned and may be maintained in a sanitary condition;
- (e) every room in the premise where food is prepared, processed, packaged, served, transported, manufactured, handled, sold, offered for sale or displayed is maintained in a sanitary condition so as to prevent contamination of food;
- (f) every room where food is prepared, processed, packaged, served, transported, manufactured, handled, sold, offered for sale or displayed is kept free from materials and equipment not regularly used in the room;
- (g) the floors, walls and ceilings of every room where food is prepared, processed, packaged, served, transported, manufactured, handled, sold, offered for sale or displayed are kept clean and in good repair; and
- (h) single-service containers and single-service articles are kept in such a manner and place as to prevent contamination of the containers or articles.

(2) Despite clause (1) (c), carpeting may be used in areas where food is served if it is maintained in a clean and sanitary condition.

(3) Every food premise shall be provided with,

- (a) a supply of potable water adequate for the operation of the premises;
- (b) hot and cold running water under pressure in areas where food is processed, prepared or manufactured or where utensils are cleaned;
- (c) an adequate number of handwashing stations that are maintained and kept adequately supplied and that are situated for convenient access by food handlers; and
- (d) refrigerated space adequate for the safe storage of potentially hazardous food.

(4) The handwashing stations referred to in clause (3) (c) shall be used only for the handwashing of employees.

#### **Equipment, utensils and multi-service articles**

8.(1) All equipment, utensils and multi-service articles that are used for the preparation, processing, packaging, serving, transportation, manufacture, handling, sale, offer for sale or display of food in a food premise shall be,

- (a) of sound and tight construction;
- (b) kept in good repair;
- (c) of such form and material that it can be readily cleaned and sanitized; and
- (d) suitable for their intended purpose.

(2) Equipment and utensils that come into direct contact with food shall be,

- (a) corrosion-resistant and non-toxic; and
- (b) free from cracks, crevices and open seams.

#### **Arrangement of furniture, etc.**

9. Furniture, equipment and appliances in any room or place where food is prepared, processed, packaged, served, transported, manufactured, handled, sold, offered for sale or displayed shall be so constructed and arranged as to permit thorough cleaning and the maintaining of the room or place in a clean and sanitary condition.

#### **Illumination**

10. The levels of illumination required under Ontario Regulation 332/12 (Building Code) made under the Building Code Act, 1992 shall be maintained in a food premise during all hours of operation.

#### **Ventilation**

11. The ventilation system in every food premise shall be maintained to ensure the elimination of odours, fumes, vapours, smoke and excessive heat.

#### **Garbage and wastes**

12. Garbage and wastes, including liquid wastes, shall be collected and removed from a food premise as often as is necessary to maintain the premise in a sanitary condition.

### **Pest control**

13.(1) Every food premise shall be protected against the entry of pests and kept free of conditions that lead to the harbouring or breeding of pests.

(2) Every operator of a food premise shall maintain records of all pest control measures that are undertaken in the premise and shall retain the records for at least one year after they are made.

### **Live birds or animals**

14. (1) Every room where food is prepared, processed, packaged, served, transported, manufactured, handled, sold, offered for sale or displayed shall be kept free from live birds or animals. O. Reg. 493/17, s. 14 (1).

(2) Subsection (1) does not apply to any of the following:

1. Service animals described in subsection 80.45 (4) of Ontario Regulation 191/11 (Integrated Accessibility Standards) made under the Accessibility for Ontarians with Disabilities Act, 2005 that are in an area of the food premise where food is served, sold or offered for sale.

2. Live birds or animals that are offered for sale on food premises other than food service premises, if the medical officer of health has given approval in writing for the keeping of the birds or animals on the premises.

3. Live aquatic species displayed or stored in sanitary tanks on food premises.

4. Live dogs in an outdoor eating area of a food service premise as long as food is not prepared in the eating area.

5. Live dogs in an indoor eating area of a food service premise if,

i. the only food items that are manufactured, processed or prepared at the food service premise are low-risk food items, and

ii. the dogs are in a room where only low-risk or pre-packaged, ready-to-eat food items, or both, are served, sold, offered for sale or displayed, and no manufacturing, processing or preparation of food items takes place in the room. O. Reg. 493/17, s. 14 (2); O. Reg. 471/19, s. 2

### **Table covers, napkins and serviettes**

15. Table covers, napkins or serviettes used in the service of food shall be clean and in good repair.

### **Cloths and towels**

16. Cloths and towels used for cleaning, drying or polishing utensils or cleaning food contact surfaces shall be,

(a) in good repair;

(b) clean; and

(c) used for no other purpose.

### **Vending machines**

17. (1) Every vending machine in a food premise that automatically mixes water to create a product shall be provided with a potable water supply piped into the machine under pressure.

(2) The name and telephone number of the operator of a vending machine shall be prominently displayed on or near the vending machine if an employee of the operator is not in full-time attendance.

## **PART IV Cleaning and Sanitizing**

### **Equipment for cleaning and sanitizing**

18. One of the following types of equipment must be provided in a food premise for the cleaning and sanitizing of utensils:

1. Mechanical equipment.

2. Equipment for washing by hand consisting of drainage racks of corrosion-resistant material and,

i. a three-compartment sink, or three sinks, of corrosion-resistant material of sufficient size to ensure thorough cleaning and sanitizing of utensils, or

ii. a two-compartment sink, or two sinks, of corrosion-resistant material for the cleaning and sanitizing of utensils, if,

A. the food premise does not use it for multi-service articles,

- B. washing and rinsing can be done effectively in the first sink, and
- C. the second sink is used for sanitizing as described in section 19.

### **Utensil sanitization**

19. Utensils shall be sanitized through the use of,
- (a) clean water at a temperature of at least 77° Celsius, or more, for at least 45 seconds;
  - (b) a clean chlorine solution of not less than 100 parts per million of available chlorine at a temperature not lower than 24° Celsius for at least 45 seconds;
  - (c) a clean quaternary ammonium compound solution of not less than 200 parts per million at a temperature not lower than 24° Celsius for at least 45 seconds;
  - (d) a clean solution containing not less than 25 parts per million of available iodine at a temperature not lower than 24° Celsius for at least 45 seconds; or
  - (e) other sanitizing agents if,
    - (i) they are approved for use by Health Canada, the Canadian Food Inspection Agency or the medical officer of health for the intended purpose,
    - (ii) they are used in accordance with the manufacturer's instructions, and
    - (iii) a test reagent for determining the concentration of sanitizer is readily available where the sanitizing takes place.

### **Mechanical dishwashers**

20. (1) Mechanical dishwashers must be,
- (a) so constructed, designed and maintained that,
    - (i) the wash water is sufficiently clean at all times to clean the dishes and is maintained at a temperature not lower than 60° Celsius or higher than 71° Celsius, and
    - (ii) the sanitizing rinse is,
      - (A) water that is maintained at a temperature not lower than 82° Celsius and is applied for a minimum of 10 seconds in each sanitizing cycle, or
      - (B) a chemical solution described in clause 19 (b), (c), (d) or (e); and
  - (b) provided with thermometers that show wash and rinse temperatures and that are so located as to be easily read.
- (2) Subsection (1) does not apply to a mechanical dishwasher that bears a certification from NSF International that certifies it for commercial use.
- (3) Subsections (1) and (2) do not apply if the medical officer of health is satisfied that the mechanical dishwasher will effectively clean and sanitize utensils and is appropriate for use at the food premise.

### **Cleaning and sanitizing of utensils**

21. (1) Multi-service articles shall be cleaned and sanitized after each use.
- (2) Utensils other than multi-service articles shall be cleaned and sanitized as often as is necessary to maintain them in a clean and sanitary condition.

### **Cleaning and sanitizing of surfaces**

22. The surfaces of equipment and facilities other than utensils that come in contact with food are cleaned and sanitized as often as is necessary to maintain such surfaces in a sanitary condition.

### **Storage of substances**

23. Toxic or poisonous substances required for maintenance of sanitary conditions shall be,
- (a) kept in a compartment separate from food so as to preclude contamination of any food, working surface or utensil;
  - (b) kept in a container that bears a label on which the contents of the container are clearly identified; and
  - (c) used only in such manner and under such conditions that the substances do not contaminate food or cause a health hazard.



## **PART V SANITARY FACILITIES**

### **Altering floor space, number of toilets or washbasins**

24. (1) No operator of a food premise shall alter the floor space, number of toilets or washbasins in a sanitary facility without first receiving approval in writing from a public health inspector.

(2) Subsection (1) does not apply if the food premise is a meat plant licensed under Ontario Regulation 31/05 (Meat) made under the Food Safety and Quality Act, 2001 or a plant licensed under the Milk Act.

### **Sanitary facilities**

25.(1) Every operator of a food premise shall ensure that sanitary facilities are maintained in accordance with the design, construction and installation requirements in Ontario Regulation 332/12 (Building Code) made under the Building Code Act, 1992.

(2) Every sanitary facility in a food premise shall be kept sanitary, properly equipped and in good repair at all times.

(3) Every sanitary facility in a food premise shall be equipped with,

- (a) a constant supply of hot and cold running water;
- (b) a supply of toilet paper;
- (c) a durable, easy-to-clean receptacle for used towels and other waste material;
- (d) a supply of soap or detergent; and
- (e) a method of hand drying that uses single-service towels or a hot air dryer.

(4) A food premise where water-flush toilets could not be installed is exempt from the requirements of clauses (3) (a), (d) and (e) if,

- (a) non-flush toilets or privies completely separate from the food premise were constructed in accordance with a permit issued under the Building Code Act, 1992; and
- (b) the facilities are lighted and provided with commercially packaged single-use moist towelettes.

## **PART VI Food Handling**

### **Food service premise, food handling**

26. (1) All food shall be protected from contamination and adulteration.

(2) All food must be processed in a manner that makes the food safe to eat.

(3) Subject to subsection (4), food that has previously been served to a customer shall not be re-served.

(4) Low-risk food that was previously served in packaging or a container that protects the food from contamination may be re-served if the packaging or container has not been compromised and the food has not been contaminated.

(5) Ice used in the preparation and processing of food or drink shall be made from potable water and shall be stored and handled in a sanitary manner.

### **Temperature, potentially hazardous food**

27. (1) Potentially hazardous food shall be distributed, maintained, stored, transported, displayed, sold and offered for sale only under conditions in which the internal temperature of the food is,

- (a) 4° Celsius, or lower; or
- (b) 60° Celsius, or higher.

(2) Subsection (1) does not apply,

- (a) to a potentially hazardous food during those periods of time, not to exceed two hours, that are necessary for the preparation, processing and manufacturing of the food; or
- (b) to a hermetically sealed food that has been subjected to a process sufficient to prevent the production of bacterial toxins or the survival of spore-forming pathogenic bacteria.

### **Frozen food to be kept frozen**

28. Food that is intended to be distributed, maintained, stored, transported, displayed, sold or offered for sale in a frozen state shall be kept in a frozen state until sold or prepared for use.

### **Food processing records**

29. (1) Any food that is liable under law to inspection by the Government of Canada or Ontario, or by an agency of either, in a food premise must be obtained from a source that is subject to inspection by that entity unless otherwise permitted under this Regulation.

(2) Every operator of a food premise shall ensure that records of the purchase of food for use in the premise are retained on the premise at least until the first anniversary of the purchase date.

### **Potentially hazardous food storage**

30. The equipment used for refrigeration or hot-holding of potentially hazardous foods must,

(a) be of sufficient size to store any potentially hazardous food and maintain it at the applicable temperature set out in section 27; and

(b) contain accurate indicating thermometers that may be easily read.

### **Other food storage**

31. Racks, shelves or pallets that are used to store food in a food premise must be designed to protect the food from contamination and must be readily cleanable.

### **Food handler training**

32. Every operator of a food service premise shall ensure that there is at least one food handler or supervisor on the premise who has completed food handler training during every hour in which the premise is operating.

### **Food handlers**

33. (1) Every operator of a food premise shall ensure that every food handler in the food premise shall,

(a) not use tobacco while engaged as a food handler;

(b) be clean and practise good personal hygiene;

(c) wear clean outer garments;

(d) take reasonable precautions to ensure that food is not contaminated by hair;

(e) wash hands as often as necessary to prevent the contamination of food or food areas;

(f) be free from any infectious agent of a disease that may be spread through the medium of food;

(g) submit to such medical examinations and tests as are required by the medical officer of health to confirm the absence of an infectious agent mentioned in clause (f); and

(h) refrain from any other conduct that could result in the contamination of food or food areas.

(2) A person who has a skin disease shall not perform any work that brings him or her into contact with food unless he or she has obtained the approval of the medical officer of health in writing before performing the work.

## **PART VII Commodities**

### **Meat and Meat Products**

#### **Manufactured meat products safety procedures**

34. (1) Every operator of a food premise at which manufactured meat products are manufactured must develop written food safety procedures relating to manufactured meat products designed to ensure that no health hazards arise in relation to their use.

(2) The written procedures referred to in subsection (1) must be approved by a medical officer of health or a public health inspector.

(3) Subsection (2) does not apply if the food premise is a meat plant licensed under Ontario Regulation 31/05 (Meat) made under the Food Safety and Quality Act, 2001.

(4) The operator referred to in subsection (1) shall ensure that the procedures are followed in the food premise.

### **Consumption of manufactured meat products**

35. In a food premise, manufactured meat products shall be subjected to a process sufficient to destroy pathogenic bacteria, parasites, the cystic forms of parasites and any other forms of contamination that would render the products unsafe to eat.

### **Manufactured meat product records**

36. (1) Every operator of a food premise in which meat products are manufactured shall ensure that records for manufactured meat products are created and retained on the premise at least until the first anniversary of the date on which they were made.

(2) The records referred to in subsection (1) shall include the kinds of meat products manufactured, the names and addresses of suppliers that supplied products used in the manufacturing, the weight of the meat products and the dates of receipt of products used in the manufacturing.

### **Manufactured meat product identifiers**

37. (1) Every manufactured meat product that is transported, handled, distributed, displayed, stored, sold or offered for sale at a food premise shall be identified as to the meat processing plant of origin by a tag, stamp or label affixed to the product.

(2) Subsection (1) does not apply to a manufactured meat product stored, sold or offered for sale in a retail outlet at the plant of origin.

### **Meat permitted at food premise**

38. (1) The only meat permitted at a food premise is meat that has been obtained from an animal inspected and approved for use as food in accordance with either Ontario Regulation 31/05 (Meat) made under the Food Safety and Quality Act, 2001 or the regulations made under the Meat Inspection Act (Canada) and that has been stamped and labelled or otherwise identified in accordance with that regulation or that Act.

(2) Despite subsection (1), a food premise where meat is sold, other than a food service premise, may have the meat of game animals obtained through hunting on the premises for the purposes of custom-cutting, wrapping and freezing it for its owner if,

- (a) the meat is custom-cut, wrapped, frozen and stored in such a manner that it does not come into contact with inspected meat;
- (b) each quarter or larger section of the carcass bears a tag showing the name and address of the owner of the meat; and
- (c) each quarter or larger section of the carcass is legibly labelled “Consumer Owned, Not for Sale” or “Consumer Owned, Not for Sale/Propriété du consommateur — non destiné à la vente” on each of the primal cut areas, using ink made from non-toxic edible ingredients and in letters at least 1.25 centimetres in height.

(3) Despite subsection (1), a food premise in a meat plant licensed under Ontario Regulation 31/05 (Meat) made under the Food Safety and Quality Act, 2001 may have uninspected meat on the premises if,

- (a) an approval has been issued under Part VIII.2 of that regulation for the uninspected meat to enter a meat plant;
- (b) a director has approved the food premise under Part VIII.3 of that regulation for the purposes of receiving the uninspected meat for the period of time that the meat is present on the premise; or
- (c) the premise has been approved under Part VIII.4 of that regulation for the purposes of receiving and processing hunted game carcasses.

(4) The operator of a food premise that has uninspected meat on the premises shall ensure that,

- (a) the uninspected meat is kept out of any part of the food premise where food is sold, served or offered for sale; and
- (b) the uninspected meat is not sold or offered for sale.

(5) Despite subsection (1), a food premise located at the Sioux Lookout Meno-Ya-Win Health Centre may have hunted game meat from wild moose, wild duck, wild goose, wild caribou, wild muskrat, wild rabbit, wild deer, wild beaver, wild

elk or wild muskox on the premises if the bird or animal was killed in the course of hunting and if the following conditions are met:

1. The meat is handled, prepared, processed and stored for the sole purpose of serving it to patients, visitors and staff at the Health Centre.
2. The meat is handled, prepared, processed and stored so that it does not come into contact with other food before the other food is served.
3. Patients, visitors and staff at the Health Centre are informed in writing each time before they are served the meat that it has not been inspected in accordance with either Ontario Regulation 31/05 (Meat) made under the Food Safety and Quality Act, 2001 or the regulations made under the Meat Inspection Act (Canada), and that meat that has been inspected is available for consumption.
4. Patients, visitors and staff at the Health Centre are informed in writing that meat that has been inspected in accordance with either Ontario Regulation 31/05 (Meat) made under the Food Safety and Quality Act, 2001 or the regulations made under the Meat Inspection Act (Canada) is always available to be served on the premises.

(6) Despite subsection (1), a food premise may have game animal meat obtained through hunting on the premises that is handled, prepared and stored for the purpose of serving it at a wild game dinner or a wild game event if the following conditions are met:

1. The meat is handled, prepared and stored so that it does not come into contact with other food before the other food is served.
  2. Patrons and staff are notified in writing each time before they are served the meat that it has not been inspected in accordance with either Ontario Regulation 31/05 (Meat) made under the Food Safety and Quality Act, 2001 or the regulations made under the Meat Inspection Act (Canada). The notice must be posted in a conspicuous place at the entrance to the venue at which the wild game dinner or wild game event is held.
  3. The operator must keep a list of all patrons who attend the wild game dinner or wild game event and must provide a copy of the list to a public health inspector upon request. The list must contain each patron's name, address and telephone number, in full.
  4. The operator must keep a list of all persons who donate hunted game animal meat for a wild game dinner or wild game event and must provide a copy of the list to a public health inspector upon request. The list must contain,
    - i. each donor's name, address and telephone number, in full, and
    - ii. with respect to each donor, the name of the species from which the donated meat was obtained.
- (7) In subsection (6),

*“wild game dinner”* means a dinner provided under the authority of an authorization granted under clause 52 (3) (a) of the Fish and Wildlife Conservation Act, 1997; (*“dîner avec gibier sauvage au menu”*)

*“wild game event”* means an event at which game wildlife may be served in accordance with section 135.1 of Ontario Regulation 665/98 (Hunting) made under the Fish and Wildlife Conservation Act, 1997. (*“événement avec gibier sauvage au menu”*)

(8) Utensils, equipment and food contact surfaces that have been in contact with uninspected meat shall be cleaned and sanitized in accordance with Part IV before being used in connection with any other food.

## **Milk and Milk Products**

### **Pasteurization and sterilization**

39. (1) Milk products with less than 10 per cent milk fat shall be pasteurized, or made from milk that has been pasteurized, by,

- (a) heating to a temperature of at least 63° Celsius and holding it at that temperature for not less than 30 minutes if a batch pasteurization system is used;
- (b) heating to a temperature of at least 72° Celsius and holding it at that temperature for not less than 15 seconds in a high temperature short time pasteurizer; or
- (c) heating to another temperature and holding it at that temperature for a period of time, if the process will result in the destruction of pathogenic organisms and phosphatase that is at least equivalent to the processes set out in clauses (a) and (b).

(2) Milk products with 10 per cent milk fat or more shall be pasteurized, or made from milk that has been pasteurized, by,

- (a) heating to a temperature of at least 66° Celsius and holding it at that temperature for not less than 30 minutes if a batch pasteurization system is used; or
- (b) heating to a temperature of at least 75° Celsius and holding it at that temperature for not less than 15 seconds in a high temperature short time pasteurizer.

(3) Milk products shall be commercially sterilized by heating the milk product to a temperature of at least 135° Celsius and holding it at that temperature for not less than two seconds, or to such other temperature for such period of time as will result in sterilization.

#### **Cooling after pasteurization**

40. (1) Milk products shall be cooled immediately after pasteurization to a temperature of at least 4° Celsius or less.

(2) Subsection (1) does not apply to a milk product that,

- (a) is to be further processed prior to packaging, then cooled to 4° Celsius, or less;
- (b) has been commercially sterilized and is to be or is aseptically packaged; or
- (c) is processed by drying.

#### **Pasteurizers**

41. (1) Every pasteurizer used to pasteurize milk products in a food premise shall be equipped with indicating and recording thermometers that are accurate and may be easily read.

(2) Every high temperature short time pasteurizer used to pasteurize milk products in a food premise shall be equipped with a properly functioning flow diversion valve.

(3) Recording thermometers shall be moisture-proof and easily read.

(4) The temperature of a milk product in a pasteurizer at any time shall be taken as the temperature shown on the indicating thermometer and not the temperature shown by the recording thermometer.

(5) The temperature shown by the recording thermometer shall be checked daily by the operator against the temperature shown by the indicating thermometer and shall be adjusted to read no higher than the temperature shown by the indicating thermometer.

#### **Pasteurization recording device**

42. (1) A pasteurization recording device shall be used in the pasteurization of milk products and shall record the following information:

1. The name of the operation and the date of the operation.
2. The number of the pasteurizer, if more than one is in use, to which the recording device is attached.
3. The temperature of the indicating thermometer at some time corresponding with a marked point in the holding period.
4. The name of the milk product being pasteurized.

(2) An operator of a pasteurizer shall create a record of the information listed in subsection (1) during the pasteurization of any milk products and sign it.

(3) The record referred to in subsection (2) must be retained for at least one year after it was made or, for milk and milk products with a shelf life greater than one year, until that shelf life has expired.

(4) The operator shall provide the records referred to in subsection (2) to a public health inspector or medical officer of health on request.

### **Cheese from unpasteurized milk**

43. Subsection 18 (2) of the Act does not apply to cheese made from unpasteurized milk if the cheese has been subjected to conditions of storage that are sufficient to destroy pathogenic bacteria and toxins and any other forms of contamination that would render the cheese unsafe to eat.

### **Sanitization**

44. Equipment for pasteurization, sterilization and subsequent handling of milk and milk products shall be cleaned and sanitized immediately prior to use.

### **Milk containers**

45. Sterilized fluid milk products shall be sold in or from containers that bear the words "STERILIZED" or "STERILE" and "REFRIGERATE AFTER OPENING".

### **Repackaging of milk products**

46. (1) A food premise that repackages milk products not produced in that food premise shall identify the original processor, packing date and batch number on the containers of repackaged milk products.

(2) Despite subsection (1), the operator of the food premise may show the following information on the containers of repackaged milk products if the operator maintains records that identify their original processor, packing date and batch number:

1. The operator's name and address or code marking.
2. The operator's "Best Before" or repackaging date.

(3) The records referred to in subsection (2) must be retained on the food premise until at least the first anniversary of the date on which the milk product was repackaged.

(4) This section does not authorize the repackaging of fluid milk products.

## **Eggs**

### **Grade C eggs**

47. (1) No operator of a food premise shall store, handle, serve, process, prepare, display, distribute, transport, sell or offer for sale ungraded or Grade "C" eggs.

(2) Despite subsection (1), the operator of a registered egg station may store and handle ungraded eggs for the purpose of grading and may sell, offer to sell and transport Grade "C" eggs to a registered processed egg station.

(3) Subsection (1) does not apply to eggs from animals other than the domestic hen if,

- (a) the eggs are in clean condition, with no visible cracks, at the time they enter the food premise; and
- (b) the eggs are transported and stored at a cold-holding temperature of 4° Celsius, or less.

### **Part VIII (OMITTED)**

48. Omitted (revokes other Regulation).

49. Omitted (provides for coming into force of provisions of this Regulation).



# Appendix 2

## Foodborne Illness Reference Chart

Organism	Type of Illness	Incubation Period	Symptoms	Duration of Illness	Source
<b>Spore-forming Bacteria</b>					
<i>Bacillus cereus</i>	Toxin-mediated infection (Diarrheal form)	6-24 hrs	Watery diarrhea, cramps, fever, occasionally vomiting	Avg. 24 hrs	Soil, milk, vegetables, meat
	Intoxication (Vomiting form)	30 min-6 hrs	Vomiting, nausea, malaise, occasionally diarrhea	Avg. 24 hrs	Soil, rice, pasta
<i>Clostridium perfringens</i>	Toxin-mediated infection	8-24 hrs (Avg. 10-12 hrs)	Watery diarrhea, nausea, abdominal pain	Avg. 24 hrs	Meats, stews, soups, gravies, human feces
<i>Clostridium botulinum</i>	Intoxication	3 hrs-several days (Avg. 12-36 hrs)	Double vision, drooping eyelids, slurred speech, muscle weakness, respiratory failure. The fatality rate is 5 to 10%.	Weeks to months	Soil, aquatic sediment, birds, animals, fish, honey, agricultural products.

Organism	Type of Illness	Incubation Period	Symptoms	Duration of Illness	Source
<b>Non spore-forming Bacteria</b>					
<i>Campylobacter spp.</i>	Infection	1-10 days (Avg. 2-5 days)	Diarrhea (may contain blood or mucous), abdominal pain, nausea, vomiting, malaise, fever	Avg. 2-10 days (relapses common)	Poultry, unpasteurized milk, beef, pork, lamb, rodents, untreated drinking water, raw vegetables, raw eggs, shellfish, human feces
<i>E. coli</i> (strains such as O157:H7)	Toxin-mediated infection	2-10 days (Avg. 3-4 days)	Severe stomach cramps, diarrhea (often bloody), vomiting, fever, between 5-15% of cases develop HUS (kidney failure) which has a 5-10% mortality rate	Avg. 7-10 days	Beef, unpasteurized apple cider or juice, raw milk, untreated drinking water, raw fruits and vegetables, sprouts, human feces

Organism	Type of Illness	Incubation Period	Symptoms	Duration of Illness	Source
<b>Non spore-forming Bacteria</b>					
<i>Listeria monocytogenes</i>	Infection	3-70 days (Avg. 1-4 weeks)	Fever, muscle aches, sometimes preceded by diarrhea and other gastrointestinal symptoms, miscarriage	Variable	Soil, untreated water, poultry, deli meats, raw milk, cheese, animals, human feces
<i>Salmonella spp.</i>	Infection	6-72 hours (Avg. 12-36 hrs)	Diarrhea, fever, cramps, nausea, vomiting	Avg. 4-7 days	Poultry, eggs, meat, raw milk and cheese, raw fruits and vegetables, unpasteurized juices, reptiles, human feces
<i>Staphylococcus aureus</i>	Intoxication	30 mins – 8 hours (Avg. 2-4 hrs)	Nausea, vomiting, abdominal pain, cramps, diarrhea	Avg. 24 hrs	Humans (skin, mucous membranes, gastrointestinal and respiratory tracts), many animals, cows with infected udders
<i>Shigella spp.</i>	Infection	1-7 days (Avg. 12-50 hrs)	Diarrhea (may contain blood and/or mucous), cramps, nausea, vomiting, fever	Avg. 24-48 hrs	Human feces, primates
<i>Vibrio parahaemolyticus</i>	Infection	4-96 hrs (Avg. 15 hrs)	Diarrhea (sometimes bloody), cramps, nausea, vomiting, headache, chills, fever	Avg. 2-5 days	Raw or undercooked bivalve shellfish and seafood, seawater, sediments
<i>Vibrio vulnificus</i>	Infection	Avg. 12-72 hrs	Diarrhea, cramps, nausea, vomiting, headache	Avg. 2-8 days	Raw or undercooked bivalve shellfish (specifically oysters) and seafood, estuary water
<i>Yersinia enterocolitica</i>	Infection	3-10 days (Avg. 3-7 days)	Diarrhea, cramps, cramps, stomach pain, fever	Avg. 4-7 days Up to several months	Pork, other animals, human feces
<i>Brucella spp.</i>	Infection	Up to several months (Avg. 5-60 days)	Fever, headache, fatigue	Up to several years. Avg. 1 year or less.	Unpasteurized milk and cheese, improperly cooked wild-game, common amongst lab-workers developing cultures

Organism	Type of Illness	Incubation Period	Symptoms	Duration of Illness	Source
<b>Parasites / Protozoa</b>					
<i>Anisakis spp.</i>	Parasitic infection	Hours - weeks	Abdominal pain, cramping, nausea, blood and/or mucous in stool, vomiting, sometimes coughing	Avg. 3 weeks	Raw or undercooked seafood (squid, crustaceans and fish, such as herring)
<i>Cryptosporidium parvum</i>	Protozoan infection	1-12 days (Avg. 7 days)	Diarrhea, sometimes vomiting, sometimes fever	Avg. under 1 month	Contaminated water, foods washed with contaminated water, animals, human feces
<i>Toxoplasma gondii</i>	Protozoan infection	5-18 days	Often no symptoms or mild flu-like symptoms in healthy individuals. Can cause a number of severe birth defects and sometimes results in stillbirth	Days-weeks	Pork, mutton (lamb) , wild game, sometimes beef raw vegetables, mice, rats, contaminated water, definitive hosts are cats
<i>Giardia lamblia</i>	Protozoan infection	3-25 days or longer (Avg. 7-10 days)	Diarrhea, cramps, bloating, greasy stool	2 weeks-several months Avg. 2-6 weeks	Untreated drinking or recreational water, animals, beavers, human feces
<i>Trichinella spiralis</i>	Parasitic infection	5-45 days (Avg. 8-15 days)	Nausea, diarrhea, vomiting, abdominal pain, muscle pain, fatigue, headache, cough, fever	Up to 2 months	Pork, wild game, bear
<i>Cyclospora cayetanensis</i>	Protozoan infection	2-14 days (Avg. 1 week)	Diarrhea, nausea, cramps, sometimes fever	Up to several months, avg. 10-24 days	Untreated drinking or recreational water, animals, beavers, human feces
<i>Diphyllobothrium spp.</i> (large tapeworm)	Parasitic infection	Weeks - years	Diarrhea, fatigue, abdominal pain, sometimes constipation, anemia	Up to several years	Raw or undercooked freshwater fish, seen in northern pike, perch, trout
<i>Taenia spp.</i>	Parasitic Infection	2 – 3 months for tapeworm to develop	Diarrhea, fatigue, abdominal pain, sometimes constipation	Up to several years	Beef, pork, other livestock

Organism	Type of Illness	Incubation Period	Symptoms	Duration of Illness	Source
<b>Viruses</b>					
<i>Norovirus</i>	Viral infection	12-48 hrs (Avg. 24-48 hrs)	Vomiting, diarrhea, abdominal cramps, fever, fatigue, muscle ache	Avg. 24-72 hrs	Human feces or vomit, raw or undercooked shellfish
<i>Hepatitis A</i>	Viral infection	15-50 days (Avg. 28 days)	Fever, fatigue, jaundice, dark urine, nausea, vomiting,	2 weeks – 3 months	Human feces, raw or undercooked shellfish
<i>Rotavirus</i>	Viral infection	Avg. 2 days	Vomiting, diarrhea, fever, abdominal pain	Avg. 3-8 days	Human feces

Organism	Type of Illness	Incubation Period	Symptoms	Duration of Illness	Source
<b>Chemicals</b>					
<b>Naturally Occurring Toxins</b>					
Mycotoxin	Intoxication	Variable	Kidney, liver and immune system impacts. Some may be carcinogenic.	Variable	Cereals, nuts, fruit and dried fruit, coffee, cocoa, spices, oilseeds and milk
Scombrototoxin	Allergic reaction	Avg. 1-30 mins	Flushing, headache, nausea, diarrhea, skin rash, itchiness	Hours-days Avg. 10-14 hrs	Tuna, mahi-mahi, sardines, anchovies, amberjack, abalone, bluefish
Shellfish toxins	Intoxication	Minutes – hours (Avg. 10-60 mins)	Nausea, vomiting, diarrhea, abdominal pain, muscle numbness, respiratory paralysis	Variable	Contaminated shellfish
Plant toxins	Intoxication	Variable	Variable	Variable	Variable
Allergens	Allergic reaction	Variable	Variable	Variable	Variable
<b>Man-Made Toxins:</b>					
Heavy metals	Intoxication	Variable	Variable - Headache, fatigue, muscle and joint pain, neurological disturbances, increased cancer risk, etc.	Variable	Mercury, rust from metal cooking utensils, storage of highly acidic foods in cooking utensils not designed for long-term storage

Organism	Type of Illness	Incubation Period	Symptoms	Duration of Illness	Source
<b>Chemicals</b>					
Pesticides	Intoxication	Variable	Variable – headaches, nausea, vomiting, abdominal pain, neurological disturbances, increased cancer risk, etc.	Variable	Pesticides used in the production of foods (produce), pesticides that are improperly used or stored in a food premise
Cleaners, sanitizers, etc.	Intoxication	Variable	Variable	Variable	Improper storage or usage of chemicals required to maintain a clean and sanitary food premise

## Appendix 3

### Quick Reference Chart for Key Temperature Conversions

°C	°F
<b>Common Food Safety Temperatures</b>	
-18	0
0	32
4	40
24	75
43	109
60	140
70	158
71	160
74	165
82	180
100	212
<b>Common Oven Temperatures</b>	
93	200
121	250
149	300
177	350
204	400
232	450



# Appendix 4

## Safe Food Storage Guidelines

The following table lists the length of recommended length of time that different foods can be stored in the refrigerator or freezer. These guidelines are provided by Health Canada. The recommended refrigeration times are for food safety and the recommended freezing times are for quality. Discard food if there is evidence of spoilage (slime, odour, mould, etc.). For more information, please visit:

<http://healthycanadians.gc.ca/eating-nutrition/safety-salubrite/storage-entreposage-eng.php>

Food Item(s)	Refrigerator: 4 °C (40 °F) or lower	Freezer: -18 °C (0 °F) or lower
<b>Fresh Meat</b>		
Beef	2-4 days	10 - 12 months
Pork	2-4 days	8 - 12 months
Lamb	2-4 days	8 - 12 months
Veal	3-4 days	8 - 12 months
Ground meat	1-2 days	2 - 3 months
<b>Fresh Poultry</b>		
Chicken/Turkey - whole	2-3 days	1 year
Chicken/Turkey - pieces	2-3 days	6 months
<b>Fresh Fish</b>		
Lean fish - cod, flounder etc.	3-4 days	6 months
Fatty fish - salmon etc.	3-4 days	2 months
Shellfish - clams, crab, lobster etc.	12-24 hours	2-4 months
Scallops, shrimp, cooked shellfish	1-2 days	2-4 months
<b>Ham</b>		
Canned ham	6-9 months	Don't freeze
Cooked ham	3-4 days	2-3 months
<b>Bacon and Sausages</b>		
Bacon	1 week	1 month
Raw sausage	1-2 days	1-2 months
Pre-cooked sausage links or patties	1 week	1-2 months
<b>Hot Dogs</b>		
Un-opened hotdogs	2 weeks	1-2 months
Opened hotdogs	1 week	1-2 months

Food Item(s)	Refrigerator: 4 °C (40 °F) or lower	Freezer: -18 °C (0 °F) or lower
<b>Lunch Meat and Deli Food</b>		
Un-opened lunch meat	2 weeks	1-2 months
Opened lunch meat	3-5 days	1-2 months
Deli packaged lunch meat	3-4 days	2-3 months
Deli or homemade salads	3-5 days	Don't freeze
<b>Leftovers</b>		
Cooked meat, stews, egg or vegetable dishes	3-4 days	2-3 months
Cooked poultry and fish	3-4 days	4-6 months
Meat broth and gravy	3-4 days	4-6 months
Soups	2-3 days	4 months
<b>Frozen Dinners</b>		
Keep frozen until ready to cook		3-4 months
<b>Eggs</b>		
Fresh in shell	3-4 weeks	Don't freeze
Fresh out of shell	2-4 days	4 months
Hard-cooked	1 week	Doesn't freeze well
Egg substitutes un-opened	10 days	1 year
Egg substitutes opened	3 days	Don't freeze
<b>Dairy Products</b>		
Un-opened milk	Best before date	6 weeks
Opened milk	3 days	Don't freeze
Un-opened cottage cheese	Best before date	Doesn't freeze well
Opened cottage cheese	3 days	Don't freeze
Un-opened yogurt	Best before date	1-2 months
Opened yogurt	3 days	Don't freeze
Soft cheese	1 week	Doesn't freeze well
Semi-soft cheese	2-3 weeks	8 weeks
Firm cheese	5 weeks	3 months
Hard cheese	10 months	1 year
Processed cheese	5 months	3 months
Un-opened salted butter	8 weeks	1 year

<b>Food Item(s)</b>	<b>Refrigerator: 4 °C (40 °F) or lower</b>	<b>Freezer: -18 °C (0 °F) or lower</b>
Un-opened unsalted butter	8 weeks	3 months
Opened butter	3 weeks	Don't freeze
<b>Vegetables</b>		
Beans green or waxed	5 days	8 months
Carrots	2 weeks	10-12 months
Celery	2 weeks	10-12 months
Leaf lettuce	3-7 days	Don't freeze
Iceberg lettuce	1-2 weeks	Don't freeze
Spinach	2-4 weeks	10-12 months
Summer squash	1 week	10-12 months
Winter squash	2 weeks	10-12 months
Tomatoes	Don't refrigerate	2 months

# Appendix 5

## Hazard Analysis Critical Control Point (HACCP) – General Principles

PROCESS	HAZARD	CRITERIA FOR CONTROL	MONITOR AND VERIFY	ACTION TO TAKE IF CRITERIA NOT MET
Receiving/ Purchasing	Contaminated food entering your facility.	Receive approved food at the appropriate internal temperature.	Check the internal food temperature upon delivery and obtain invoices.	Refuse the delivery if appropriate temperatures have not been maintained.
Refrigerating	Growth of pathogenic bacteria.	Refrigerate food so that it is held at 4°C or colder.	Monitor refrigerator and internal food temperatures.	Discard food if internal temperature rises above 4°C for more than 2 hours.
Freezing	Survival of pathogenic bacteria and microorganisms.	Freeze food so that it remains at an internal temperature of -18°C or colder.	Monitor freezer and internal food temperatures.	Modify freezer settings. Discard any food that shows evidence of having been partially thawed.
Thawing	Incomplete thawing can lead to insufficient cooking, allowing microorganisms to survive. Items thawed at room temperature can lead to bacterial growth and the production of toxins.	Use approved thawing methods to keep item out of the Danger Zone. Thaw the item completely.	Observe thawing procedures; check the temperature. Do not use until completely thawed unless thawing is part of the cooking process.	Modify the thawing procedure; continue to thaw if frozen. Discard products of questionable quality.
Preparing	Contamination from equipment, hands, surfaces, etc. Bacterial growth if food is in the Danger Zone for more than 2 hours.	Wash hands as they become dirty or contaminated. Clean and sanitize equipment and surfaces. Limit time spent in the danger zone.	Observe procedure, hand contact, and cleaning and sanitizing of equipment and surfaces. Exclude ill food handlers.	Discard food if it has become contaminated. Discard the food if it has been in the danger zone for more than 2 hours.
Cooking/ Re-heating	Pathogens can survive in inadequately cooked or re-heated food. Toxins and spores may not be destroyed.	Thoroughly cook and re-heat all foods to the required minimum internal cooking temperature. Check the temperature	Measure final temperatures in the centre or thickest part of the food with a probe thermometer.	Continue cooking or re-heating until the required internal cooking temperature is achieved.

PROCESS	HAZARD	CRITERIA FOR CONTROL	MONITOR AND VERIFY	ACTION TO TAKE IF CRITERIA NOT MET
		with a probe thermometer.		
Cooling	Large masses of food that are allowed to cool slowly will allow bacteria to multiply.	Cut up large items, use ice-water baths, and use shallow pans to rapidly cool food before putting it into refrigerator.	Measure product temperatures during the cooling process. Ensure proper techniques and equipment are being used.	If the food has not been rapidly cooked, discard the product.
Hot-Holding	Spores may germinate and pathogens can multiply at low hot-holding temperatures.	Maintain the temperature at 60°C or hotter.	Measure and monitor internal food and hot-holding equipment temperatures at least every 2 hours.	If the temperature falls below 60°C (for less than 2 hours), rapidly reheat to the original cooking temperature before returning to the hot-holding unit (but reheat products one time only).
Serving	Contamination from a food handler's hands.	Avoid direct hand contact with food. Exclude servers who are ill.	Observe whether food products are touched. Exclude ill food handlers.	Modify procedures as necessary. Discard contaminated food.

## Appendix 6

### Example HACCP Audit for Pre-packaged and Pre-cooked Chili

PROCESS	HAZARD	CRITERIA FOR CONTROL	MONITOR AND VERIFY	ACTION TO TAKE IF CRITERIA NOT MET
Receiving/ Purchasing	Contaminated food entering your facility.	Product must be delivered from supplier at 4°C or colder at least one week before best before date.	Take the internal temperature upon delivery to ensure 4°C or colder and check best before date. Obtain invoice.	Refuse the delivery if the internal temperature of the chili is determined to be greater than 4°C.
Refrigerating	Growth of pathogenic bacteria.	Immediately refrigerate the chili so that it is held at 4°C or colder.	Monitor the refrigerator and internal temperature of the chili.	Discard the chili if the internal temperature rises above 4°C for more than 2 hours.
Freezing	Survival of pathogenic bacteria and microorganisms.	N/A this product will never be frozen.	N/A	N/A
Thawing	Incomplete thawing can lead to insufficient cooking, allowing microorganisms to survive. Items thawed at room temperature can lead to bacterial growth and the production of toxins.	N/A this product will never need to be thawed, as it will never be frozen.	N/A	N/A
Preparing	Contamination from equipment, hands, surfaces, etc. Bacterial growth if food is in the Danger Zone for more than 2 hours.	Wash your hands before handling the chili. Take the chili package from the fridge, immediately open the package and pour the chili into a cleaned and sanitized stainless steel stockpot. Put the stockpot on the stovetop.	Monitor hand washing and the time it takes from removing the chili from the fridge and getting it into the stockpot on the stove. Take action to prevent cross-contamination	Discard the chili if it has taken more than two hours to get it onto the stovetop or if it has become cross-contaminated by another product.



PROCESS	HAZARD	CRITERIA FOR CONTROL	MONITOR AND VERIFY	ACTION TO TAKE IF CRITERIA NOT MET
Re-heating	Pathogens can survive in inadequately cooked or re-heated food. Toxins and spores may not be destroyed.	Since the chili is pre-cooked, it must be re-heated to 74°C within two hours.	Measure the final internal cooking temperature. Stir the chili and check the temperature with a probe thermometer in the centre of the pot to ensure it has reached 74°C.	If the temperature has not reached 74°C , continue cooking or re-heating until it does reach 74°C . If it has, it can go on to the next step.
Cooling	Large masses of food that are allowed to cool slowly will allow bacteria to multiply.	N/A the chili will not be cooled; any leftovers are to be discarded.	N/A	N/A
Hot-Holding	Spores may germinate and pathogens can multiply at low hot-holding temperatures.	Transfer the chili from the stockpot on the stovetop to the steam table. Maintain the temperature at of the chili at 60°C or hotter.	Monitor the internal temperature of the chili by measuring with a probe thermometer every two hours on the steam table.	If the temperature falls below 60°C re-heat the chili to 74°C, then return it to the steam table. If it falls below 60°C a second time, discard the product.
Serving	Contamination from a food handler's hands.	Avoid direct hand contact with food. Ensure to have a scoop that can be used to serve the chili.	Observe whether food products are touched. Exclude ill food handlers.	Use a scoop for the chili and replace the scoop at least every two hours.

## Appendix 7

### A VERY GENERAL CLEANING, SANITIZING AND MAINTENANCE SCHEDULE

“Clean” refers to the removal of food material and foreign debris from surfaces by thorough scrubbing action (by way of cloth, sponge or other appropriate material) with hot and soapy water. This shall be followed by removal of lifted material and debris with hot and clean water (by way of separate cloth, sponge or other appropriate material).

“Sanitize” refers to antimicrobial treatment, most commonly through an exposure time of at least 45 seconds to the following chemicals in the proper concentration (not lower than 24°C):

chlorine: 100 ppm in dishwashing sink or machine or for “in-place” sanitizing,

quaternary ammonium: 200 ppm in dishwashing sink or machine and follow manufacturer’s directions for “in-place” sanitizing.

1) FOOD CONTACT SURFACES: (*e.g., food preparation utensils, cutting boards, knives, tongs, etc.*) need to be cleaned and sanitized between food-preparation tasks or every 2 hours when in use.

2) POTENTIAL HAND-CONTACT SURFACES: (*e.g., cooking equipment, hand-wash sinks, fridge/freezer handles, counter-tops, etc.*) need to be cleaned and sanitized on a daily basis or as necessary to maintain them in a clean and sanitary manner.

3) WALLS, FLOORS, CEILINGS, EQUIPMENT and SANITARY FACILITIES: need to be kept clean and in good repair. Floors need to be swept and mopped on a daily basis, or as needed. Sanitary facilities (washrooms) need to be cleaned and sanitized on a daily basis or as necessary to maintain them in a clean and sanitary manner. Walls, ceilings, hood-vents etc. are to be cleaned as needed.

4) DISHWASHER/MANUAL DISHWASHING: the mechanical dishwasher must be checked at least once per shift to ensure the wash-water is being maintained between 60 - 71°C and test-strips are used to ensure proper sanitizer concentration. OR, where manual dishwashing is used: ensure appropriate water temperatures in the different sinks and ensure proper sanitizer concentration is being maintained in the ‘sanitize sink’. Multi-service articles (eating utensils or containers designed for repeated use) are cleaned and sanitized after each use.

5) FRIDGE/FREEZER TEMPERATURES: checked at least once per shift to ensure all fridges are being maintained at 4°C or below and all freezers are being maintained at -18°C or below.

6) LOG BOOK/POSTED CHECKLIST: records shall be maintained and kept on site regarding procedures 2-5 outlined above. The records must contain information regarding: who performed the task, what was performed, measurements taken (if applicable) and time of completion.

This document is not intended to replace **R.R.O 1990, Regulation 493/17, Food Premises.**

Please consult with the regulation and your local Health Unit if you have any questions regarding the creation of your own cleaning, sanitizing and maintenance schedule.

# Appendix 8

## Canada's Food Guide

<https://food-guide.canada.ca/en/>

**Canada's food guide**

# Eat well. Live well.

**Eat a variety of healthy foods each day**

Have plenty of vegetables and fruits

Eat protein foods

Make water your drink of choice

Choose whole grain foods

Discover your food guide at **Canada.ca/FoodGuide**

Health Canada Santé Canada

# Eat well. Live well.

Healthy eating is more than the foods you eat



Be mindful of your eating habits



Cook more often



Enjoy your food



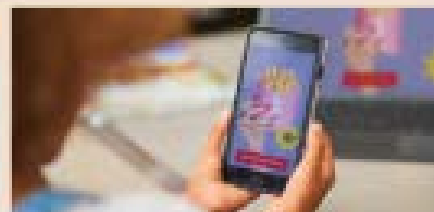
Eat meals with others



Use food labels



Limit foods high in sodium,  
sugars or saturated fat



Be aware of food marketing

# Appendix 9

## Answers to the Chapter Review Questions

### Chapter 1

1. Any of: restaurant, fast-food restaurant, sandwich/coffee shop, hot dog cart, hospital, day care facility, long-term care facility, mobile food premises, cafeteria, banquet facility, supermarket, etc.
2. The goal of the health unit's Food Safety program is to prevent or reduce the burden of foodborne illness.
3. The name of the Act that governs public health in Ontario is the Health Protection and Promotion Act (HPPA).
4. The Food Premises Regulation lists the minimum standards that must be maintained by food premises in Ontario.
5. Choose: high, moderate, or low risk.

### Chapter 2

1. Foodborne illness is when a person becomes sick from something they eat or drink.
2. The three groups of people most prone to the severe consequences of foodborne illness include the very young, the elderly, and people with weakened immune systems.
3. Completed Chart:

Type of Hazard	Example	Prevention Method
Chemical	cleaner, sanitizer, pesticides, heavy metals etc.	Keep food covered, keep chemicals and food labeled, store chemicals in a separate, locked area, etc. Use food grade containers.
Physical	hair, bandages, glass, etc.	Wear headgear to confine the hair. Wear a glove over a bandage. (Many other preventions possible.)
Biological	parasites, bacteria, viruses, fungi	Keep hot food hot and cold food cold, wash your hands, clean and sanitize equipment.
Allergen	Peanuts	Keep active ingredient lists in order to be able to effectively communicate and be honest with your customers.

4. *Infection*: Illness that is the result of consuming disease-causing bacteria, which have grown and multiplied in/on the food or will continue to do so in your gut.  
*Intoxication*: Illness that is the result of directly consuming a toxin that has been produced by bacteria growing in or on the food (or may be found naturally in the food, e.g. seafood toxins).  
*Toxin-Mediated Infection*: Illness that is a combination of infection and intoxication. Disease-causing bacteria are consumed, which proceed to produce a toxin in the person's gastrointestinal tract, resulting in disease and illness.
5. The six factors affecting the growth of microorganisms include:  
**Food**                      **Temperature**  
**Acidity**                    **Oxygen**  
**Time**                        **Moisture**

## Chapter 3

1. To calibrate a probe thermometer using the ice-point method, there are three steps:
  - i. Fill a container with crushed ice and add enough cold water to fill in any air gaps. Stir the mixture for about 10 seconds.
  - ii. Insert the stem of the thermometer into the centre of the mixture, ensuring that the probe is submerged. Make sure that the tip of the probe does not touch the sides or bottom of the container. Wait until the temperature indicating needle stops moving.
  - iii. If the dial reads 0°C (32°F), then the thermometer is accurate and no change is required. If it doesn't, turn the calibration nut located under the dial until the indicating needle reads 0°C (32°F).
2. The temperature danger zone is from 4°C to 60°C (40°F to 140°F). We are concerned about it because it is the range of temperatures where harmful microorganisms and pathogenic bacteria grow most rapidly. We must limit the time that potentially hazardous foods spend in the temperature danger zone to 2 hours or less in order to prevent foodborne illness.
3. Four things to look for when receiving or purchasing food include (any of): temperature, intact packaging, expiry/best before dates, signs of thawing and re-freezing, food spoilage, insects, dirt, freshness of meat and seafood, approved supplier, cleanliness of the delivery truck, etc.
4. Food must be stored at 4°C (40°F) or colder in a refrigerator. Frozen food must be maintained in a frozen state. It is best practice to ensure a freezer temperature of -18°C (0°F) or colder is being maintained.
5. The safe methods to thaw frozen food include: in the refrigerator on the bottom shelf with a drip tray; under clean, cold, running water; in the microwave (with cooking immediately to follow); and as part of the continuous cooking process (i.e. cook from frozen).
6. A good minimum internal cooking temperature for most foods is 74°C (165°F).
7. Hot-holding is used to keep cooked food hot and out of the danger zone when it is not going to be served immediately. Food must be hot-held at 60°C (140°F) or hotter.
8. Hot food must be cooled quickly if it is not going to be served immediately in order to quickly bring it back down through the danger zone. This will limit the time that cooked food spends in the danger zone and prevent further bacterial growth or the production of toxins.
9. The safe methods to cool hot food quickly are: use shallow containers or pans; use an ice-water bath; cut up and debone large pieces of meat; and use an ice wand.
10. **Hazard Analysis Critical Control Point** – It is a system used to create safe food by identifying, monitoring, and controlling potential hazards at each stage in the flow of food.

## Chapter 4

1. The six steps of proper handwashing are:
  - (1) Wet hands
  - (2) Apply liquid soap
  - (3) Lather hands (15-20 seconds)
  - (4) Rinse hands
  - (5) Dry hands with paper towel
  - (6) Turn off the taps with the paper towel
2. A handwash sink in a food premises must be equipped with: potable hot and cold running water, liquid soap from a dispenser, and single-service paper towels.
3. The appearance of a food handler exhibiting good personal cleanliness includes (but is not limited to): frequently washing hands, hair confined, clean outer clothes, short and clean fingernails, minimal jewelry, etc.
4. When handling food, avoid: tasting food in a way that will contaminate it, picking your nose, touching your face or hair, not washing your hands, and working when you are sick.
5. Someone with diarrhea must be excluded from handling food because they could be ill with a foodborne illness and shedding so many pathogens, that even frequent and thorough handwashing may not be effective enough to stop the transfer of disease-causing agents from the food handler to



the food. The person should be excluded for at least twenty-four hours after their symptoms have cleared up.

## Chapter 5

1. Cleaning means to physically remove visible food or soil from a surface (what you can see). Generally a soap or detergent along with hot water and a scrub brush or cloth is used to accomplish cleaning. The friction created by rubbing the hot, soapy brush or cloth against the surface lifts the soil from the surface. Cleaning must occur before sanitizing.
2. Sanitizing means to reduce the number of microorganisms to safe levels (effectively killing 99.9% of disease-causing microorganisms). Sanitizing follows cleaning and is generally accomplished using extremely hot water or a chemical solution. Temperature, concentration and contact time are important in order to accomplish effective sanitization.
3. The five steps of manual dishwashing in a three-compartment sink are:
  - i. Scrape – Remove any large pieces of food or debris.
  - ii. Wash (Sink 1) – Use a scrub brush, sponge, or cloth along with hot soapy water and friction to loosen and remove leftover food and oil from the surface.
  - iii. Rinse (Sink 2) – Rinse the article to remove the remaining soap and food particles. The water in this sink should be warm.
  - iv. Sanitize (Sink 3) – Sanitize in the third sink by fully submerging the article for at least 45 seconds in either hot-water (at least 77°C / 171°F) or a lukewarm chemical solution (at least 24°C / 75°F). This chemical solution may be 100 ppm chlorine, 200 ppm quaternary ammonium, or 25 ppm iodine. Other sanitizing agents may be used as long as they are approved for their intended purpose by Health Canada, the Canadian Food Inspection Agency or the medical officer of health. Test strips or reagent kits must be available to ensure the correct concentration of sanitizer is being used.
  - v. Air Dry – Allow articles to fully air dry before putting them into storage.
4. The two main types of mechanical dishwashers are:
  - i. High-Temperature Dishwashers – use hot water to sanitize; the final rinse must reach 82°C for at least 10 seconds.
  - ii. Low-Temperature Dishwashers – use a chemical solution to sanitize (45 second contact time); the chemical solution may be 100 ppm chlorine, 200 ppm quaternary ammonium, or 25 ppm iodine.
5. When cleaning and sanitizing kitchen equipment or surfaces “in-place” with a household chlorine bleach solution, the following three steps must be followed:
  - i. Wash the surface with hot, soapy water.
  - ii. Rinse the surface with hot, clean water.
  - iii. Sanitize by spraying a 100 ppm chlorine solution onto the surface and allowing it to remain wet for at least 45 seconds before wiping dry with a clean cloth or paper towel.
6. An Integrated Pest Management (IPM) System can be used to control an existing pest problem or reduce the likelihood of getting one. General measures include (but are not limited to): hiring a licensed pest control company, adequate garbage removal and storage, screening doors and windows, filling holes around foundation, rotating stock, general housekeeping, checking deliveries for infestations, etc.

# Appendix 10

## Food Handler Course Training and Certification Manual – Glossary

**Additive (Food):** A substance added in small amounts to something else to improve, strengthen or otherwise alter it.

**Adulteration:** To make something impure or inferior by adding something else to it. An example is adding less expensive apple juice to other fruit juices to reduce costs. Adulteration can also happen when an ingredient is accidentally or unknowingly added to food.

**Aerobic Bacteria:** Bacteria that need oxygen to live and grow.

**Allergen:** A substance, such as pollen or a food, that causes an allergy.

**Allergy:** An abnormally high sensitivity to certain substances, such as pollens, foods or microorganisms. Common symptoms of allergy may include sneezing, itching and skin rashes.

**Anaerobic Bacteria:** Bacteria that can only live and grow where there is no oxygen.

**Anaphylaxis:** A sudden, severe allergic reaction that includes a sharp drop in blood pressure, rash or hives and breathing difficulties. The reaction may be fatal if emergency treatment, including epinephrine injections, is not given immediately.

**Anisakiasis:** Also called parasitic roundworm, a parasite spread through uncooked marine fish and raw fish items such as sushi, sashimi, ceviche or salmon.

**Approved Source:** A food supplier that is inspected, meets the provincial and federal legislation and is permitted to supply food to food premises.

**Bacteria:** Plural for bacterium. Any of a group of single-celled microorganisms that live in soil, water, the bodies of plants and animals, or matter obtained from living things. They are important because of their chemical effects and disease-causing abilities.

**Bacterial Infection:** A foodborne illness caused by the consumption of food containing pathogenic bacteria, which grow and multiply in a person's gastrointestinal tract resulting in disease.

**Bacterial Intoxication:** A foodborne illness caused by the consumption food containing the toxins of pathogenic bacteria.

**Botulism:** Poisoning caused by eating food containing a toxin made by a spore-forming anaerobic bacterium. Its symptoms are nausea, vomiting, trouble seeing, muscle weakness and tiredness. It can be fatal.

**By-Laws:** Laws created by municipal or regional governments to deal with important issues that fall under their control and aren't dealt with at the provincial or federal level.

**Calibrate:** The process of checking a probe thermometer to see if it is measuring temperatures accurately and adjusting the thermometer if it is found to be inaccurate.

**Campylobacter:** A foodborne pathogenic bacterium, commonly found in poultry and meat. It can be carried by rodents, wild birds and household pets like cats and dogs. It can also be found in untreated water.

**Canadian Food Inspection Agency (CFIA):** CFIA is made up of food inspectors from Health Canada, Agriculture and Agri-Food, and the Department of Fisheries and Oceans. It is responsible for the inspection of food at the federal level.

**Carrier:** Carriers are people or things that carry microorganisms. When food is not handled safely, microorganisms can get into food through carriers.

**Chlorine:** A nonmetallic element, found alone as a greenish yellow, irritating gas. It is used as a bleach, disinfectant or sanitizer. It is often used in liquid form to sanitize food contact surfaces. It is also used in the sanitizing sink in two and three sink dishwashing systems.

**Clean:** To remove oil, grease, dirt and debris using soap, water and friction.

**Clostridium Perfringens:** Foodborne pathogenic bacteria that can be found in high protein or starch-like foods such as cooked beans or gravies. It is especially likely to be a problem in improperly handled leftovers.

**Communicable:** Capable of being transferred or carried from one person or thing to another. Also called contagious.

**Compliance Inspection:** A thorough and complete inspection of a food premise to determine the overall level of food safety compliance with Food Premises Regulation (O. Reg. 562) at the time of the inspection. Compliance inspections are conducted by a public health inspector.

**Contaminant:** Something in food -- like bacteria, viruses, parasites, chemicals or allergens -- that can cause a foodborne illness.

**Contamination (of Food):** Adding microorganisms or other things to food that can cause foodborne illness. See also cross-contamination.

**Critical Control Point (CCP):** In a Hazard Analysis Critical Control Point System, the point in a recipe where a hazard exists and a control measure is used to eliminate, prevent or minimize that hazard.

**Cross-Contamination:** Transferring microorganisms or disease agents from raw food to safe or ready-to-eat food, making the ready-to-eat food unsafe. Cross-contamination can happen when raw food or its juices come in contact with cooked or ready-to-eat food. Cross-contamination can also happen when contaminated hands touch food. Another way food can be cross-contaminated is through using the same equipment or utensils to handle raw and cooked food.

**Critical (Crucial) Infraction:** An infraction that poses a high and immediate food safety risk.

**Cryptosporidiosis:** A foodborne illness caused by the protozoan parasite *Cryptosporidium*. *Cryptosporidium* can spread through contaminated water.

**Danger Zone:** The temperature range from 4°C to 60°C in which bacteria grow and multiply extremely well.

**Dehydration:** An abnormal loss of water from the body, especially from illness or physical exertion.

**Diarrhea:** Abnormally frequent and watery bowel movements.

**Disinfection Solution:** A mixture of a disinfection chemical and water that will be used to disinfect or sanitize food contact surfaces, equipment and multi-service articles. Also called a sanitizing solution.

**E. coli:** Foodborne pathogenic bacteria that live in the intestines of animals. E. coli can be spread to the outer surfaces of meat when meat is being butchered. E. coli can also be spread through contaminated water.

**Eczema:** A skin condition marked by redness, itching and scaly or crusty lesions.

**Enterotoxin:** A toxin that is produced by micro-organisms and causes gastrointestinal symptoms (as in some forms of foodborne illness or cholera).

**Epinephrine:** A hormone of the adrenal gland. It causes narrowing of blood vessels and raising of blood pressure. Also called adrenaline. Used to treat anaphylaxis.

**FIFO:** Acronym for the principle “first in, first out”, which is a stock rotation principle used to ensure that the oldest products are used before newer products.

**Flow of Food:** Describes the time from food entering a home or food premises until the time it is consumed or served to customers.

**Food and Drugs Act:** The main regulating legislation at the federal level. It looks at things such as the alteration, colouring, bacterial standards, manufacturing conditions and distribution of food to ensure the safety of human health.

**Food Grade:** Made of corrosion-resistant, non-toxic materials that will not break down during normal use. A food grade product can be readily cleaned, sanitized and kept in good repair. If a product is not manufactured or designated to have repeated contact with food, it is not to be used. Some examples of non-food grade materials are plastic garbage containers and plastic storage bins that are not designed for storing food.

**Food Premises:** Premises where food or milk is manufactured, processed, prepared, stored, handled, displayed, distributed, transported, sold or offered for sale but doesn't include a private residence (HPPA 1990).

**Foodborne Illness:** The term used to describe a type of illness or disease the results from consuming contaminated food or drink.

**Friction:** The rubbing of one object or surface against another.

**Fungi:** Microorganisms such as yeasts and moulds. Some spoil food, others cause foodborne illness.

**Giardiasis:** A foodborne illness caused by the protozoan parasite Giardia lamblia. It's also known as beaver fever or backpacker's diarrhea. It can spread through contaminated water or food.

**Handwashing:** The physical action of removing dirt and microorganisms from the hands using soap and water by scrubbing for at least 15 seconds then rinsing and drying with paper towels. The six-step method is to be used in food premises.

**Hazard Analysis Critical Control Point (HACCP):** A system used throughout the food industry to enhance food safety. The system looks at hazardous food, identifies the greatest risk factors and makes the necessary changes to reduce or eliminate the risk. HACCP also monitors overall food handling.

**Hazardous Food:** Food in which pathogenic microorganisms can grow or produce toxins.

**Health Hazard:** Any condition of a substance, thing, plant or animal other than man, or a solid, liquid, gas or combination of any of them that has or is likely to have an adverse effect on the health of any person.

**Hives:** A skin condition of intensely itching welts. Hives can be caused by an allergic reaction to internal or external agents, an infection or a nervous condition.

**Host:** A living animal or plant on or in which a microorganism lives.

**Ice Wand:** A plastic stirring instrument that is filled with a freezable liquid. Stirring hot food with the frozen wand causes food to cool more quickly. It is also called a cooling wand.

**Immune System:** The bodily system that protects the body from foreign substances, cells and tissues by producing the immune response. A person's immune system includes the thymus, spleen, lymph nodes, lymphocytes and antibodies.

**Immuno-compromised:** Unable to develop a normal immune response, usually because of disease, malnutrition or immunosuppressive therapy.

**Infection:** A condition caused by the presence, growth and increase in numbers of germs in the body.

**Infestation:** Having a large number of pests (insects or rodents) in a location (i.e. a pest problem).

**Intolerance (to Food):** Describes a reaction to a food when a person is unable to digest a specific kind of food.

**Intoxication:** An adverse reaction by the body to a foreign (toxic) substance, whether the substance was produced within or outside the body.

**Iodine:** A chemical used as a disinfectant or sanitizer. Very expensive and can stain multi-service articles.

**Legislation:** A law or a body of laws enacted. Food safety legislation means all of the laws and by-laws that are in place to govern safe handling of food.

**Listeria:** Foodborne pathogenic bacteria found in soil. People can get infected by eating dairy products, vegetables, fish and meat products that are contaminated with the bacteria.

**Microorganisms:** Living single cell organisms too small to be seen with the naked eye.

**Monosodium Glutamate (MSG):** A chemical used to flavor food, especially in China and Japan. It occurs naturally in tomatoes, parmesan cheese and seaweed.

**Mould:** An often fuzzy surface growth of fungus especially on damp or decaying matter.

**Multi-service Articles:** Utensils (forks, knives, spoons) and dishes (plates, bowls, and cups) meant to be used more than once. Multi-service articles must be cleaned and sanitized after each use.

**Mycotoxin:** A toxic substance produced by a fungus, especially a mould.

**Outbreak:** As related to foodborne illness: The occurrence of two or more cases of a similar illness resulting from the same food.

**Parasites:** Organisms that cause illness by living and feeding off a host organism. Parasites don't necessarily cause disease.

**Pasteurized:** To expose (a food such as milk, cheese, yogurt, beer or wine) to a high temperature for a period of time long enough to destroy certain microorganisms without radically altering the taste or quality of the food. Pasteurization is done to destroy microorganisms that can produce disease or cause spoilage or undesirable fermentation of food.

**Pathogen:** Harmful microorganisms that can cause disease in humans.

**Pathogenic Bacteria:** Colourless and odourless bacteria that cause disease in humans.

**pH:** A number used to express acidity or alkalinity on a scale whose values run from 0 to 14. Seven represents a neutral pH. Numbers less than seven show increasing acidity and numbers greater than seven show increasing alkalinity. Very high or very low pH won't kill pathogenic bacteria but won't allow them to grow.

**Potable:** Fit or suitable for human consumption (drinking).

**Preparation (of Food):** The final stage(s) of readying a food to be eaten, whether commercially or in the home. Preparation is usually done in a kitchen.

**Processing (of Food):** The treatment of food, usually on a commercial scale, to increase its usefulness, stability or acceptability.

**Production (of Food):** The growing, usually under human supervision, of the basic animal or vegetable material of a food.

**Protein:** Any of numerous substances that consist of chains of amino acids and contain the elements carbon, hydrogen, nitrogen, oxygen and often sulfur. Proteins include many compounds like enzymes and hormones that are essential for life. Proteins are supplied by various foods like meat, milk, eggs, nuts and beans. Proteins are used as a food source by living organisms.

**Protozoa:** Any of a large group of single-celled and usually microscopic organisms, such as amoebas, ciliates, flagellates and sporozoans. Some protozoa are parasites and may be pathogenic.

**Provincial Legislation:** Acts and regulations passed by the provincial government. The legislation must be followed throughout the province.



**Quaternary Ammonium Compound (Quats):** A chemical used as a disinfectant or sanitizer. Commonly used in the sanitizing rinse cycle of mechanical dishwashers.

**Reagents:** Substances used in a chemical reaction to detect, measure, examine or produce other substances. When a sanitizer is mixed with a reagent, the colour the solution turns is used to tell whether the solution is the right strength.

**Retail (of Food):** The selling of food to the end-user consumer.

**Rework Materials:** Leftover ingredients or food products kept for subsequent use or reprocessing. Examples include re-forming meat patties from others that were broken or too small, or reusing cooked sausage as pizza topping.

**Salmonella:** Foodborne pathogenic bacteria most commonly found in raw poultry. Salmonella can also be found in other meats, unpasteurized milk and raw eggs.

**Sanitize:** To kill 999 out of 1000 pathogenic microorganisms (99.9% kill rate).

**Service (of Food):** The final preparation and sale or giving of food to be eaten on the premises (in a restaurant or cafeteria) or elsewhere (take-out). Service can also include outdoor group feeding at picnics.

**Shigella:** Foodborne rod-shaped bacteria that cause an infection of the intestine leading to severe diarrhea in animals and especially humans.

**Source (of a Contaminant):** Where a microorganism originates or comes from (often human or animal intestines).

**Solute:** A substance dissolved in another substance. The solute is usually the component there is less of. If salt is dissolved in water, salt would be a solute.

**Spores:** A resistant body formed by certain bacteria when exposed to hostile environments where the bacteria can't grow. Most spores are not destroyed by typical cooking temperatures.

**Sterilize:** To kill all microorganisms (100% kill rate).

**Sulphites:** Regulated food additives that are used as preservatives to maintain food colour and prolong shelf life, prevent the growth of microorganisms, and maintain the potency of certain medications. Sulphites are used to bleach food starches (e.g., potato) and are also used in the production of some food packaging materials (e.g., cellophane).

**Tartrazine:** A water soluble synthetic yellow dye used as food colouring. Also called FD&C Yellow 5.

**Toxin:** Poisonous substances that may be produced by some bacteria as a by-product of their metabolism. Most toxins are not destroyed by typical cooking temperatures.

**Toxin-Mediated Infection:** A foodborne illness that is caused by the consumption of food containing pathogenic bacteria that proceed to produce a toxin when they enter a person's gastrointestinal tract.

**Trichinosis:** Also known as pork tapeworm. A parasite spread through raw or undercooked pork or wild game.

**Viruses:** Microorganisms that multiply inside living cells and cause illness.

**Wash in Place (In-Place Cleaning and Sanitizing):** A system to clean, rinse and sanitize large equipment that can't be cleaned in a dishwasher or sink. The equipment must be washed with soap and water and rinsed with clean water. The sanitizing rinse can consist of hot water or steam sprayed on the treated surface to a minimum temperature of 82°C (178°F) or a chemical solution sprayed on the treated surface at double the strength used for manual dishwashing.

**Yeast:** Single celled fungi that may occur on the surface of sweet foods, especially liquids. Also a commercial leavening agent containing yeast cells; used to raise the dough in making bread and to ferment beer or whiskey.