Food Handler Certification Manual

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This manual was adapted from *Food Safety: A Guide for Ontario's Foodhandlers* with the permission of the Ontario Ministry of Health and Long-Term Care.

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Introduction to Food Safety

The food service industry is a big part of the Canadian economy, employing over one million people. This includes people working in restaurants, grocery stores, and factories. It also includes people who process, package, and ship food.

A food premises is a place that prepares and/or sells food.

There is a need for safety standards in the food industry because of:

- The risk of spreading disease and illness through food
- Customers' expectations that the food they buy is safe

The first goal of any food premises should be to produce the safest and highest quality food possible. People working in food premises should fully understand the risks involved in food service and the need to meet food safety requirements, like personal hygiene, avoiding food contamination, and keeping foods at safe temperatures.

As a food handler, it is your responsibility to know and follow the food safety regulations and standards.

This course will teach you how to keep food safe.

The Benefits of Food Safety

The main benefit of a food safety program is people staying healthy. Food safety has many more benefits, though. For example, food safety encourages quality food, quality food means repeat customers, and repeat customers means higher profits. Here are some other ways that food safety is beneficial:

- Employees are happier with their jobs, knowing that the food they are working with is safe
- Money is saved because less food is thrown away that was not kept safe
- Closures are prevented, which means that bad publicity and losing customers is avoided
- Insurance costs are lower because no claims are made for unsafe food
- Money spent on lawsuits, medical claims, or fines for having unsafe food is prevented
- Cleaning and sanitizing costs can be kept down

Food Safety Legislation

People working in food premises need to follow rules to make sure that food is kept safe. Some of these rules are specific to the food, like food handling and storage. Other rules cover things like the condition of the building and the types of equipment that need to be used. All of these rules are very important and have an impact on how safe your food is. It is the responsibility of

everyone working in food premises to make sure that they know the rules and how to follow them.

Legislation set out the requirements that food premises have to follow to make sure their food is kept safe. The food service industry is regulated by legislation at all three levels of government:

- Federal
- Provincial
- Municipal

Federal Legislation

The Canadian Food Inspection Agency (CFIA) is responsible for the inspection of food at the federal level.

The CFIA enforces policies and standards, set by Health Canada, governing the safety and nutritional quality of all food sold in Canada. The CFIA verifies industry compliance with federal acts and regulations, including:

- *Food and Drugs Act/2019,* through activities that include the registration and inspection of abattoirs and food processing plants, and the testing of products.
- *Consumer Packaging and Labelling Act/2019*, sets standards for packaging, labelling, sale, importation and advertising of prepackaged foods in Canada.

Provincial - Legislation

Each province has its own provincial health acts and regulations. In Ontario, the *Health Protection and Promotion Act, 1990 (HPPA)* authorizes the provincial government to make regulations, programs, and protocols that govern food premises. Public health units across Ontario are responsible for enforcing these regulations to reduce health hazards.

'Health Hazard' means
a) **a condition of a premises**
b) **a substance, thing, plant, or animal other than man, or**
c) **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. (HPPA, 1990)

The HPPA lays out the powers of the medical officer of health (MOH) and public health inspector (PHI). Some of these powers are listed below.

Power of Entry (HPPA Section 41)
The public health inspector may enter any place of business, during normal work hours, without a warrant, to carry out the duties under the Act. This would include routine inspections or the investigation of complaints of health hazards.

Power of Seizure (HPPA Section 19)
The public health inspector may seize anything suspected of being a health hazard for laboratory testing.

Power of Destruction (HPPA Section 19*)*
If a public health inspector determines that food is a health hazard, he / she has the power to destroy or dispose of the food immediately.

Power to Make an Order (HPPA Section 13)
Orders are issued by Public Health Inspectors (PHI) to eliminate a health hazard or to lessen the effects of a health hazard. They can be either verbal (spoken) or written. Orders may also require a person (or persons) to stop doing something specific.

In the case of a food premises, this includes the power to order the premises to be closed until a health hazard is removed or fixed.

Provincial - Public Health Inspector (PHI)

Public health inspectors are **Provincial Offences Officers** who enforce both the HPPA and the *Ontario Food Premises Regulation (O. Reg. 493/17)* under the HPPA. They conduct enforcement by routine compliance inspections of all food premises.

The Food Premises Regulation covers food premises, including cleaning and sanitizing, equipment, food temperatures, food handling, employee hygiene in food premises and the requirement for food handlers training. We'll cover all of these later in this course.

Public Health Inspectors are Provincial Offence Officers who protect and promote the health of all individuals in their area.

Roles of the Public Health Inspector:

- Enforces the Food Premises Regulation by conducting inspections of food premises
- Educates food handlers in safe food practices
- Investigates food-borne illnesses and food-borne outbreaks
- Investigates consumer complaints
- Takes action in case of food recalls, fires, floods and emergencies

How Often are Food Premises Inspected?

Based on a risk assessment, public health inspectors assign each food premises in their health unit's area a risk level of high, moderate, or low, based on the establishment's potential risk of a food-borne illness. This classification may change based on the types of food served or on the results of the last inspection.

The minimum number of inspections is three times per year for high-risk food premises, two times per year for moderate-risk food premises, and once per year for low-risk food premises.

During the inspection, the public health inspector may do a Hazard Analysis Critical Control Point (HACCP) audit. We'll talk more about HACCP in the Food Safety Management chapter.

Factors Considered in Food Premises Risk Assessment:

- Types of food prepared and/or served
- Volume of food prepared
- Refrigeration and hot holding equipment
- Source of water
- Whether the premises caters off-site
- Type of population served
- Past compliance with the regulation
- Food safety knowledge
- History of food-borne illness

If any immediate health hazards are seen during an inspection, the PHI could close the food premises and/or issue offence notices (tickets) under the *Provincial Offences Act* for not meeting the requirements of the *Food Premises Regulation.*

Inspections

When PHIs inspect a food premises, they're checking to make sure that the regulations are being followed so that food is kept safe. Below are some things they are looking for.

Potentially hazardous foods are maintained at the required temperatures.
Example: Cooked poultry is stored or held for service at lower than 4°C or higher than 60°C. (See *O. Reg. 493/17 Sec. 27(1).)*

Food is protected from contamination and adulteration.
Example: Food displayed for sale or service is protected from contamination and adulteration by enclosed containers, cabinets, shields, or shelves. (See *O. Reg. 493/17 Sec. 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, and made of material that can be readily cleaned and sanitized. (See *O. Reg. 493/17 Sec. 8.*)

Good personal hygiene is being practiced 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, and after using the washroom. (See *O. Reg. 493 Sec. 33(1).)*

Cleaning and sanitizing of multi-service utensils to prevent harmful bacteria from spreading.
Example: Multi-service utensils are manually washed, rinsed, and sanitized in a three-compartment sink. (See *O. Reg. 493/17 Sec 21.*)

Ensuring that owner/operators are maintaining the food premises.
Example: All floors, walls, and ceilings are readily cleanable, kept clean, sanitary, and in good repair. (See *O. Reg. 493/17 Sec. 7, 59.*)

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. (See *O. Reg. 493/17 Sec. 6.)*

Municipal Legislation

Each municipality has by-laws governing its geographical area. Municipalities create by-laws to deal with issues that are important to the community but are not dealt with at the provincial and federal levels. By-laws can be different in each municipality, as each area has issues that are unique to its situation

Municipal by-laws for food premises cover things like:

- Licensing
- Zoning
- Building standards
- Garbage disposal and recycling
- Sewage disposal

Municipal by-laws are enforced by by-law enforcement officers.

Check Inspection Results

Many health units in Ontario have an "Inspections Disclosure Program" that provides the public with information on inspections of food establishments. Residents and visitors can access the most recent Public Health inspection reports by visiting the website of the health unit where the food premises is located.

Responsibilities

As you can see, there are many things you need to know to keep food safe. The responsibility for safe food belongs to everyone in your food premises, from the owner, to the chef, to the server, and to the dishwasher. Every person in your premises has a role in keeping the food you prepare or sell to customers safe. As a food handler, it's your responsibility to know what the regulations and standards are and to follow them. You have a responsibility to provide safe food.

In Review

In this chapter, you were introduced to the following:

- The importance of food safety
- The benefits of following safe food handling practices
- Federal, provincial, and municipal legislation governing food safety
- The role of public health inspectors
- The responsibilities of food premises owners, operators, and food handlers
- How to access the health inspections results

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Food-borne Illness

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Introduction

When something you eat or drink makes you sick, your sickness is called a *food-borne illness*. In the past, food-borne illness was called *food poisoning*, but because more food-borne illnesses are caused by infection than poison, we now call it food-borne illness.

When food is contaminated by bacteria, viruses, parasites, or chemicals, it can make you sick. Any of these things in food can be called a *contaminant*.

Every year, there are approximately 4 million cases of food-borne illness in Canada (Public health Agency of Canada, 2016). For most people, a food-borne illness won't be a serious problem. Most will recover in a short time without getting seriously ill. Groups at a higher risk for food-borne illness, however, are young children, the elderly, pregnant women, and people with weakened immune systems. For these groups, food-borne illness can be very dangerous and even fatal.

Many people have had a food-borne illness without knowing what made them feel sick.

Symptoms of Food-Borne Illness

For each reported case of food-borne illness, it's estimated that hundreds of additional cases occurred in the community. When people say they have a 24-hour flu, it's often actually a case of food-borne illness.

Symptoms of a food-borne illness include some or all of the following:

- Abdominal cramps
- Diarrhea
- Vomiting
- Nausea
- Fever

Symptoms can start soon after eating contaminated food, or they can occur up to a month or more later. How long it takes for the symptoms to begin will depend on:

- What caused the illness
- How healthy the person was before this illness
- The amount of contaminant the person ate

Causes of Food-borne Illness

There are four causes of food-borne illness: chemical contamination, physical contamination, allergens, and microbiological contamination.

A food is adulterated if it contains a poisonous or harmful substance that may make it harmful to health.

Chemical Contamination

Symptoms usually happen fast, from 20 minutes to a few hours after eating the contaminated food. They usually start suddenly, with the most common symptoms being nausea, vomiting, and abdominal or stomach pain. Diarrhea sometimes occurs.

Food-borne illness caused by chemicals is called Food Poisoning.

Metal Food Poisoning

Dissolved metal in food may cause chemical food poisoning. If an acidic food, like fruit juice, maple syrup, or tomatoes, is stored or cooked in metal containers, the acid can cause the metal to dissolve. Lead, copper, tin, zinc, iron, and cadmium are all possible sources of metal food poisoning.

Some ways that food can be contaminated with metal are:

- Copper beverage lines. Water can be safely run through copper lines because it won't dissolve the copper. Acidic fruit juice or carbonated beverages, however, will cause the copper to dissolve and it will then be in the beverage.
- Cadmium in shelving. If unwrapped meats are stored directly on shelves containing cadmium, the metal can dissolve and be absorbed into the meat.
- Lead in paint. Painted dishes or glassware may contain lead which can be absorbed into acidic food.
- Metal containers. Acidic foods should never be stored in containers made of metal. Use food-grade containers.

Intentional Additives

Some chemicals are added to food on purpose. These include things like salt, spices, preservatives and colouring.

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." In other words, food additives are things added to colour, thicken, firm, or preserve food.

If additives are used correctly, they aren't harmful to most people. They make food look better, taste better, and last longer. These are called intentional chemical additives, as they're added to food on purpose. If not used properly or too much is used, a chemical additive can cause food poisoning.

Any food additive can make a person sick if he or she is allergic or has a sensitivity to it. Three additives are well-known for this:

- Sulphites – used to maintain colour and give longer shelf life
- Monosodium Glutamate (MSG) – used to boost flavour
- Tartrazine (also known as FD&C Yellow #5) – used as a yellow food colouring

Many food additives are regulated in Canada under the food and drug regulations. You can find a list of all allowed food additives on this Health Canada website: *www.hc-sc.gc.ca*. Search "food additive dictionary."

Incidental Additives

Poisonous chemicals like insecticides, rodenticides, and cleaning chemicals are sometimes used in food premises. If these chemicals get into food, they can cause food poisoning. This would be called an incidental chemical additive.

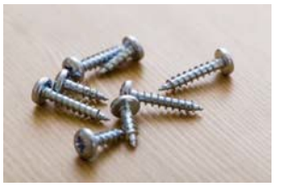
For safety, chemicals should be stored in their original containers. If chemicals are put into different, smaller containers or spray bottles, each must go in a clean, dry container labeled with the product name and contents.

Proper storage and instructions for use must be followed very carefully when dealing with poisonous chemicals to make sure that food is kept safe. For example, some cleaners must be rinsed off a counter before the counter can be used to prepare food. If the counter is not rinsed off, there will be cleaner on the counter which can get into the food and cause food-borne illness. Never store chemicals with food. Also, never leave chemical products or cleaning cloths used with chemicals on food preparation surfaces.

Always store chemicals below and separated from food, equipment, or dishes.

Physical Contamination

Physical hazards are things like dirt, hair, broken glass, nails, staples, bits of metal, or any other object that accidently gets into food.



These objects could cause anything from a small cut to possible choking.

To keep physical hazards out of food:

- Put and maintain protective shields or covers on lights over food storage and preparation areas.
- Remove staples, nails, and other objects from boxes and crates when food is received so they don't fall into the food.
- Don't use glasses to scoop ice. Use only commercial, food-grade plastic or metal scoops with handles.
- Don't chill glasses or any food items in ice that will be used in drinks.
- Don't store toothpicks or non-edible garnishes on shelves above food storage or preparation areas.

Allergens

Food allergies, or sensitivities to certain foods, are a problem for many people. Some foods, like peanuts, shellfish, or eggs, are very common allergens. Any food can be a hazard for a person who is allergic or sensitive to it. Symptoms of food allergies can appear immediately after the food is eaten or can show up sometime later.

If a customer has a severe allergic reaction, call 911.

It's estimated that as many as 7.5 percent of population have food allergies. This means that for every 13 people who come into your food premises, it's likely that one of them has a food allergy.
Allergic reactions to food can cause these symptoms:

- Skin reactions like eczema, hives or itching redness
- Digestive symptoms like vomiting, diarrhea, nausea, and cramps
- Respiratory symptoms like coughing, sneezing, tightness in the chest, and trouble breathing because of swelling of the throat and tongue, or a runny or stuffy nose
- Cardiovascular reaction like paler than normal skin colour/blue colour, weak pulse, passing out, dizziness or light-headedness, shock
- Other reactions like metallic taste, headache

Anaphylactic shock

Some people can develop one or more of these symptoms very quickly. Breathing difficulties and low blood pressure are the most dangerous symptoms, and if left untreated, can be life-threatening. It is recommended that epinephrine (e.g. EpiPen) be given at the start of a known or suspected anaphylactic reaction.

An estimated one to two percent of Canadians live with the risk of an anaphylactic reaction. Anaphylaxis starts within minutes of contact with the food to which a person is allergic. The reaction can go from the start of symptoms to possibly fatal shock within 10 to 15 minutes. It can happen so fast there may not be time to seek medical attention.

Epinephrine will help a person's breathing long enough to allow him or her to be rushed to a hospital for further treatment.

Exposure to the food doesn't always mean eating it. For some people, exposure can even mean just smelling food to which they're allergic. This is common with nuts and peanuts. Because avoiding the food is the only way to prevent the allergic reaction, these people need to know exactly what's in their food. It's critically important for food service staff to know about allergies and be aware of how dangerous they can be. Knowing this can save lives.

Risky Foods

The Canadian Food Inspection Agency (CFIA) has identified the following foods and additives as causing the most common and severe allergic reactions:

- Eggs
- Nuts e.g. peanuts, almonds, Brazil nuts, cashews, hazelnuts or filberts, macadamia nuts, pecans, pine nuts, pistachios, walnuts
- Wheat
- Milk and dairy products
- Seafood
- Sulphites
- Monosodium Glutamate (MSG)
- Mustard
- Soy beans
- Sesame seeds

For more information on each of these allergens, please see the Food Allergies and Allergen Labeling fact sheets on the CFIA's website *www.inspection.gc.ca*.

Preventing Allergic Reactions

Knowing the ingredients in food is critical when a person with an allergy dines out. Restaurants, fast food outlets, and bakeries are not required by law to list ingredients like you see on pre- packaged foods.

Here are some tips to help people with allergies:

- Ask patrons before they order
- Make sure descriptions and ingredients on menus are accurate.
- Make sure food doesn't get contaminated by other foods.
- Have an accurate and up-to-date recipe binder. Show ingredient lists from prepackaged foods to customers.
- Avoid ingredients known to cause allergic reactions, if possible.
- Educate serving and kitchen staff on menu items and on dealing with allergies.

If you are not sure what's in a product, let customers know. Don't give incomplete or inaccurate information.

Identify Potential Problems

Now that you know the list of foods that are more common allergens, you can review the recipes used in your food premises to identify the ones that use these ingredients. Where possible, change an allergenic ingredient for one that is less risky. For example, you could use vegetable oil instead of peanut oil.

If you can't find out the ingredients in one of your packaged items, let customers know that you don't know all the ingredients. You can suggest another item that you are sure about.

Educate and Train

Food service staff are sometimes unaware of how dangerous food allergies can be. Management, kitchen, and service staff should all be aware of food allergies and understand how important it is that ingredient information is accurate.

Staff need to be trained about the health effects of allergic reactions and the danger of anaphylactic shock. They need to know that it's very serious and isn't just about a person liking or not liking an ingredient. Staff need to understand the premises' policy on handling questions about ingredients.

Kitchen staff need to know that they must follow written recipes exactly when preparing and cooking food. If a recipe needs to be changed, management and all employees involved in preparing and serving the food should be notified.

Have a Policy

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

Employees need to know that policies must always be followed.

You don't need to give away your recipes. As described below, you can simply give the list of ingredients. You can also have the customer tell you what he or she is allergic to and check it against the recipe.

Inform the Customer

Make sure that your customers know they can get information about the ingredients you use. This can be as simple as a note on the menu such as "ask about ingredient information."

Employees need to know the policy so they can answer any questions that customers ask.

Here are some other ways to inform customers and staff about ingredients in your food:

Provide allergen management information online/ on-line menus
Update your company website to include allergen management policy and procedures. Include information on menu options and ingredients, as well as who to contact directly with an allergy related question.

Print ingredient information on your menus
If you have a smaller menu that doesn't change often, this could work for you. However, if you have a large menu, or you change it often, this could be too costly.

Use food allergy and sensitivity charts
An allergy chart lets customers and staff quickly see which menu items have known allergens in them. These charts are designed to identify known allergens rather than all ingredients.

Use recipe binders
A recipe binder would list all the menu items with all ingredients listed for each, like a cookbook. The list would include the ingredients of any prepared food used in the recipe, like a bottled sauce or a blend of spices. The binder could be changed whenever menu items are added, removed, or updated. Daily menu items and special items should all be included.

Choose a designated employee
An employee on each shift would be designated to answer customers' questions about allergenic ingredients. This employee needs direct access to the recipes and kitchen staff and needs a clear understanding about the importance of ingredient information. Customers would then have all questions answered by this employee.

Check with guests in advance
The organizer of a catered event should ask if any of their guests have special dietary needs or food allergies. When printing banquet and catering contracts, a section called "special dietary needs" should be added to address allergies.

Have Emergency Procedures
All food service premises should have written emergency procedures for handling allergic reactions. These procedures should be posted in an area that all staff know about and have access to, like a staff bulletin board. Food service premises should also have a phone number for emergency services and a list of the names of employees trained in first aid and CPR posted and easily visible to all staff.

You can help prevent allergen contamination!

Prevent Allergen Contamination
Kitchen and service staff must be aware of the risk of foods being contaminated by allergens. Like cross-contamination of other foods, allergen contamination happens when food isn't kept properly separated. Here are some of the ways that this could happen:

- Using equipment that hasn't been thoroughly cleaned and still has other food on it
- Contamination (adulteration) of food, whether on purpose or by accident
- Using rework materials that came into contact with an allergen (for example, using pastry dough for two different recipes)
- Using the wrong packages or labels
- Not identifying all ingredients in food received from a supplier
- Using misleading names for foods or ingredients (for example, "Bombay duck" is actually a type of fish)
- Carrying too many plates at one time, causing food on separate plates to touch

Impacts of Food-borne Illness

While contaminants that cause food-borne illness can get into food anywhere it's processed, prepared, or served, about 50 percent of food-borne illness cases come from food prepared in food premises.

Food-borne illness doesn't just affect the person who gets sick. The average cost of food-borne illness outbreaks to Canadian taxpayers is estimated to be between $12 and 14 billion every year. Some of these costs are:

- Medical costs, such as doctor's visits, hospitalization, and medications
- Investigation costs, like the Public Health doing tests to confirm the type of food-borne illness
- Loss of productivity, including sick people missing work and food premises having to close during an investigation
- Higher legal and insurance costs if a food premises is sued by those who got sick

Complaints

If your food premises receive a complaint about a food-borne illness, call your local public health office to report the complaint. Public health will investigate the case. Record these details before you call:

- Who got sick
- What food they ate and when
- What symptoms they had and when
- Anything else about what happened

You also need to:

- Talk to your staff
- Ask if any of them have or had the same symptoms
- Ask if any of them were ill when handling food
- Review how the food was prepared
- Save food samples from the meal that was eaten
- Don't give medical advice; instead, refer people to the local Public Health Unit or a healthcare professional

In Review

In this chapter, you were introduced to the following:

- The definition of food-borne illness
- Common symptoms of food-borne illness
- Chemical, physical, and allergenic causes of food-borne illness
- Preventing food-borne illness
- The impact of food-borne illness on people and businesses
- Dealing with food-borne illness complaints from customers

Notes

Microorganisms

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What makes pathogenic bacteria so dangerous?

Bacterial Growth

Potentially Hazardous Foods

Introduction

The previous chapter looked at food-borne illnesses caused by chemical contamination, physical contamination, and allergens. This chapter will now look at food-borne illness caused by microbiological contamination. Microbiological contamination is the most common cause of food-borne illness, and it involves microorganisms.

Microorganisms are too small to be seen with the naked eye.

To understand how to handle food safely, you need to know a little about microorganisms. Microorganisms typically require a microscope to be seen. They're found just about everywhere, and they can exist in or on food, water, animals, objects, and the human body. Because microorganisms are so small, food that's contaminated with them may look, smell, and taste normal, even when it's not safe. So, it's very important that you know about these microorganisms and how to control them.

Microorganisms that make us sick are called pathogens.

Types of Microorganisms

There are six main types of microorganisms: viruses, parasites, protozoa, yeasts, mold, and bacteria. Some of these microorganisms are good for us and can be helpful, such as:

- Yeast used to make bread and produce alcohol
- Bacteria used to make yogurt and sauerkraut
- Mould that ripens and flavours cheese (for example, blue cheese)

Other microorganisms, however, can be a nuisance, make us sick, and even be deadly. Examples of these include bread mould, viruses (like Norovirus and Hepatitis A virus), and bacteria (like *Salmonella* and *E. coli*).

Viruses

Viruses are found in nearly all life forms, including humans, animals, plants, and fungi. They are between 20 and 100 times smaller than bacteria, often being too small to be seen by a standard microscope. Viruses don't grow in food because they can only grow inside a cell that's alive. Viruses use living cells in humans, animals, and plants to increase in number.

Viruses that cause food-borne illness are called enteric viruses, which means they infect the human body through the intestines. Symptoms may include weakness, nausea, vomiting, and diarrhea. Symptoms usually start suddenly and last one to two days, but a person may keep feeling ill for several more days. It's also possible for a person who's infected with a virus to have no symptoms but to pass that virus on to another person. Dehydration is also a common problem, especially for people in a high-risk group. Viruses are very good at infecting people and most times can't be treated with drugs, which means a person must wait for the virus to go away on its own.

The best way to control the spread of viruses is proper handwashing.

Human hands are the most common way that viruses get into food. This is why handwashing is so important. We'll learn more about this in the Personal Hygiene chapter.

Another source of viruses is contaminated water. This water can contaminate food washed in it or seafood and shellfish exposed to it.

Viruses can also spread through cross-contamination. Examples of viruses that can be carried in food are Hepatitis A, and Norovirus.

Parasites

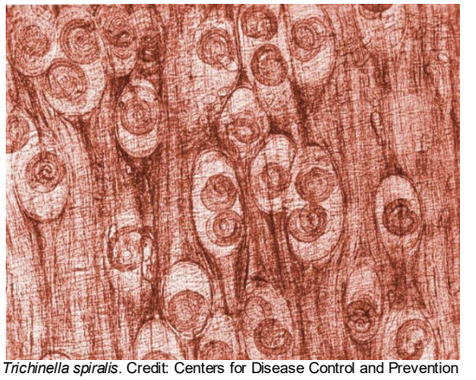
Parasites live in (or on) humans and animals, and they use humans and animals to grow. People can get parasites from:

- Contaminated water, or any food washed with contaminated water
- Eating undercooked meat from a contaminated animal
- Cross-contamination of foods

The best way to control the spread of parasites is thorough cooking.

Like viruses, parasites don't grow in food. Symptoms of a parasitic infection depend on the type of parasite. Abdominal or stomach pain, diarrhea, muscle pain, coughing, skin lesions, weight loss, and many other symptoms are possible. Examples of parasites include:

- *Trichinella spiralis*, which causes **Trichinosis**, is spread through raw or undercooked pork or wild game meat



Trichinella spiralis. Credit: Centers for Disease Control and Prevention

- *Anisakis* (parasitic roundworm), which causes **Anisakiasis** is spread through uncooked fish and raw fish items such as sushi, sashimi, ceviche, and salmon.

Anisakis. Credit: Centers for Disease Control and Prevention.

Parasitic Protozoa

Other kinds of parasites (*Parasitic Protozoa)* are spread through contaminated drinking and recreational water.

Parasitic Protozoa can get into food from contaminated water. They can survive longer in water than bacteria, and they're harder to remove from water than bacteria.

Protozoa are more likely than other microorganisms to infect someone who eats or drinks contaminated food or water. Cross-contamination can spread protozoa to other food.

Examples of Parasitic Protozoa include:

- *Giardia*, which causes Giardiasis ("Beaver Fever" or backpacker's diarrhea) is spread through drinking untreated surface water.
- *Cryptosporidium,* which causes Cryptosporidiosis is spread through ingestion of contaminated water.

Yeasts

Yeast is used to make food, like breads and alcohol, but yeast can also spoil food. Yeast spoils food by slowly eating it. Contamination shows up as bubbles, an alcoholic smell or taste, pink spots, or slime.

Yeast can grow at most food storage temperatures. It needs sugar and moisture to survive which it finds in foods like jellies and honey. Yeast usually spoils food without making people sick.

Mould

The blue in blue cheese, the flavour of some soy sauces, and the power of penicillin to fight disease all come from different kinds of moulds. These are beneficial. But the unwanted moulds we find in our kitchens are the ones that spoil food. These are not beneficial.

Single mould cells are usually very tiny, but mould colonies (groups of cells that are growing together) may be seen as fuzzy growths on food.

Some moulds make toxins called mycotoxins, which can cause serious illness. You can't tell by looking whether the mould you see is one of the poison-producing types.

Examples of poisonous toxins made by moulds are:

- Aflatoxin, found in nuts, peanuts and peanut butter
- Ochratoxin A, found in grain, coffee and wine

Mould can grow on almost any food, at any storage temperature, and under any conditions. Freezing prevents the growth of mould but it won't kill mould cells already in the food.

The mould that you see on food isn't the only mould that's there. If it creates poisons, it's generally under the surface of the food as well.

Mould can be thought of like a plant. The part you can see is like the flower, and the part that you can't see is like the roots. The softer the food, the further into the food the mould is likely to spread.

When in doubt, throw it out!

Does all mouldy food have to be thrown out? No. Some hard cheeses and hard salami can be saved, if you can cut out the mould at least one inch around and under it. Any other food should be thrown away. If you're not sure, the safest action is to follow the rule for all questionable foods: when in doubt, throw it out!

Bacteria

Bacteria are pretty much everywhere in our environment. Some can be very helpful to us, such as following:

- Lactobacillus and Bifidobacterium, which help us digest food
- Those used for bioremediation of toxic chemical spills

Bacterial illnesses are the most common type of food-borne illness.

Bacteria can also be harmful. Below are some examples of harmful bacteria.

Campylobacter
Commonly found in poultry and meat. It can be carried by rodents, wild birds, and household pets such as cats and dogs. It can also be found in untreated water.

Listeria
Found in soil. People can get infected by eating unpasteurized dairy products, vegetables, fish, and meat products that are contaminated with the bacteria.

E. coli
Lives in the intestines of animals and can be spread to the outer surfaces of meat when it's being butchered. *E. coli* can also be spread through contaminated water.

Clostridium perfringens
Can be found in high protein or starch-like foods such as cooked beans or gravies and is likely to be a problem in improperly handled leftovers.

Salmonella
Most commonly found in raw poultry, but also found in other meats, unpasteurized milk, and raw eggs.

Bacterial Infections

When food contaminated with living, harmful bacteria is eaten, it can cause food-borne illness. Bacteria will pass through the stomach and down to the intestines where it'll multiply and infect the person. It may take only a small number of bacteria to cause an infection, depending on the bacteria type

Symptoms of infection often appear one or more days after eating the contaminated food. With most bacteria, symptoms will appear within three days, but some pathogenic bacteria won't cause symptoms for 10 or more days. Others can take more than two months. Symptoms usually come on slowly and can last for several days. Since this is an infection, one of the symptoms is usually a fever.

Bacterial Intoxications

Sometimes it's not the bacteria itself that makes a person sick, but what the bacteria produces. All bacteria produce waste products, some of which are toxic to humans. These waste products are called toxins. A food-borne illness caused by a toxin is also called a food-borne intoxication.

Toxins have no smell or taste. Because some toxins can't be destroyed by normal cooking temperatures, cooking a food contaminated with a toxin may not make it safe. Bacterial toxins can come from bacteria that's growing in food or from bacteria that's on a person handling the food. Infections, cuts, burns, boils, and pimples all have bacteria, and, if those bacteria or their waste products get into food, they can cause food-borne illness.

Food-borne intoxication symptoms can start the same day or within a day or two of eating contaminated food. They can last up to two weeks. These illnesses can be very dangerous. Remember, a toxin is a **poison**. One example of food intoxication is **Botulism** caused by *Clostridium botulinum* (*C. botulinum*). Symptoms of botulism intoxication include:

- Nausea
- Vomiting
- Tiredness
- Dizziness
- Headache
- Double vision
- Dryness in the throat and nose
- Respiratory failure
- Paralysis
- Death

It's important to remember that with food-borne intoxication, it's not the bacteria that are making the person sick; it's the toxin made by the bacteria.

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

Staphylococcus aureus is another common bacteria that can cause Food Poisoning. *Staph. aureus* can be transferred to food through unwashed hands. The bacteria can multiply in the food and produce toxins that can make people ill. Staph bacteria are killed by cooking, but **the toxins are not destroyed by heat.**

Bacterial Spores

Some kinds of bacteria produce spores that can't be destroyed by normal cooking temperatures, dryness, and chemicals. These bacteria create spores when they're in conditions where they can't grow. Spores are the resting stage of live bacteria, and they can grow into active bacteria when good conditions are available.

Bacterial spores are NOT destroyed by cooking temperatures or most disinfectants.

Clostridium botulinum, the bacteria that causes botulism, produces spores. If an infant eats botulinum spores in food, the spores can grow into active bacteria in the intestine and produce toxins. This can also happen in adults with previous medical problems affecting the intestines. Later in this chapter, we'll learn more about what bacteria and need in order to grow.

Examples of Microbiological Illness

Illness (and microorganism)	Usual source of microorganism	Start of symptoms*	Symptoms	Foods typically contaminated with the microorganism	Factors that contribute to an outbreak
Salmonellosis (*Salmonella*)	Raw poultry, raw pork, feces of infected humans	6-72 hours; usually 18-36 hours	Fever, abdominal pain, diarrhea, nausea, vomiting, dehydration	Poultry, meat, meat products, unpasteurized milk, egg products, raw eggs, shellfish, pudding, gravies	Inadequate refrigeration, holding foods at warm temperatures, inadequate cooking and reheating, preparing food several hours before serving, cross-contamination, inadequate cleaning of equipment, infected worker touching cooked foods, obtaining foods from contaminated sources
Staphylococcal intoxication (*Staphylococcus aureus*)	Nose, skin, lesions of infected humans and animals, cow udders	1-8 hours; usually 2-4 hours	Severe nausea, vomiting, cramps, and prostration; usually diarrhea	Foods high in protein, custards, cream-filled baked goods, ham, poultry and meat products, potato and other salads	Inadequate refrigeration, infected worker touching cooked foods, preparing foods several hours before serving, working with cuts or abrasions containing pus, holding foods at warm temperatures
Trichinosis (*Trichinella spiralis*)	Flesh of infected pig and bear	4-23 days; usually 9 days	Vomiting, nausea, eye problems, muscular stiffness, spasms, difficulty breathing	Undercooked pork and foods in contact with undercooked pork	Inadequate refrigeration, holding foods at warm temperatures, preparing foods several hours before serving, inadequate reheating of leftovers
Hepatitis A virus	Feces, urine, and blood of humans infected with Hepatitis A	10-50 days; usually 25 days	Fever, malaise, nausea, abdominal pain, jaundice	Shellfish, raw oysters, clams, milk, sliced meat, water	Infected workers touching foods, poor personal hygiene, inadequate cooking, harvesting shellfish from sewage contaminated waters, and inadequate sewage disposal
Hemorrhagic colitis (*E. coli*)	Raw beef, pork, and poultry	2-6 days	Abdominal cramps, bloody or watery diarrhea; sometimes fatal	Hamburger, other meat products, raw milk	Undercooked hamburger and chicken in fast food facilities, cross-contamination

* This is the time from when a person eats the contaminated food to the time when the person starts to feel sick.

Carriers

Microorganisms can come from food, water, animals, and objects. They can also be found in and on the human body. Microorganisms can be present naturally or they can get into food through a carrier.

Carriers are people or objects that are carrying microorganisms. These microorganisms can end up in food that's not handled safely. Because microorganisms are so small, they can't be seen with the naked eye and they can be on people and on objects without them knowing it.

Remember: Bacteria, viruses, protozoa, and parasites can be transferred to food by a carrier.

People can transfer their germs into the food they're preparing. It's possible for a person to have an infection without showing any symptoms or signs. In fact, we're always carrying some germs around. Feeling well doesn't necessarily mean you don't have any microorganisms on or in your body. People can also pick up microorganisms from one type of food and transfer it to another type of food if they don't handle the food safely. This is called cross-contamination and will be talked about more in a later chapter.

Who Gets Sick?

There are a number of things that can make a person who eats contaminated food more or less likely to get sick. Some of these are:

- The person's health before eating the food. A person who has a weak immune system is more likely than a healthy person to get sick. Persons with weak immune systems include the very young, the very old and people immunocompromised by a medical condition.
- The amount of pathogen in the food. *Campylobacter* will generally cause food-borne illness in a healthy person if more than 500 cells are in the food eaten. For *Salmonella*, the number is 100,000. For *Shigella*, a person can get sick from eating as few as 10 cells. These numbers are called the 'infectious dose'. There has to be enough bacteria to make it through the stomach to the intestines for a person to get sick. Again, if a person's immune system is compromised, it'll take even less.
- The type of microorganism. Some microorganisms are more likely to cause food-borne illness than others. Protozoa and parasites are very likely to cause illness if they're eaten.

What makes pathogenic bacteria so dangerous?

- They can multiply very quickly at room temperature.
- They can live and multiply in food.
- They aren't killed by refrigeration or by freezing.
- Their spores and toxins may still be dangerous after food is cooked.

Bacteria are carried in water, food, and as "hitchhikers" on humans, insects, rodents, and objects (such as dishes, towels, and clothing).

Bacteria can multiply quickly when they're in conditions that suit them, meaning they have the right temperature, moisture level, and a source of food.

Bacterial Growth

Many kinds of bacteria will double every 10 to 20 minutes if its surroundings are perfect. In this case, the number of bacteria can reach dangerous levels very quickly in a short period of time.

Let's look at the things that bacteria need to grow:

- Time
- The Temperature Danger Zone
- Oxygen
- pH
- Moisture
- Protein

Time and Temperature

There's a temperature danger zone for food where bacteria will grow the fastest. The danger zone is between 4°C (40°F) and 60°C (140°F). It's important to keep food out of this danger zone as much as possible because the longer food is left in this zone, the more bacteria can grow and the more dangerous the food can get.

Holding hot food above 60°C (140°F) will kill live bacteria, but it won't kill bacterial spores and may not destroy toxins. Chilling food below 4°C (40°F) doesn't kill bacteria or do anything to spores or toxins, but it does slow the growth of most bacteria.

Temperature control is the most effective way to slow the growth of bacteria in food. Temperature control is so important that we'll discuss it in more detail in the next chapter.

The DANGER ZONE is between 4°C (40°F) and 60°C (140°F).

Oxygen

Bacteria that require oxygen in order to grow and survive are called *aerobic bacteria*. Most bacteria are aerobic. Bacteria that can survive and grow without the presence of oxygen are called *anaerobic bacteria*. Food-borne illness can be caused by both.

Aerobic bacteria

Salmonella is often found in poultry products like chicken, turkey, or eggs, and it needs oxygen to grow.

Anaerobic bacteria.

Clostridium botulinum can be found in improperly processed canned food and food preserved in oil that is maintained at room temperature.

pH

pH is a measure of how acidic or alkaline a substance is. The pH scale ranges from 0-14, with

7 being neutral. Pure water has a pH of 7. Any food with a pH below 7 is acidic, and any food above 7 is alkaline. Most foods that we eat are acidic, having a pH between 2 and 7.

Pathogenic bacteria need a pH that's slightly acidic on the pH scale.

pH of some common foods	
lemons	2.2 - 2.4
oranges	3.1 - 4.1
oysters	4.8 - 6.3
pork	5.3 - 6.9
squash	5.5 - 6.2
corn	6.0 - 7.5
potatoes	6.1
milk	6.3 - 8.5
eggs	6.4 – 9.0

Moisture

Bacteria need water to grow. Bacteria will grow faster in moist foods. Moist foods that are good for bacterial growth are things like:

- Meat (steak, hamburger, and pork)
- Dairy products (milk and cheese)
- Fish
- Eggs
- Vegetables

Dry foods don't have enough moisture in them for bacteria to grow, but bacteria can survive in them without growing. They can become hazardous when water is added; bacteria in them would then have the moisture needed for growth.

Food can be made safer if the amount of water available to bacteria is lowered by freezing, dehydrating (removing the water), cooking, or adding solutes like salt, sugar, and preservatives.

Remember, low moisture won't kill bacteria, but it will keep bacteria from growing.

Protein

Bacteria grow best when there is a good supply of food or nutrients. The main nutrient for bacteria is protein. Foods that are rich in protein are:

- Meat (steak, hamburger, and pork)
- Fish
- Poultry (chicken and turkey)
- Eggs
- Dairy products (milk and cheese)

Foods that have a high level of both protein and moisture are very good for bacterial growth.

Potentially Hazardous Foods

Potentially hazardous foods are foods that support the growth of bacteria.

Potentially hazardous foods are rich in protein and have high moisture content and neutral pH. These foods need to have their time and temperature watched very carefully to keep bacteria from growing, producing toxins or producing spores.

Potentially hazardous foods include:

- Moist foods with a pH above 4.5
- Dairy products
- Meat, fish, poultry, and eggs
- Some raw vegetables and fruit (e.g., bean sprouts, garlic in oil, and cut melon), especially those that won't be cooked

Remember, any food that contains one of these ingredients is potentially hazardous. So, a cream- filled doughnut, a salad with sliced chicken, a pasta dish with meat sauce, and a casserole with cheese would all be potentially hazardous.

Some raw and cooked vegetables and fruit will support the growth of pathogenic microorganisms and are therefore potentially hazardous. Vegetables and fruit my be easily contaminated and have caused a number of outbreaks (e.g., *E. coli* in spinach—September 2006; *Salmonella* in uncooked and fresh tomatoes—July 2008).

In Review

In this chapter, you've learned about the different types of microorganisms that cause food-borne illness and how they, especially bacteria, can be controlled. The following topics have been covered:

- Not all microorganisms are bad for us.
- The types of pathogenic microorganisms that cause food-borne illness are bacteria, viruses, parasites, yeasts, and mould.
- The similarities and differences between pathogenic microorganisms.
- The sources of pathogenic microorganisms.
- The food-borne illnesses these pathogenic microorganisms cause and the symptoms of illness.
- Why some kinds of food contamination are more likely than others to make people sick.
- Why some people are more likely to get sick than others when they eat contaminated food.
- How carriers can transfer microorganisms to food.
- What bacteria need in order to grow: time, temperature, oxygen, pH, moisture, and protein.
- What makes a food potentially hazardous.

Notes

Time and Temperature

Introduction

The Probe Thermometer

Food Safety Sequence

Freezing

Thawing

Refrigeration

Condiment Fridge

Food Preparation

Cooking

Hot and Cold Holding

Cooling

Reheating

Introduction

In the previous chapter we talked about the danger zone and how important it is that food be in the danger zone range of temperatures (between 4°C/40°F and 60°C/140°F) for as short a time as possible. This is true during all of the different stages of preparing, storing, serving, and selling food.

Food goes through many stages before it's made available to your customers. Steps need to be taken at each of these stages to make sure bacterial growth is kept to a minimum. This is done by controlling the temperatures food is kept at and the amount of time food is kept at those temperatures.

The Probe Thermometer

To make sure the proper food temperatures are reached and maintained, use a probe thermometer.

Your probe thermometer must be a food service thermometer. It should have a metal probe; an instant-read type is preferred.

Probe thermometers must be cleaned and sanitized by using alcohol swabs or a sanitizing solution before and after each use. This is to make sure you don't cross-contaminate food

To use a probe thermometer:

- Insert the probe so the sensing area is in the thickest part of the food or in the center of the food if there is no part that is thickest.
- Wait at least 15 seconds for the reading to steady, and then read it.
- Don't let the probe touch the bottom or sides of the food containers because you won't get an accurate temperature if you do. Never leave the thermometer in food that is being cooked by oven, microwave, or stove.

Thermometer Recalibration

Recalibrating your thermometer regularly will help to ensure your temperature readings are accurate. Recalibrating means adjusting the thermometer to make sure it's reading the right temperature. A thermometer should be recalibrated:

- After an extreme temperature change
- If it has been dropped

Even if these things haven't happened, your thermometer needs to be recalibrated on a regular basis.

How to Recalibrate

The recommended way to recalibrate your probe thermometer is by using the ice point method.

1. Set the probe of the thermometer in the mixture, making certain it's not touching the sides or the bottom. Wait until the needle stops moving to see what temperature it's reading. If it's not 0°C (32°F), it needs to be adjusted.

2. If your thermometer has a calibration nut, use a small wrench to turn it until the temperature reads 0°C (32°F). Keep the probe in the ice water to make sure the temperature is accurate.

3. Other types of thermometers can be adjusted in much the same way using its plastic cylinder or pliers.

When You Can't Recalibrate

Digital thermometers don't usually have a way to be recalibrated, but they still need to be checked for accuracy. Use the same method as described above for a dial type thermometer. The exception is that your digital thermometer may have a reset button that has to be pushed to recalibrate the setting. If your thermometer doesn't read 0°C (32°F), try a new battery or have a repair service check the unit. Follow any instructions for maintenance and care of your thermometer that come with it at purchase, including those for recalibration. To avoid confusion, be sure to recalibrate your thermometer as soon as possible.

If your thermometer is not reading accurately, you can't trust it. Recalibrate it or use a different one.

Food Safety Sequence

The basic sequence of safe food preparation is:

- Receiving and storage (see next chapter)
- Freezing
- Thawing
- Refrigeration
- Food preparation
- Cooking
- Cooling
- Hot and cold holding
- Reheating

Not all foods will go through all these stages and they may not go through them in this order. It's very important to monitor and control the temperature of food during all of these stages to make sure bacteria has little chance to grow.

Use your probe thermometer to check temperatures through all of these stages

Freezing

Frozen foods must be kept at a temperature of -18°C (0°F) or lower. All freezers must have a thermometer that is accurate and easily seen. The thermometer should be in the warmest part of the freezer, which is near the door and near the top. Temperatures need to be monitored several times a day to make sure they stay at or below -18°C (0°F). Once a week, a probe thermometer should be used to make sure that the temperature showing on the freezer's thermometer is right.

If food has defrosted, don't re-freeze it without cooking it first.

Freezers and refrigerators will run better and keep your food safer if you follow these tips:

- Keep the door closed as much as possible.
- Don't overload the space.
- Use open wire shelves that haven't been lined (no cardboard, tin foil, or other solid material).
- Make sure door seals are tight and in good repair.

Thawing

NEVER thaw foods at room temperature. Since the food thaws from the outside the surface of the food, where most of the bacteria are found, will be at room temperature while the middle will still be frozen. Because room temperature is in the danger zone, bacteria on the outside of the food will multiply very quickly.

Thaw foods safely using one of the following four methods:

In a refrigerator at 4°C (40°F)

This method is slow, so allow a day or more for large items, such as poultry and roasts. It takes about 10 hours/kg or 5 hours/lb. Use this method whenever possible, as it's the safest.

In a sink under cold running water

Use a large, clean sink and don't let water splash on other foods or surfaces where food will be, such as counters. Keep the water flowing constantly to keep the outside of the product cold. Remove the food from the sink as soon as it is thawed. Sanitize the sink and all utensils used in thawing.

As part of the continuous cooking process

This method works well for small portions of food like seafood, ground beef, and similar foods, but not for large items, unless the package directs you to cook from frozen.

In the microwave

Because the food is warm when it's thawed, use this method only if the food will be moved immediately to another cooking source after thawing. This method isn't effective for large items.

Refrigeration

Refrigerated foods must be kept at a temperature of 4°C (40°F) or lower. All fridges must have a thermometer that is accurate and easily seen. The thermometer should be in the warmest part of the fridge, which is near the door and near the top. Temperatures need to be monitored several times a day to make sure they stay at or below 4°C (40°F). Once a week, a probe thermometer should be used to make sure the temperature showing on the fridge's thermometer is accurate.

Condiment Fridge

Condiment refrigerators are often used to prepare or assemble food items like sandwiches or pizza. The top of a condiment refrigerator has a preparation counter with food compartments for holding ingredients like cold cuts, cheese, tomatoes, lettuce, and pickles. Proper temperatures in the top wells are very hard to maintain in these units, so it's important to keep the lid closed as much as possible and closely monitor temperatures.

Remember! Move the containers with food to the main part of the refrigerator for overnight storage.

Food Preparation

When you're working with food at room temperature, getting it ready to be cooked or served, you need to take extra care.

Any food preparation that takes place at room temperature is risky because it takes place in the temperature danger zone. Most bacteria grow fastest in the 20° to 50°C (68° to 122°F) range, especially at 37°C (98° F; human body temperature). The longer hazardous foods are in this range, the greater the chance that pathogenic bacteria will grow and/or produce toxins which will cause food-borne illness.

Don't keep foods in the danger zone longer than necessary. If you need to leave your work station for any reason, put food back in the refrigerator until you can start working with it again.

If you're preparing large amounts of food:

- Use small batches
- Use pre-chilled ingredients
- Pack food on ice

Cooking

We talked about what kinds of food are considered hazardous in the Microorganisms chapter; as a reminder, they're foods like:

- Dairy products (such as milk and cheese)
- Meat
- Poultry
- Fish
- Eggs

Food mixtures that contain hazardous foods need to be cooked to an internal temperature of 74°C (165°F). Verify the temperature with your probe thermometer for at least 15 seconds.

Cooking Meats

Some types of meat have different minimum internal cooking temperature requirements. As mentioned in the section on defrosting, most bacteria are on the surface of food. So when a solid piece of meat like a steak is cooked, the outside gets thoroughly heated and the surface bacteria are killed, even if the centre doesn't reach 74°C (165°F).

When meat is ground up, any bacteria on the surface are mixed through the meat. To make sure all bacteria are killed, the meat must be cooked all the way through.

To ensure *Trichinella* and *Salmonella* are killed, pork and poultry have higher temperature requirements.

Cooked Food from Raw	Temperature Requirement
Poultry (whole)	82°C (180°F) for at least 15 seconds
Poultry (pieces or ground)	74°C (165°F) for at least 15 seconds
Food mixtures containing poultry, eggs, meat, fish, or other potentially hazardous foods	74°C (165°F) for at least 15 seconds
Pork, lamb, veal, and beef (whole or ground)	71°C (160°F) for at least 15 seconds
Fish	70°C (158°F) for at least 15 seconds

For more information about different cooking temperatures for different kinds of meat, see Food Retail and Food services Code, 2016.

Hot and Cold Holding

Never top up old foods with new foods!

Holding food means keeping it at the right temperature once it's been prepared and until it's served. Food can be held hot, cold, or at room temperature, depending on the type of food and how long it's being held. There are different requirements for each type of holding.

Hot Holding

When food is kept hot after being cooked, it's called *hot holding*. Some examples of this are:

- Food held in a buffet
- Hot dogs kept hot in a hot dog cart
- Fast food held in a warming tray until it's served

Reheat the food at cooking temperature before transferring it into a hot holding unit!

Food being held hot for service or display must be held at 60°C (140°F) or higher at all times. Use a probe thermometer to monitor temperatures regularly during the holding time and record them. Hold food hot after the food has been cooked to the right internal temperature.

Room Temperature Holding

Potentially hazardous foods that are meant to be eaten right away can be displayed or held for service at room temperature (not kept on ice or heated) but for **less than two hours**. These foods should be marked with the time they were placed at room temperature so they can be thrown away at the right time.

NEVER mix old food with new food. If you do, you won't be able to follow the two-hour rule. An old pan of food should be removed completely and replaced with a new, fresh pan of food. Potentially hazardous foods can be held at room temperature for up to two hours because that time is too short for bacteria to grow or produce toxins at a level that would likely cause harm.

Cold Holding

All foods being held cold for service or display must be held at 4°C (40°F) or lower at all times. This is the same temperature they would be at in a refrigerator. Use a probe thermometer to monitor temperatures regularly during the holding time and record them.

Don't overfill containers. Use metal containers for all hazardous food since metal conducts cold better than plastic. Food can be held in the cold zone on ice or using a refrigerated unit. When using ice to keep food cold, ensure food is surrounded by ice, not just sitting on top of it. Containers of food should always be moved into

a refrigerator if they'll be stored overnight. Ingredients and containers can be pre-chilled before use.

Cooling

If cooked food needs to be cooled for storage or service, it must be done carefully because the food will pass through the temperature danger zone. The food must be placed on ice or refrigerated before it drops below 60°C/140°F. The faster the food is cooled, the less time it spends in the danger zone and the less risk there is of bacterial growth.

Cooling foods too slowly is one of the leading causes of food-borne illness.

The time it should take to cool food:

- Within two hours, the temperature of the food should drop from 60°C (140°F) to 20°C (68°F).
- Within the next four hours, the temperature of the food should drop from 20°C (68°F) to 4°C (40° F) or less.

As with cooked foods, the temperature of the food must be monitored during cooling using your probe thermometer. This is to make sure it's being cooled fast enough. Cooled food can be stored at 4°C (40°F) or less.

Let's look at some ways that food can be cooled quickly.

Shallow Pans

The best way to cool food is to transfer the hot, cooked food from large containers to shallow pans (2 to 3 inches / 5 to 7 cm deep or less). Partly cover pans to protect from contamination but allow heat to escape. Stirring food and using an ice water bath will also reduce cooling time significantly. When cool enough, place the pans in the refrigerator to bring the temperature down quickly. Store them on the top shelves to reduce the risk of cross-contamination.

Once the foods are thoroughly cooled, cover tightly to protect from contamination and to keep the food from drying out. Label and date the containers so that you'll know how long to keep the food.

Large Containers

Cooling cooked food in large containers is much harder and can mean that food will be in the danger zone for a longer time. Extra care must be taken. You can cool food faster by:

- Placing the large container in a sink of ice water (ice water bath)
- Stirring
- Using an ice wand
- Adding ice directly to the food
- Dividing food into small quantities

To make sure the food's being cooled fast enough, the temperature of the food must be monitored during cooling using your probe thermometer

Cooling After Preparation

Food prepared at room temperature must be cooled from 20°C (68°F) to 4°C (40°F) or less within four hours. This applies to food that won't be cooked right after being prepared, like meat that's being marinated. It also applies to food that won't be cooked at all, such as a salad.

Use your probe thermometer to make sure food is being cooled fast enough.

Reheating

Don't use hot holding units for reheating hazardous food.

When hazardous foods are reheated, they need to be brought to their minimum required cooking temperature for at least 15 seconds. The food needs to reach that temperature within two hours.

Use your probe thermometer to check the reheating temperatures.

As the food will pass through the danger zone, reheating should be done as quickly as possible so use the highest temperature you can. Keep these things in mind:

- Foods like soups, stews and gravies should be brought to a boil. When possible, reheat in small amounts so you can reheat faster.
- Food can't be reheated in a hot holding unit (like a steam table, chafing dishes, soup urn, or holding oven) because they're not designed to heat food quickly or to high enough temperatures.
- Be careful when using leftovers as they pass through the danger zone twice. Throw out any leftovers after reheating.

Never reheat food more than once! Don't use leftovers of a leftover!

In Review

In this chapter, you learned about using your probe thermometer and keeping food at the right temperatures during the different stages involved in serving food to your customers.
The following topics have been covered:

- How and when to recalibrate your probe thermometer
- The correct temperatures to store frozen and refrigerated foods
- How to properly monitor freezer and refrigerator temperatures
- Safe methods for thawing frozen foods
- The stages that put food in the danger zone: preparation, cooking, cooling, and reheating
- The different safe temperatures for cooking meats and other hazardous foods
- How to safely hold food at hot, cold, and room temperatures
- How to cool and reheat food safely by minimizing time in the danger zone

Notes

Receiving and Storage

Introduction

Shipping and Receiving

Storage

Stock Rotation

Introduction

Food safety is important during all of the different stages of preparation and production. To make sure the food you're serving to customers is safe, you need to make sure it comes from a safe source and is stored properly.

Shipping and Receiving

Whenever food is received at your premises, it should be inspected. You want all of the food you're receiving to come from an approved source and be in good condition.

Check delivery trucks. They should be clean and shouldn't have signs of contamination. Also, check all food products before they're accepted to make sure they're not spoiled or damaged. Look for:

- Proper shipping temperatures
- Dents or rust on cans
- Bulging, leaking, or stains on packaging
- Signs that products may be spoiled or infested by pests (e.g., gnawed holes or insect wings)
- Proper labeling, and labeling intact - not changed, broken, or removed from the food to which it's supposed to be attached

Check the manufacturer's 'best before' date. If the date has passed, don't accept the food

The following outlines how different foods need to be inspected for different things.

Temperatures

Foods that need to be refrigerated or frozen need to be shipped in vehicles that can keep them at the right temperatures. Refrigerated foods must be shipped at 4°C (40°F) or lower, and frozen foods must be frozen solid with no signs of thawing.

Thawing and refreezing are major dangers for frozen foods.

Products that must be kept at refrigerator or freezer temperatures should be double-checked for their actual temperatures. Because all delivery trucks are required to have thermometers in their refrigeration units, check the temperature of the thermometer in the delivery truck first. Then, use your probe thermometer to check the internal temperature of the food. If you can't insert the thermometer directly into the product, open a case and insert the entire sensing area of the thermometer between two packages, being careful not to poke a hole in them. Reject any products that are too warm.

Frozen products should be checked carefully to make sure they haven't thawed and been refrozen. Look for large ice crystals, solid areas of ice, and discoloured or dried-out food. Reject any food product that may have been thawed and refrozen. If a product you receive is thawing, it should not be refrozen; put it in the refrigerator, date it, and continue the thawing process—or reject it.

Water

Any water used in food premises must be from a potable water supply, which means the water must be safe for drinking. When buying ice, make sure it comes from an approved source and is made under sanitary conditions.

Meat, Poultry, Fish and Seafood

Only government-inspected meat, poultry, fish, and shellfish are allowed in food premises.

Wrappers and boxes of these foods usually show government approval and where the food was packaged.

You should reject meat and poultry products if they're discoloured, have a strange smell, or if the food is slimy, sticky, or dry. Remember, these products must be delivered frozen or refrigerated.

Look for government stamps or tags on meat, chicken, and seafood products.

Fish and shellfish should be delivered either frozen at -18°C (0°F) or refrigerated at 4°C (40°F). Shellfish must be received frozen or live. Inspect the fish itself. Reject fish products if:

- There is a strong 'fishy' or ammonia smell.
- The eyes are sunken or cloudy.
- The shipping temperature is above 4°C (40°F).
- The flesh is soft and gives (i.e., you poke the flesh with your finger and the finger print stays).
- Clam, mussel, or oyster shells are partly open and don't close when tapped.
- Lobster and shrimp are soft and have a strong smell.

Eggs

Hen eggs must be from an approved supplier and must be graded. Always check inside egg cartons. Look for cracks, feathers, and feces. If you see any of these, the eggs may be ungraded and may carry an increased risk of *Salmonella* contamination.

Cracked eggs and Grade C eggs can't be used in food premises. Liquid eggs must be pasteurized, and the packaging can't be broken or damaged.

Eggs and egg products should be delivered at 4°C (40° F) or lower; reject them if they're at a higher temperature. If eggs are coming from an egg grading station, they can be shipped at 13°C (55°F). Refrigerate acceptable eggs as soon as you receive them. Store them in their original containers.
Non hen eggs, such as duck and quail, should be clean and uncracked when received. Any transportation and storage of these eggs should be done at 4°C (40°F) or lower.

Dairy Products

Buy only pasteurized milk. All dairy products like ice cream, cheese, sour cream, and yogurt must be made using only pasteurized milk. This doesn't apply to cheese made from unpasteurized milk if the cheese is prepared in a licensed plant and cheese made from milk from animals other than cows and goats, provided the cheese has been prepared in a way that destroys and prevent bacterial growth and any other contamination that would make it unsafe to eat.
It is recommended to freeze the ice cream and to store most other dairy products between 2-4 ° C (36-40°F). Make sure you check the expiration or 'best before' dates.

MAP Foods

Modified Atmosphere Packaging (MAP) reduces or replaces oxygen with other gases to help keep bacteria from growing. Food packaged in MAP can be kept longer without using preservatives. Some of the foods available in MAP are:

- Refrigerated meals
- Fresh pasta
- Prepared salads
- Soups
- Sauces
- Cooked meats and poultry

Check packages for any holes, tears, bubbles, slime, or discoloured contents. If you see any of these, reject the food. MAP makes food much less likely to spoil as long as the initial packaging was done correctly, the packaging remains intact, and the food isn't mishandled. Also, check the expiration or 'best before' date on the package, and make sure the foods are received at the temperature marked on the package by the manufacturer or supplier.

Canned Foods

Food premises can't use or accept any home-canned foods—the risk for botulism is too high. Commercially prepared canned foods are made safe by heating to very high temperatures under pressure to meet quality control standards, which are tested and verified on a regular basis.

Never taste a can's contents to test them. You can get botulism from even a small taste of contaminated food.

Don't accept any cans with swollen sides or ends, flaws in the seams, rust, dents, leaks, or bad-smelling contents. Reject any can without a label. After a can is opened, it must not be re-used to store or cook foods.

Fresh Produce

Check fresh fruits and vegetables for wilting, mould, or any signs of infestation by bugs or other pests. Reject any products that aren't in good condition. Remember your cross-contamination rules, and make sure that unwashed refrigerated produce is stored below ready-to-eat foods and above any raw meats, poultry, and seafood.

Dry goods

Dry goods are foods like cereal, grains, nuts, rice, crackers, pretzels, sugar, and flour. They must be received in dry, unbroken packages. Dampness or mould may be signs of spoiled food or bacterial growth. Check packages for holes or tears which could be evidence of pest infestation. Make sure these products are well within the 'best before' or expiration dates. Store all grain and bulk foods in closed metal or plastic containers to prevent contamination and keep pests out.

How to Receive

Once you've inspected food and decided to accept it, there are a few more things you need to do to keep the food safe.

Remove potential physical contaminants
Remove staples, nails, and other fasteners from packages so they don't later end up as physical contaminants in food served to customers.

Check your invoices
Check what you're getting against invoices to make sure you're receiving everything you ordered and only what you ordered.

Remember your temperature control
Get refrigerated and frozen items into cold storage as quickly as possible. Don't leave them on the dock or in receiving.

Prevent contamination.
All foods should be moved to their storage areas as soon as possible to keep them from getting contaminated.

Maintain records and receipts.
It is a requirement to keep all receipts up to a year after purchase.

Inspected sources.
Ensure food that is subject to inspection by government of Canada or Ontario (i.e. meat, dairy, hen eggs) is obtained from an inspected source.

Rejecting a Shipment

Employees responsible for receiving goods should know what to do when a shipment doesn't meet the standards of your food safety system. If you are responsible for this, make sure you know your company's policy on what to do.

If you need to reject all or part of a shipment:

- Keep the food you are rejecting separate from your other food and supplies.
- Tell the delivery person the exact problem with the food.
- Use your purchase agreement and documented standards to back up your case and show that you have reason to reject it.
- Don't throw the food out or let the delivery person remove it until you get a signed adjustment or credit.
- Record the rejection in a delivery log. Include the date, food involved, the package identification (if there is one), the standards not met, and the type of adjustment made.

Storage

Different kinds of foods have different storage needs. Some foods can be safely stored at room temperature; others need to be refrigerated or frozen to be kept safe.

Always store food in an area that's used only for food storage.

All foods must be stored on shelves. Food should never be stored on the floor. If there isn't enough space, adjustments have to be made. Consider more frequent, smaller deliveries, or decreases in menu choices. Never store food in:

- Washrooms
- Staff dressing rooms
- Corridors
- Furnace rooms

Mops, pails, brooms, and other such items must be kept separate from food storage areas.

Storage Guidelines

There are some general rules that apply to all kinds of food storage:

- Your storage areas need to be kept clean.
- All food products must be kept at least 15 cm (6 inches) off the floor. This makes cleaning and pest control easier.
- Chemicals and food must never be stored together. Keep chemicals in their original containers, labeled with proper mixing instructions, warnings, and first-aid information. Store them away from food.
- All foods should be stored in food grade containers that can be washed and sanitized properly. Cardboard as an original container for certain foods (e.g., mushrooms) is allowed, but can't be reused to store any other foods.

- Food should not be crowded. There needs to be enough space for air flow and circulation both in cold storage (refrigerators and freezers) and room temperature storage areas. There should also be enough space to keep foods separate to prevent cross-contamination.
- Keeping moisture low will help food last longer and prevent mould.

Stock Rotation

Remember the stock rotation rule: First In, First Out (FIFO)

It's important to make sure you keep your stored food products or stock in a way that will keep them safe and fresh:

- All foods stored in the freezer, refrigeration unit, or dry storage should be arranged using the First In, First Out (FIFO) rule: the first product you received (In) is the first product you use (out).
- Sort foods by their expiration or 'best before' dates. Products without these dates should be dated when they're received. New products should be put behind older products to make sure that older products are used first
- Follow the recommended storage times for refrigerated, frozen, and dry good foods. Make sure all foods are dated.
- Don't order more than you can use. If you overstock, you'll end up wasting food.
- If you're not going to immediately throw away foods that are past their 'best before' or expiration date, keep them away from other foods.

In Review

In this chapter we looked at how to make sure you're receiving food that meets safety standards and how to keep your food safe when you're storing it.

The following topics were covered:

- The different shipping and storage requirements for different types of foods
- Checking the temperature and condition of foods you receive to make sure they've been shipped using food safety standards
- What to do when you need to reject a shipment
- Using the First In, First Out (FIFO) rule to ensure food is used in the right order

Notes

Microbiological Contamination

Introduction

Cross-Contamination

Refrigerate Right

Food Display

Serving Food

Discarding

Equipment

Tasting Food

Introduction

Microbiological contamination is the spread of harmful microorganisms to food that doesn't naturally contain those microorganisms. As discussed in the Microorganisms chapter, some foods naturally have pathogens in them, like *Salmonella* in raw poultry. If *Salmonella* is transferred from raw poultry to another food, this is called cross-contamination. There are also other sources of microbiological contamination. Viruses, like Hepatitis A, can be transferred to food from an infected person who is handling the food.

Other sources of microbiological contamination include poor cleaning, poor personal hygiene, or dishes that haven't been cleaned properly. There are simple things you can do as a food handler to make sure food doesn't get contaminated.

Cross-Contamination

Cross-contamination happens in three ways:

1. **Food to Food**: Raw food or juices come in contact with ready-to-eat food.
2. **Equipment to Food**: The same equipment is used with raw and ready-to-eat food without cleaning and sanitizing in between.
3. **People to Food**: Hands that have touched raw food then touch ready-to-eat food without being washed in between.

Refrigerate Right

When food is stored in a refrigerator, it's important to place the food in a way that helps to keep it from getting cross-contaminated. Keep raw meat, poultry, and seafood on the bottom shelves. Raw fruits and vegetables, and foods that will be reheated, belong in the centre. Cooked and ready-to-eat foods go on the upper shelves. If there's a lot of refrigeration space, store each food group in a separate area of the refrigerator. Make sure that all stored foods are covered to keep them from getting cross-contaminated with drippings or juices from other foods, and to keep out other contaminants like dust or objects.

If you think there's a chance that food has been contaminated, throw it away or let your supervisor know.

What Could Go Wrong?

The image below shows food stored in a refrigerator in the wrong order. What could go wrong here?

- Lettuce is stored next to raw chicken. Lettuce won't be cooked before being served and could be contaminated with *Salmonella* or other bacteria from the chicken.
- Raw chicken is stored above loosely covered ready-to-eat foods. The juices from the chicken could drip into the foods below and contaminate them.

- The soup at the bottom of the fridge is uncovered. Physical or microbiological contamination from the food stored above it could happen easily.

Food Display

Old food should never be mixed with new food. Microbiological contamination is another reason not to mix old food with new food. Keeping them separate keeps any contaminants that got into the old food from getting into the new food.

You should always use new utensils and new food containers when replacing food on display.

Each time a pan of food is replaced, the pan and all utensils used with it should be sent for dishwashing. Clean and sanitized utensils should go out in their place. 'Sneeze guards,' which are the protective shields that sit between a person's face and the food on display, should always be used. The handles of utensils used to serve out the food should never come in contact with the food.

Serving Food

Microbiological contamination can also happen when food is being served to customers. To prevent contamination of food as it's being served, follow these tips:

- Use scoops, spoons, or tongs to serve.
- Use single-use disposable plastic bags, wax paper, or disposable gloves to give out food.
- Cover cutlery (forks, knives, and spoons) and keep glasses upside down if they're out but not in use.
- Use trays to serve.
- Don't touch the surfaces of dishes or utensils that come into contact with mouths or food, like the inside of glasses, straws, or the eating ends of cutlery.
- Don't put your thumb on top of a plate to hold it. Hold plates underneath with your thumb on the rim.

Discarding

Any food that has been served but not eaten must be thrown out.

Even if food looks like it hasn't been touched, you don't know for sure that it hasn't been. It could be contaminated and must be discarded.

Single-service items such as disposable plates, plastic cutlery, or chopsticks must be discarded. Even if they look like they haven't been used, you can't know that for sure, so you must throw them out. Single-service items aren't made to be used more than once. They can't be properly cleaned or sanitized, so don't reuse them.

Equipment

If a piece of equipment in your kitchen comes in contact with raw food, it will pick up the microorganisms that are on the food. If the equipment then touches ready-to-eat food, that food will be cross- contaminated. To keep this from happening, all equipment must be washed, rinsed, and sanitized often, especially between uses with different foods.

It's very important to keep raw food away from cooked or ready-to-eat food. Raw foods, including meat and other animal products like eggs, raw fruit, and vegetables, may contain harmful microorganisms. The best way to avoid cross-contamination between raw food and ready-to-eat food is to have separate equipment, utensils, cutting boards, and preparation areas for each. Colour-coded utensils and cutting boards can help. Use one colour for raw foods and a different colour for ready-to-eat food. If you can't, then it's very important to immediately

wash, rinse, and sanitize any surface that food (especially raw food) touches each time it's used.

How Could This Happen?

To show you how easy it can be for food to get cross-contaminated, consider this example.

A food handler slices raw chicken on a cutting board. The raw chicken is contaminated with *Salmonella* bacteria, which is commonly found on raw poultry but is destroyed by cooking.
! The raw chicken contaminates the board, the knife, and the food handler's hands.

The food handler wipes the contaminated knife and board with a cloth, and sets them aside.
! Now the board, knife, cloth, and food handler's hands are all contaminated with microorganisms from the raw chicken.

Sitting out at room temperature, *Salmonella* bacteria multiply very quickly.
! The microorganisms can't be seen, so other food handlers in the kitchen won't know that all of these objects are contaminated.

Another food handler picks up the knife and cutting board and uses them to chop lettuce for a salad.
! The lettuce is now contaminated with Salmonella bacteria.

To prevent this, the knife, cutting board, and cloth need to be cleaned and sanitized before they come into contact with any food or food contact surfaces.
! The food handler's hands need to be washed before handling any other food or food contact equipment.

Equipment Care

To help prevent equipment cross-contamination:

- Keep sanitizing solution available in a bucket or labeled spray bottle, mixed to the proper strengths.
- Keep wiping cloths in sanitizing solution to keep bacteria from growing on the cloth.
- Replace cutting surfaces if they have cracks, crevices, or open seams. Damaged surfaces can't be cleaned well enough to get rid of harmful microorganisms.
- Remember that meat slicers come into contact with food and must be taken apart and thoroughly cleaned and sanitized after use. If slicers are used several times every day, clean the equipment throughout the day to remove bacteria from cutting surfaces. Take the slicer apart and thoroughly clean it at the end of the day.
- Change utensils (knives, ladles, tongs, etc.) often throughout the day. If a utensil is dropped, don't wipe it on your apron or cloth and reuse it. It's dirty and must be sent to the dishwashing area and be replaced with a clean one.
- Can-opener blades enter the can and touch the food. They must be cleaned regularly.

Tasting Food

Food handlers often need to taste food as they prepare it.

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.

Do:

- Use a disposable spoon or fork and throw it out right after you have tasted the food.
- Use a clean regular spoon and place it with the dirty dishes right after you have tasted the food.
- Ladle food into a cup, tasting bowl, or another spoon. Use a second spoon to taste the food. That way the first utensil goes into the food, the second goes into your mouth, and the two never touch.

Don't:

- Dip your fingers into the food then into your mouth.
- Put a spoon that has been in your mouth back into the food.

Do not double dip!

In Review

In this chapter, you learned about how food can be contaminated with microorganisms and what you can do as a food handler to prevent this.

The following topics have been covered:

- How to keep microorganisms from being transferred into food that is being prepared, served, stored, or displayed
- The importance of keeping kitchen equipment and utensils clean
- How to prevent cross-contamination by keeping foods separate as they're prepared and stored

Notes

Personal Hygiene

Introduction

Uniforms, Clothing, and Aprons

Hair

Hands and Nails

Handwashing

No-Touch Techniques

Disposable Plastic Gloves

When You’re Sick

Returning to Work

Introduction

People are one of the major sources of microorganisms that cause food-borne illness. There are microorganisms on (and in) the body (e.g., on hands, face, hair) and on clothes. These microorganisms are always there, not just when a person is feeling ill. They could make another person very sick if they're transferred through food. This could happen even if the microorganisms don't make the person carrying them feel sick.

As someone who handles and prepares food, it's important that you follow good personal hygiene practices. This will make it less likely for you to transfer microorganisms from yourself to the food you're handling. Personal hygiene is something you have control over. You must take it seriously. Even a small amount of a pathogen could be deadly to some people.

Uniforms, Clothing, and Aprons

The *Ontario Food Premises Regulation* requires all employees in food premises to wear clean outer clothing when they handle food. Light-coloured clothing is recommended because it's very easy to see when the clothing gets dirty.

Remember, dirty clothing may carry pathogens. When a food handler's clothing or apron looks dirty, get it changed for a clean one immediately.

Hair

Human hair can be a problem both as physical contamination and microbial contamination. The average person loses about 50 to 100 hairs per day. Headgear, such as hats or hairnets, will help to keep hair out of food and off of food contact surfaces.

Headgear also helps to keep people from touching their hair and contaminating their hands. When it gets warm in the kitchen, people may brush their hair from their forehead and back of neck without even realizing they're doing it. Wearing headgear would make you more aware of touching your head and hair.

Hair also carries microorganisms, some of which may be pathogens, so hair must be kept out of food to prevent food-borne illness. It's also important to not let your hands touch your hair when preparing food or handling food contact surfaces or utensils (such as dishes, forks, spoons, and knives).

Hair Confinement

Food handlers, with some exceptions, are required by the Food Premises Regulation to take reasonable precautions to ensure food is not contaminated by hair. This could include wearing headgear that confines their hair.

Food service workers who don't prepare food, like persons who wait on tables, may not have to wear headgear. If a server waits on tables and also does some food preparation (e.g., prepares salad or desserts, or ladles soup), then headgear is required.

It's important to wear headgear properly. It should cover all the hair, keeping hair off the forehead and the back of the neck.

Hands and Nails

Hands can pick up germs very easily. Hands need to be cleaned well to keep dirt and germs from being transferred to food. Pay extra attention to your fingernails. Dirt can get stuck under fingernails and may need more than just regular handwashing to clean.

- Use a personal nylon nail brush to clean under nails.
- Keep nails well-trimmed to help them stay clean.
- Avoid nail polish as it could chip and fall into food.
- Protect and care for hangnails to prevent infection.

Avoid wearing hand jewelry, rings, bracelets and wrist watches, as these can trap dirt and making thorough, proper handwashing difficult.

Handwashing

Handwashing, when done correctly, is the single most effective way to prevent the spread of communicable diseases. That includes food-borne illness. Food handlers need to wash their hands well whenever needed:

- Always wash your hands before you start work.
- Wash before handling any food or cleaning dishes and utensils.
- Anytime your hands get dirty or contaminated with germs, chemicals or other types of food, you must wash them.

Let's look at some of the things that could contaminate your hands.

Using the Washroom

It's very important to wash your hands properly after using the toilet or urinal. Very high levels of microorganisms and pathogens can be spread through fecal matter or urine, even when you don't feel sick. Toilet paper doesn't keep germs from getting on your hands. Microorganisms are so small they can pass through the toilet paper.

Hepatitis A outbreaks have been caused this way:

> "Other people are the only source of the hepatitis virus. The virus is found in feces in high numbers a week or two before symptoms become obvious. Therefore, it is possible to unknowingly spread the virus to other people through lapses in proper personal hygiene (handwashing). Outbreaks have been associated with . . . food contaminated by infected food handlers, including sandwiches and salads which are not cooked or are handled after cooking."
> (Alberta Health and Wellness: Common Food-borne Illnesses, 2009)

Nose or Mouth Contact

Touching your nose will contaminate your fingers and hands. Avoid rubbing or picking your nose; if you do, wash your hands at the hand sink immediately.

To make sure you don't transfer microorganisms from your mouth to your fingers and hands, you should avoid:

- Biting your fingernails
- Smoking
- Licking your fingers to pick things up, like paper
- Smoothing your hair, beard, or moustache
- Rubbing or picking your nose

You must wash your hands properly before handling food or anything that touches food, like counters or utensils.

Cough or Sneeze

Credit: Centers for Disease Control and Prevention

Coughs and sneezes send microorganisms, such as *Staphylococcus aureus*, into the air where they can be breathed in by other people. They also land on nearby surfaces where they can contaminate anything that comes in contact with those surfaces.

You need to contain any sneezes or coughs with tissues and wash your hands at the hand sink immediately afterwards. Remember, microorganisms are so small they can pass through the tissue and onto your hands. If you don't have a tissue handy, cough or sneeze into your upper sleeve instead of your hands. Don't use a cloth handkerchief. Each time you touch it, the germs already on it get back onto your hands.

Any food contaminated by a sneeze or cough must be thrown away. Any food contact surface contaminated by a sneeze or cough must be cleaned and sanitized.

Here are some other common ways that your hands could get contaminated:

- Handling raw foods
- Clearing tables
- Handling dirty dishes
- Handling garbage
- Cleaning and mopping
- Handling bottoms of boxes
- Handling money

How to Wash Your Hands

Now that you know when to wash your hands, let's look at how to do it properly.

To wash your hands so that surface microorganisms are removed, you need to use lots of soap and warm water. Use a sink that's only used for handwashing. Here are the steps:

1. **Wet hands:** Remove jewelry and watches. Wet hands with warm water first.
2. **Soap:** Be sure to use enough liquid soap to cover your hands.
3. **Lather well:** Lather soap for 15 to 20 seconds. Clean wrists, palms, back of hands, and between fingers.
4. **Rinse:** Rinse with warm water. Be sure not to touch the side of the sink.
5. **Dry:** Dry hands completely with paper towel or with an air dryer.
6. **Keep clean:** Use a paper towel to turn off the water to protect hands from getting dirty again.

Remember, using hand sanitizer do not replace or eliminate handwashing.

No-Touch Techniques

Food handlers should avoid directly touching food whenever possible. Utensils like tongs, spoons, and scoops act as barriers between your hands and the food.

Napkins or sheets of waxed paper can be used to pick up foods like muffins, donuts, cookies, bread, and ice cream cones without directly touching the food with your hands.

'No-touch' techniques are especially important when handling any food that isn't going to be heated or cooked after you touch it. If you touch a ready-to-eat food with dirty hands, then whatever is on your hands will get on the food and then in someone's mouth. Remember, nobody wants your fingers in their mouth!

Other Handling Tips

Some other tips to keep the food you're handling safe are:

- Never stack plates to carry several of them at one time, as your hands may touch the food.
- Never blow into bags or gloves to open them.
- Never pick up cutlery, dishes, and food without washing hands.
- Never touch the inside of glasses and the eating surfaces of tableware.

During a single shift, you should avoid combining jobs that are likely to cause contamination

- Don't work with both raw and cooked foods.

If you have to work with both raw and ready- to-eat foods, you need to wash your hands between each task.

- Don't wash dishes and stack clean ones.
- Don't clear dirty dishes and reset tables with clean dishes.

Disposable Plastic Gloves

Gloves can be used instead of bare hands, but gloves will pick up microorganisms the same way hands do. Wash your hands before and after wearing gloves. Throw away the used gloves.

Remember, glove use doesn't eliminate the need for handwashing.

If you have a cut or infection on your hand, a bandage must be worn to cover it and a glove must be worn over the bandaged hand until the cut or infection heals. A bandage alone is not enough. Bandages get wet and dirty and can carry pathogens. This is the only time a food handler must wear gloves, unless it's required as part of your employer's policy.

When You're Sick

If you're sick, your body is producing more germs and microorganisms than it does when you're healthy. If you have any of the following symptoms you must not prepare or serve food:

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

If you have any of these symptoms or if you have a communicable disease, you must let your manager or supervisor know.

Returning to Work

If you have diarrhea, the levels of pathogens being shed by your body are so high that even good handwashing may not reduce them to safe levels. After 24 hours without symptoms, pathogens are still being shed by your body, but the numbers are much lower.

You shouldn't return to work until 24 hours after your diarrhea has stopped.

Even if you're feeling well, you should still be careful and practice proper handwashing. You could be sick and not know it. With some illnesses, your body can shed pathogens for up to two weeks before you start to feel sick.

In Review

In this chapter, you learned about the importance of your own personal hygiene when handling food. You've learned what you can do to keep food safe and how to minimize the spread of microorganisms from your body to the food you're handling.

The following topics have been covered:

- Why it's important to keep your hands clean
- Some of the ways your hands can get contaminated
- How to properly wash your hands before handling food
- Ways to handle food without directly touching it.

Notes

Cleaning and Sanitizing

Introduction

How to Clean

How to Sanitize

Dishwashing

Food Contact Surfaces

Clearing Tables

Equipment

Facility

Washrooms

Handwash Sink

Garbage Control

Live Animals

Kitchen Layout and Plans

Introduction

Keeping your food premises clean isn't only about it looking good. It's about cleaning and sanitizing to control microorganisms and keep your food and your customers safe. Destroying all microorganisms is nearly impossible, but by cleaning and sanitizing it's possible to reduce them to safe levels. To do this, both steps are needed, and both must be done properly.

The difference between clean and dirty food premises will depend on:

- Using proper cleaning materials and using them the right way
- Educating staff on how to clean and sanitize
- Having dedicated management and employees
- Being organized

We'll look at all of these things in this chapter.

How to Clean

When you clean, use the right chemicals and friction to remove dirt and soil. Examples of this could be washing a floor with floor cleaner or washing dishes with dish soap.

The steps to cleaning are:

- Remove any obvious pieces of food, dirt, or other debris.
- Use cleaning chemicals and friction to remove the rest.
- Rinse with hot tap water to remove cleaning chemicals.

When it comes to food contact surfaces like counters, dishes, cutting boards, and utensils, cleaning alone isn't enough. A surface can look clean but still have unsafe levels of micro-organisms. Once a food contact item is clean, the next step is to sanitize it.

How to Sanitize

When you sanitize, you reduce the number of microorganisms to safe levels. Examples of this could be soaking cleaned utensils in diluted bleach or using the very high water temperatures in the sanitizing cycle on a dishwasher.

The steps to sanitizing:

- Always clean before sanitizing.
- Use very hot water, at least 77°C (171°F), or chemicals to remove microbiological contaminants.
- Make sure the items you're sanitizing are in contact with the chemical solution or hot water for at least 45 seconds.
- Use test reagents, test strips, or a thermometer to make sure your sanitizer or sanitizing solution is working.

Follow the manufacturer's directions when using chemicals to sanitize.

It's important to mix chemicals properly. Not using enough chemical will mean microorganisms are not being killed. Using too much chemical can lead to chemical contamination.

Types of Chemical Sanitizers

Only approved food grade sanitizers are permitted to be used on food contact surfaces.

When selecting a sanitizer, make sure you also get a test reagent or test strips to measure the solution's strength. Special test strips are available from your chemical or restaurant supplier. Where hot water is used to sanitize, an accurate thermometer must be used to check the water temperature. Below are the most common types of food grade chemical sanitizers.

Remember, vinegar is not a sanitizer!

Chlorine-Based Products

Concentration – 100 parts per million (ppm)

There are many chlorine-based chemicals. The most common one is household bleach. To make a 100 mg per litre concentration, add 5 ml (1 teaspoon) of bleach (5 percent strength) to every litre of water.

Quaternary Ammonium- Based Products

Concentration – 200 parts per million (ppm)

Mix and follow the manufacturer's label instructions. These quaternary ammonium-based cleaning compounds are also called 'Quats' or 'Quat sanitizers.'

Iodine-Based Products

Concentration – 25 parts per million (ppm)

Mix according to the manufacturer's label.

Chemical Sanitizers

Whichever one you choose to use, it's important to remember three things that affect how well they work:

Selectivity

Some products are more effective than others in killing certain types of microorganisms. Quats, in particular, may not kill all types of microorganisms.

Contact Time (CT) – at least 45 seconds

The solution must be in contact with the items you're sanitizing for at least 45 seconds for it to kill microorganisms.

Concentration (C%)

Solutions need to be mixed to the right strength. If the solution is too weak, it may not sanitize. If it's too strong, it may leave a taste or smell, damage metals, or be a health hazard. It's best to use a system that automatically dispenses sanitizer.

Always use test strips to test if the sanitizer is at proper concentration!

Making Sure it's Sanitized

Make sure you use a test reagent or test strips to measure your sanitizing solution's strength. If you sanitize with hot water, you need to check the water temperature with an accurate thermometer.

All food contact surfaces should be sanitized between uses. This includes:

- Sanitizing dishes after cleaning them
- Sanitizing tables with chemicals between customers
- Sanitizing food preparation areas between preparing different types of food

Dishwashing

Proper dishwashing sequence:
WASH – RINSE – SANITIZE!

Depending on the type of dishes you have and the equipment you use to clean, one of the following dishwashing methods should be conducted in a food premises for cleaning and sanitizing of dishes/utensils:

- Manual dishwashing
- Mechanical dishwashing

Manual Dishwashing

Depending on the type of dishes you use in the food premises, one of the following manual dishwashing methods should be followed:

Three - Compartment Sink Method

If you're washing multi-service articles (e.g., reusable dishes, knives, forks, spoons, glasses) you need three sinks: one to wash, the second to rinse, and the third to sanitize. Here are the steps:

1. **Scrape or Pre-Rinse:** Remove any leftover food on the dishes, utensils, and pots by scraping or rinsing it off.

2. **Sink 1 - WASH (warm water and soap):** In the first compartment, wash and scrub the dishes, utensils and pots, making sure all food and grease are removed. Use warm water and detergent, only!

3. **Sink 2 – RINSE (warm water):** In the second compartment, rinse the dishes, utensils and pots, and remove the soap and any remaining food particles. This is important because any detergent left on the dishes will weaken the sanitizer. Use clean water that's at least 43°C (110°F). Change the water if it doesn't look clean

4. **Sink 3 – SANITIZE (approved sanitizer):** Sanitize in the third compartment by submerging dishes, utensils, and pots for at least 45 seconds, in a sanitizer solution that's at least 24°C (75°F), or hot water that's at least 77°C (171°F). It's important to make sure that the sanitizer is strong enough to do the job, so test the sanitizer right after mixing it in the sink.

5. **Air dry:** After sanitizing, let items air dry on a non-porous sloped draining board. Never towel dry, as you could cause contamination from a worker's hand or a damp dish towel.

Two - Compartment Sink Method

You can use the two-compartment method only if:

- You use single-service disposable dishes.
- You don't have very many utensils to wash because you do only a small amount of food preparation.
- You use pots and pans too large for a mechanical dishwasher.
- If you have items with baked-on grease or heavy food residue, scrape and pre-soak before you wash.

Here are the steps:

1. **Scrape or Pre-Rinse:** Remove any leftover food on the dishes by scraping or rinsing it off.

2. **Sink 1 – WASH and RINSE:** In the first compartment, wash and scrub the dishes, utensils and pots, making sure all food and grease are removed. Use warm water and detergent. After washing, rinse under the tap with clean running water. Make sure the soapy water and all soap suds are rinsed off.

3. **Sink 2 - SANITIZE:** Sanitize in the second compartment by submerging dishes, utensils, and pots for at least 45 seconds, in a sanitizer solution that's at least 24°C (75°F), or hot water that's at least 77°C (171°F). It's important to make sure that the sanitizer is strong enough to do the job, so test the sanitizer right after mixing it in the sink.

4. **Air dry:** After sanitizing the items, air dry them on a non-porous sloped draining board. Never towel dry, as you could cause contamination from a worker's hand or a damp dish towel.

Mechanical dishwashing

All dishwashers must meet minimum standards as outlined in *Food Premises Regulation*. They must be regularly cleaned and maintained. Dishwashers may be high temperature (that sanitize using hot water) or low temperature (that sanitize using a chemical sanitizer). Either one can be used as long as it's checked regularly to make sure it's sanitizing properly.

High Temperature Machine

High temperature machines use hot water in the rinse cycle to sanitize. The water temperature in this cycle must reach 82°C (180°F) or higher for at least 10 seconds. Use a water temperature booster if needed.

Low Temperature Machine

Low temperature machines use chemical sanitizers in the rinse cycle to sanitize. Test strips for measuring the sanitizer in the rinse cycle must be available and used to make sure the machine is sanitizing properly.

Don't overcrowd the dishes as it will be harder for them to get clean. Bowls, cups, and glasses should be placed open-side down. Cutlery should be mixed to keep them from 'nesting.'

NSF Machine

NSF approved dishwashers may also be used in a food premises. They may have different time/temperature settings for washing and sanitizing. Operators must ensure that is working as per manufacturer directions.

All machines must have gauges that show wash and rinse temperatures.

After Washing

Always wash your hands before handling clean dishes.

Once dishes, utensils, and pots have been cleaned, they should be stored on surfaces that are cleaned and sanitized. Keep them away from dust, garbage, and splashes and at least 15 cm (six inches) off the floor. Don't put them away until they are dry and cool. Remember, don't towel dry dishes as they could get contaminated from the towel. Damaged dishes (cracked, chipped, or warped) can't be used because they're a physical hazard. They should be thrown away.

General Cleaning

To be effective, cleaning must be organized. Expecting staff to clean "when they have a free moment" doesn't work and tasks get forgotten. A food service manager must show dedication to keeping things clean. This shows the importance of cleaning to their staff. All staff members need to take pride in their job. No one person alone can keep the food premises clean.

A cleaning schedule is very useful. It should include:

- Each job that needs to be done
- Who will do the job
- The chemicals and/or tools to be used to do the job
- How often the job must be done (hourly, daily, weekly)
- A follow-up check to make sure the job was done

The schedule should be discussed with staff before it's put in place and monitored regularly afterwards to make sure it's working.

Food Contact Surfaces

Work surfaces that come in direct contact with food, such as counters, cutting boards, tables, and grills must be durable and easy to clean.

Having many cutting boards small enough to fit into a dishwasher or sink is better than having a few large ones. Small boards can be quickly changed when dirty without slowing down food preparation. It's a good idea to code cutting boards for specific uses to avoid cross-contamination. One good way to do this is to use different coloured boards or boards with coloured handles for different food types: red for raw meat, green for vegetables, orange for bread, etc.

Plastic is a good cutting board material because it's durable and easy to clean and sanitize. Hardwood can be used as long as it's free of gaps and cracks that would trap bits of food and make thorough cleaning and sanitizing impossible. Extra care must be taken to sanitize wood cutting boards as they can't go in a dishwasher. Wooden food contact surfaces must not be varnished or sealed as these finishes will wear and the chemicals will get in the food.

Replace damaged cutting boards that can't be properly cleaned and sanitized.

Clearing Tables

Tables must be cleaned and sanitized between customers. Use sanitizer and a clean damp cloth or a disposable paper towel to make sure any contaminants on the table are removed. Cloths used for cleaning tables should be clean and shouldn't be used for any other purpose.

If there are any table linens (tablecloths, cloth napkins, placemats) change them between settings. Any table linens used must be clean and in good repair. They must be laundered between uses.

Any food that remains on the table must be discarded. The same goes for any single- service items like plastic cutlery, paper napkins, and disposable cups and plates.

Equipment

Your equipment needs to be cleaned often enough to keep it from getting a buildup of food residue or any other contaminants like dust or debris.

Equipment that's used without breaks at room temperature or used with hazardous foods needs to be cleaned and sanitized at least once every four hours and between being used with raw and ready-to-eat foods. Examples are a meat slicer or grinder, a cheese slicer, or a food processor. It's a good idea to have more than one piece of equipment when possible, so that one can be used while the other is being cleaned.

Facility

Food safety depends in part on how your premises is laid out, and its maintenance. Make sure your building:

- Is kept clean
- Has proper lighting
- Is in good repair
- Has proper ventilation
- Is pest free

Microorganisms can be transferred from floors or walls to food contact surfaces by other objects. Remember:

- Floors must be tight, smooth, and non-absorbent.

- Walls and ceilings must be easy to clean.
- Floors, walls, and ceilings must be kept clean. Repair any damaged areas as they can't be properly cleaned and sanitized.
- Water-damaged or broken ceiling tiles need to be replaced.

Washrooms

The number of washrooms (including accessible washrooms) you need in your food premises for customers and staff is determined by the Ontario Building Code and the local building department. The number of fixtures (sinks, toilets, etc.) needed is listed in the building code.

No operator can alter the floor space, number of toilets or washbasins in a sanitary facility without receiving approval in writing from a public health inspector.

Washroom fixtures must be cleaned and sanitized at least once a day and as often as needed to keep them sanitary.

Handwash Sink

As discussed in the Personal Hygiene chapter, you need to wash your hands using the six-step method whenever they get contaminated.

Handwashing sinks must be accessible, convenient located and used for only for handwashing.

Food premises need to have at least one dedicated handwashing the food preparation area. This sink needs to be in an area that is convenient for employees. In large food premises, there must be one handwashing sink in each area where food is prepared or processed, or where utensils are washed. The handwashing sink can't be used for food preparation, washing dishes, or emptying out water from pots and cleaning buckets.

Using the sink for anything other than handwashing increases the risk of contaminating a food handler's hands.

At a minimum, each handwashing sink needs to have:

- Hot and cold running water
- Soap or detergent in a dispenser
- Clean, single-use towels or a cloth roller towel AND a supply of paper towels.

Garbage Control

Garbage containers inside your food premises should be easy for your staff and customers to use. There should be enough available to keep them from getting overfilled, and the containers should be emptied often to prevent overfilling. When garbage containers are full, they need to be emptied immediately.

Lids or other kinds of coverings, like a garbage container inside a compartment with a swinging door, will help to prevent odours, pests, and airborne contamination. Garbage containers need to be cleaned and sanitized after each use, so they need to be made of durable materials.

When garbage is taken to containers outside your premises, those containers need to be made in a way to keep out pests and keep in odours or health hazards (like contaminated foods). Any spills or leaks should be cleaned up right away.

Live Animals

Live animals are not permitted in food premises. There are exceptions to this rule:

- Service animals as described in subsection 80.45(4) of Ontario regulation 191/11 Disabilities Act, 2005 where food is served, sold, or offered for sale.
- Aquatic species that are in sanitary tanks such as fish or lobsters

- Live birds or animals if they are offered for sale on food premises other than food services premises with permission from public health inspector.
- Live dogs in an outdoor eating area of a food service premise where food is not prepared in the eating area.
- Live dogs in an indoor eating area where only low risk foods are prepared, handled, offered for sale.

Kitchen Layout and Plans

Premises that are easy to clean and have a good flow for people and food products are less likely to have problems with cross-contamination, temperature abuse, or personal hygiene. If the handwashing sink is easy to get to, it's more likely to get used often. If the fridge is close to the food preparation area, it's more likely that food will stay in the fridge until it's needed.

Before building or renovating any part of a food premises, plans or blueprints of the layout should go to Public Health for review. Having the plans reviewed before work starts can save money and time by keeping you from having to change things after they're built.

The layout of the kitchen should be designated to:

- Allow people and food to easily move from place to place to avoid crowding and cross contamination.
- Make sure there is plenty of storage space for cold and dry storage, staff clothing, and garbage and cleaning supplies
- Have separate food preparation areas for raw foods and ready-to-eat foods, if possible, to reduce risks of cross-contamination.
- Make access to handwashing sinks easy and convenient.
- Have separate sinks for handwashing and dishwashing.
- Separate the dishwashing area from food preparation areas.

In Review

In this chapter, you've learned that keeping your food premises clean does more than make it look good—it helps to keep food safe.

The following topics were covered:

- Why it's important to clean and sanitize food contact surfaces and other areas of your premises
- How to clean and how often to clean the different areas and equipment
- The two compartment, three compartment, and mechanical dishwashing methods
- How the layout of a food premises can facilitate cleaning and sanitizing

Notes

Pest Control

Introduction

Cockroaches

Flies

Other Insects

Rodents

Prevention and Control

Introduction

Insects and rodents are more than just a nuisance in a food premises. Pests can contaminate your food supplies. They can damage your building by causing electrical or fire hazards and creating holes in the building structure.

The greatest threat of insects and rodents is that they spread diseases by contaminating food.

Cockroaches

Once you have cockroaches, you'll find it very hard to get rid of them. Live cockroaches can survive on very little food and water. They can live for up to two years during which the female roach can lay over 500 eggs. Cockroach eggs are protected by an egg case.

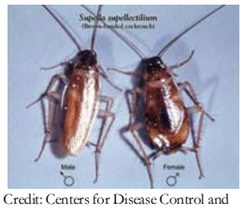
Cockroaches can live and breed almost anywhere that is dark, warm, moist, and hard to clean. Some spots they like are:

- Behind refrigerators, freezers, and stoves
- In sink and floor drains
- In spaces around hot water pipes
- In the motors of electrical equipment
- Under shelf liner and wallpaper
- In delivery boxes and bags

Cockroaches give off a strong oily odour and their feces looks like large grains of pepper. They are normally active in the dark, looking for food and water. If you see cockroaches in a lit-up area, it usually means you have a serious cockroach infestation.

Common Types of Cockroaches

There are many different types of cockroaches. Here are the ones most commonly found in Ontario: (see next page)

Cockroach Type	Picture	Description & Notes
German	 Credit: Centers for Disease Control and Prevention	• Pale brown or tan and 10 to 15 mm (about 1⁄2 inches) long • Found indoors (in motors, cracks, crevices, soft drink machines, and near water) • Like potatoes, onions, and sweet beverages • Reproduce more rapidly than other cockroaches
Oriental	 Credit: Centers for Disease Control and Prevention	• Shiny, black, and about 25 to 32 mm (about 1 to 1-1⁄4 inches) long • Found in basements, water pipes, and indoor incinerators
American		• Reddish brown and about 34 to 53 mm (about 1-1⁄4 to 2 inches) long • Drawn to wallpaper, water, and starch in food • Found in drainage and sewer areas, rest rooms, heating pipes, and damp oven areas
Brown-banded	 Credit: Centers for Disease Control and Prevention	• Look like the German cockroaches • Found in kitchens, dry storage, and under dining area tables and chairs
Asian	 Credit: Baldwin & Fasulo, University of Florida, 2005	• Look like the German cockroach, but they can fly • Drawn to light and tend to hide in tropical plants

Flies

Flies are so common in our day-to-day lives that sometimes they're not really seen as a problem. But in food premises, they're a big problem.

Flies are attracted by smells. They breed in garbage and feces. A female housefly can lay between 375 to 750 eggs over its lifespan and eggs laid will hatch in as little as seven days. A small fly problem can turn into a big one very quickly.

Flies easily spread filth because their bodies are covered in hair and their feet have claws. Any contaminants they touch get stuck to them. Flies don't have teeth, so they can't chew food. If they want to eat something that is solid, they vomit on it. The acid from their stomach dissolves the solid food, and then they suck it back up. If the fly is scared away, the vomit stays behind and so do the germs. Flies usually defecate while feeding as well.

Flies:

- Can enter a building through an opening the size of a pinhead
- Are drawn to smells of rot, garbage, human feces, and animal waste. This is where they lay their eggs and find food.
- Are drawn to places out of the wind and to the edges of objects, such as garbage can rims
- Need moist, warm, rotting material out of sunlight for their eggs to hatch into maggots

Other Insects

Beetles, moths, and ants can survive on very small amounts of food. Flour moths, beetles, and similar insects are often found in dry storage areas. Look for:

- Insect bodies
- Wings or webs
- Food that's clumped together
- Holes in foods and packaging

Ants often nest in walls and floors, especially near stoves and hot water pipes. They're drawn to warmth and to greasy and sweet foods.

Rodents

Rodents, like rats and mice, eat and ruin food and damage property. Both rats and mice can damage buildings. They can make walls weak by chewing holes, and they even cause fires by chewing through electrical wires.

Rodents are a serious health hazard. They can spread disease through their waste and by touching food or food contact surfaces. Rodents have a simple digestive system and weak bladder control. They urinate and defecate as they move around your premises. Their waste can fall, be

blown, or carried into food. Like other pests, rats and mice breed often and quickly.

Rats are smart enough to avoid poorly set traps and other control measures. Rat bites can be dangerous to humans and dead rats must be carefully handled to avoid spreading disease.

Like cockroaches, rodents are active in the dark and at night. If you see them in daylight or in well-lit areas, it's a sign of heavy infestation.

Prevention and Control

The best way to control a pest infestation is to prevent it from happening in the first place. In this section we'll look at what you can do to keep pests out of your food premises.

Preventing pests from infesting your premises is much easier and less expensive than getting rid of pests that are already there.

Integrated Pest Management

Food premises operators should rely on certified pest control services and emphasize integrated pest management practices that minimize the reliance on chemical controls in order to minimize the risk of contamination of food products by pesticides.

An integrated pest management (IPM) program is a system designed to keep pests from getting into your food premises and get rid of any pests that are already there.
Three rules for developing an IPM program are:

- Don't provide food, water, and shelter for pests. Follow good sanitation and housekeeping practices.
- Keep pests out of the food premises by pest-proofing the building.
- Work with a licensed pest control company.

Pest Control Company

Pest control companies can be used for emergencies where pests have already infested your food premises. They should also be used for prevention.

A good working relationship between the food premises operator and the pest control company is important to keep a pest free environment.

Hire a licensed pest control company with a good reputation. They should combine sanitation, non-chemical controls, building maintenance, and chemical treatment. Work with your pest control company to arrange the best possible contract, inspection system, treatment procedures, and follow-up. Know which chemical(s) and procedure(s) will be used in specific areas.

Pest control methods, especially the use of chemicals, can be very dangerous for your employees and customers if they're not used properly.

Control Methods

Before using chemicals
Cover all food and dishes in areas where chemicals will be sprayed before spraying starts.

After using chemicals
All food contact surfaces and equipment must be thoroughly cleaned and sanitized before being used for food preparation.

NEVER spray while food preparation is going on.

Some chemicals and treatments can't be used when employees are in the area or on the premises. Again, you should hire a professional to do this.
Other methods that a pest control operator can use are traps, glue boards, and poison baits. They can also destroy nests and breeding places.

Follow-up is important to make sure the methods are successfully eliminating the infestation. If not, other methods must be tried.

Pest Proofing

DO:

- Seal gaps, cracks, and openings in floors, walls and equipment.

- Repair any leaky plumbing.
- Keep the outside of the building in good repair.
- Use screens to cover windows, doors, and vents.
- Install heavy plastic strips or air curtains on any receiving doors that need to be opened often.

DON'T:

- Don't leave doors open when you're not using them. Install a sweep on the door if there's a gap between the door and floor. Mice can squeeze through a 0.6 cm (quarter inch) opening and rats can squeeze through a 1.3 cm (half inch) opening.
- Don't provide water sources for pests. Make sure to drain sinks and repair leaky pipes.

Sanitation and Housekeeping

Pest control doesn't take the place of good sanitation. The cleaner your premises is, the easier it will be for you to control pests

DO:

- Store all food and supplies at least 15 cm (6 inches) off the floor so you can watch for signs of pests.
- Keep grain products and open bulk food products in sealed metal or heavy plastic containers.
- Keep break rooms, washrooms, and locker rooms clean and dry.

DON'T:

- Don't accept any shipment that shows signs of pests, like gnawing or feces.
- Don't keep cardboard packaging around. It can carry cockroach eggs.
- Don't let spilled food attract pests. Clean up any spills right away.
- Don't leave garbage where it will attract pests. Store it properly.

In Review

In this chapter, you've learned about the dangers that pests in food premises pose to food safety. The following topics have been covered:

- The different kinds of pests to look out for in food premises
- What you can do to keep pests from being attracted to your food premises
- Why it's more effective and less expensive to prevent a pest infestation, rather than get rid of them once they're in.

Notes

Food Safety Management

Introduction

Before You Start

HACCP Principles

Introduction

HACCP stands for Hazard Analysis Critical Control Point. It's a self-inspection system designed to control physical, chemical, biological, and allergen contamination at all points in food processing.

The HACCP system of monitoring food was originally developed for NASA. Food prepared for astronauts in space had to be as risk-free as possible. The program was so successful it was introduced to food production companies and is now used around the world.

The goal of the HACCP system is to eliminate or reduce the amount of food-borne illness and prevent food adulteration.

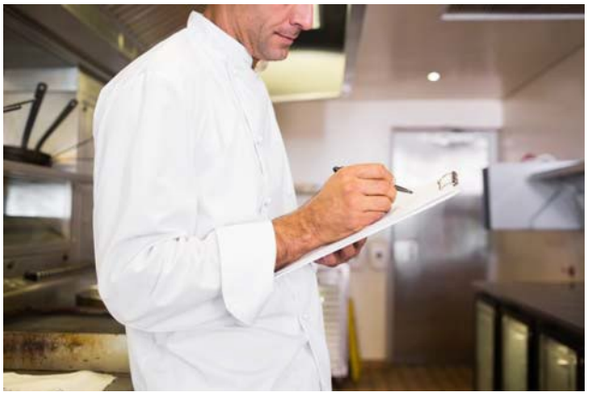
In this chapter, we'll review the principles of HACCP. You can read more about implementing a HACCP system on the Canadian Food Inspection Agency (CFIA) website.

Before You Start

Before you begin with any food safety management system, you need to make sure you're following basic food safety practices. We've gone over these practices in previous chapters:

- Make sure your food premises is clean and sanitary. This includes cleaning, sanitizing, pest control, and proper maintenance of your equipment.
- Your food suppliers must be safe. This includes both receiving and storage, as well as transportation methods.
- You must use safe food handling and packaging methods.
- Every member of your staff who is handling food must practice good personal hygiene.

HACCP Principles



The seven principles of HACCP are:

1. Conduct a hazard analysis.
2. Determine the Critical Control Points (CCPs).
3. Establish critical limit(s).
4. Establish a system to monitor control of the CCPs.
5. Establish the corrective action to be taken when monitoring indicates that a particular CCP isn't under control.
6. Establish procedures for verification to confirm that the HACCP system is working effectively.
7. Establish documentation concerning all procedures and records appropriate to these principles and their application.

(Adapted from Canadian Food Inspection Agency, QMP Reference Standard and Compliance Guidelines, Chapter 3, Subject 4, Section 5.)

Step 1: Hazard Analysis (HA)

The first step in HACCP is a hazard analysis. This involves:

- Identifying any potential hazards in your food processing or preparation
- Determining how critical each hazard is
- Determining how likely it is that each hazard could happen

These hazards need to be identified at every stage of food processing and preparation. As you've learned, these stages are:

- Receiving and storage
- Freezing
- Thawing
- Refrigeration
- Food Preparation
- Cooking
- Hot and cold holding
- Cooling
- Reheating

Hazard examples

In the previous chapters, you've learned about the different types of food safety hazards. Some of these are:

- Microorganisms that can grow during preparation, storage, and/or holding of food
- Spores or toxins that can survive heating
- Chemicals that can contaminate food or food contact surfaces
- Physical objects that can accidentally enter food

Some examples of potential hazards are:

- Adding a known allergen to a recipe. **Potential hazard: Allergen.**
- Moving foods received from original packaging to storage containers. **Potential hazard: Physical contamination.**
- Reheating food from cold to hot temperatures**. Potential hazard: Microbiological growth.**
- Cleaning food contact surfaces with chemicals. **Potential hazard: Chemical contamination.**

Remember, each of these are a potential hazard. Each should be examined to determine whether they're a critical hazard based on how high the food safety risk is and how likely it would lead to food-borne illness.

Processing Risks

Some of the ways food is prepared or processed can increase the risk of a potential hazard. Some examples are:

- Large volumes of food being prepared at one time, which increases time in the temperature danger zone
- Processes involving multiple step preparation, especially if they occur over more than one day or involve more than one food handler
- Processes with significant temperature changes that enter the danger zone or pass through the danger zone from hot to cold or cold to hot

Step 2: Critical Control Points (CCP)

A Critical Control Point (CCP) is any point during food preparation or production where food safety could be at risk. Once hazards are identified and analyzed, CCPs must be established. For each critical hazard identified in Step 1, a way to lessen, prevent, or eliminate the risk needs to be documented. A standard Hazard Analysis/Critical Control Point worksheet should be used for record-keeping.

Critical Control Point Examples

You learned to control the CCPs related to temperature and time in the Time and Temperature chapter. As a reminder, some of these are:

- Making sure hazardous foods are cooked to the minimum temperature needed to kill bacteria
- Storing foods at temperatures that keep pathogens from growing
- Limiting the amount of time that food is in the danger zone

In the Food-borne Illness chapter you learned how to put allergen controls in place by:

- Making sure food ingredients are clearly communicated to the customer
- Using safe food handling methods to make sure allergens aren't added to foods they aren't supposed to be in
- Replacing known allergens with foods less likely to cause a reaction

Step 3: Critical Limits

For each Critical Control Point (CCP) identified, a critical limit needs to be set. You've learned about critical limits in other chapters. Some examples are in the following table.

Critical Control Point	Critical Limit
Raw chicken parts may contain *Salmonella* bacteria.	Chicken must be cooked to a minimum internal temperature of 74°C (165°F) to kill the *Salmonella* bacteria.
Bacterial growth is most likely to occur between 4°C (40°F) and 60°C (140°F).	Cool cooked foods from 60°C (140°F) to 20°C (68°F) within two hours, and from 20°C (68°F) to 4°C (40°F) or less within the next four hours.
Handling raw foods contaminates a food handler's hands.	Hands must be washed between handling raw foods and ready-to-eat foods.

Step 4: Monitoring

At each Critical Control Point (CCP), the system needs to be monitored to make sure the critical limits are in effect.

Monitoring procedures need to be documented. They should be measurable and recordable, and it needs to be clear who's responsible for doing them and how often.

Some examples of monitoring include checking:

- Temperatures during cooking
- Refrigerator and freezer storage temperatures
- Cooling times to make sure temperatures of foods drop quickly enough
- For government inspection stamps or labels on received food
- For signs of infestation or contamination
- For correct shipping temperatures for received food

Step 5: Corrective Action

Corrective actions explain what to do if monitoring shows the critical limits aren't being met. The steps for a corrective action need to cover:

- Correcting the problem
- Identifying the product(s) affected by the problem
- Dealing with the affected products
- Preventing the problem from happening again

When corrective action needs to be taken, records should be kept showing what was done, when, and why.

Corrective Action examples

Corrective actions may be different in different food premises. Below are some examples that could be in place.

Critical Limit	Corrective Action (if control measure is NOT met)
Whole chicken must be cooked to a minimum internal temperature of 82°C (180°F) to kill *Salmonella* bacteria.	Continue to cook chicken until minimum internal temperature is reached.
Cool cooked foods from 60°C (140°F) to 20°C (68°F) within two hours, and from 20°C (68°F) to 4°C (40°F) or less within the next four hours.	If food has not been cooled to 20°C (68°F) within two hours, food must be discarded.
Hands must be washed between handling raw foods and ready-to-eat foods.	Any food handled with contaminated hands must be discarded.
Hold baked chicken at 60°C (140°F) or higher until served.	If held over two hours, discard. If held less than two hours and temperature falls below 60°C (140°F), reheat to 74°C (165°F) or higher for at least 15 seconds – one time only.

Make sure your corrective actions meet food safety standards.

Step 6: Verification

Verification is a double-check to make sure the HACCP system is working. Verification is done in addition to monitoring. Unless there's a problem, verification would be done less often than monitoring.

As with the other HACCP principles, procedures for verification should be written down. They should include:

- Who will do the verification
- How to do it
- When to do it
- What needs to be verified

Verification is usually done by someone who isn't involved with monitoring.

Step 7: Documentation

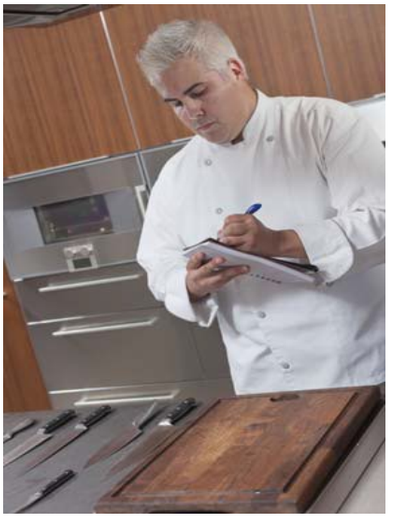
There are two types of records needed for HACCP: documentation and records. HACCP documentation refers to the policies, procedures, and other documents that are written as the HACCP system is created. Records are created when the HACCP procedures are followed. Records include recorded temperatures, logs of corrective actions, and any other information kept.

Records should be simple and easy for employees to use. Make sure to:

- Keep blank forms and a clipboard near work areas to check several items at the same time.
- Have notebooks or extra pages available to write down what actions have been taken.
- Post or store documentation near work areas so employees can refer to them quickly.
- Attach logs to the equipment they're used for, like posting temperature logs on the front of a refrigerator.

For more information on implementing a HACCP system and the types of records kept, see the HACCP section of the Canadian Food Inspection Agency (CFIA) website.

Employees are more likely to use records correctly if they are easy to use. Hard to use or inconvenient record-keeping areas can tempt staff to put in numbers without actually measuring.



In Review

In this chapter, you've learned the principles of the HACCP food safety management system. The following topics have been covered:

- The seven principles of HACCP
- How to identify Critical Control Points (CCPs) and how to set limits for them
- What you need to monitor and verify your HACCP system
- The documentation and records you'll need to create and keep

Notes

Food Handlers' Storage Guide

General guidelines for the shelf life of common foods.

Intended as general information. Wellington-Dufferin-Guelph Public Health assumes no responsibility toward persons using this guide. Adapted from the Ontario Ministry of Health and Long-Term Care.

PublicHealth WELLINGTON-DUFFERIN-GUELPH Stay Well.

Cupboard

(room temperature)

Unless otherwise specified, times apply to unopened packages.

Cereal Grains

(store in airtight containers once opened)

Bread crumbs (dry).....3 mo.
Cereals (ready-to-eat).....8 mo.
Cornmeal.....6-8 mo.
Crackers.....6 mo.
Pasta.....several yr.
Rice.....several yr.
Rolled oats.....6-10 mo.
White flour.....1 yr.
Whole wheat flour.....3 mo.

Canned Foods

(refrigerate in airtight containers once opened)

Evaporated milk.....9-12 mo.
Other canned foods.....1 yr.

Dry Foods

(store in airtight containers once opened)

Baking chocolate.....7 mo.
Baking powder/soda.....1 yr.
Beans, peas, lentils.....1 yr.
Cocoa.....10-12 mo.
Coffee (ground).....1 mo.
Coffee (instant).....1 yr.
Coffee whitener.....6 mo.
Fruit (dried).....1 yr.
Gelatin.....1 yr.
Jelly powder.....2 yr.
Mixes
cake, pancake, biscuit.....1 yr.
pie filling, pudding.....18 mo.
main dish acc. .....9-12 mo.
Potatoes (flakes).....1 yr.
skim milk powder
unopen.....1 yr.
open.....1 mo.
Sugar (all types).....several yr.
Tea bags.....1 yr.

Miscellaneous Foods

Honey.....18 mo.
Jam, jellies (refrigerate once opened).....1 yr.
Mayonnaise, salad dressings
unopen.....6 mo.
open.....1-2 mo.
Molasses.....2 yr.
Nuts.....1 mo.
Peanut butter
unopen.....6 mo.
open.....2 mo.
Pectin - liquid.....1 yr.
open (cover in fridge).....1 mo.
powdered.....2 yr.
Sandwich spread (covered in fridge once open).....8 mo.
Syrups (corn, maple, table).....1 yr.
Vegetable oils (covered in fridge once opened).....1 yr.
Vinegar.....several yr.
Dry yeast.....1 yr.

Vegetables

Potatoes, rutabaga, squash.....1 wk.
Tomatoes.....1 wk.
Cool room (7-10°C, 45-50°F)
Onions (dry, yellow skin)...6 wk.
Potatoes (mature).....6 mo.
Rutabaga (waxed)...several mo.
Winter squash.....several mo.

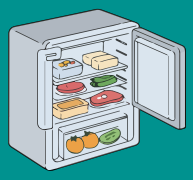
Scan for more information:

Or call 1-800-265-7293 ext. 4753

Fridge

(4°C, 40°F)

Unless otherwise specified, cover all foods.



Dairy Products and Eggs

(check best before dates)

Butter
unopen.....8 wk.
open.....3 wk.
Cheese
cottage (open).....3 days
firm.....several mo.
processed
unopen.....several mo.
open.....3-4 wk.
Eggs.....3 wk.
Margarine
unopen.....8 mo.
open.....1 mo.
Open milk, cream, yogurt.....3 days

Fish and Shellfish

Live clams, crab, lobster, mussels.....12-24 hr.
Cleaned fish
raw.....3-4 days
cooked.....1-2 days
Live oysters.....24 hr.
Raw scallops, shrimp
.....1-2 days
Cooked shellfish.....1-2 days

Fresh Fruit (Ripe)

Apples.....2 mo.
purchased Feb. to Jul.....2 wk.
Apricots (uncovered).....1 wk.
Blueberries (uncovered)...1 wk.
Cherries.....3 days
Cranberries (uncovered)...1 wk.
Grapes.....5 days
Peaches (uncovered).....1 wk.
Pears.....1 wk.
Plums.....5 days
Raspberries (uncovered)
.....2 days
Rhubarb.....1wk.
Strawberries (uncovered)
.....2 days

Fresh Vegetables

Asparagus.....5 days
Beans (green, wax).....5 days
Beets.....3-4 wk.
Broccoli.....3 days
Brussels sprouts.....1 wk.
Cabbage.....2 wk.
Carrots.....several wk.
Cauliflower.....10 days
Celery.....2 wk.
Corn.....use same day
Cucumbers.....1 wk.
Lettuce.....1 wk.
Mushrooms.....5 days
Green onions.....1 wk.
Parsnips.....several wks.
Peas.....use same day
Peppers.....1 wk.
Potatoes (new).....1 wk.
Spinach.....2 days
Sprouts.....2 days
Summer squash.....1 wk.

Meat and Poultry

Uncooked
Chops, steaks.....2-3 days
Cured or smoked meat
.....6-7 days
Ground meat.....1-2 days
Poultry.....2-3 days
Roasts.....3-4 days
Variety meats, giblets
.....1-2 days
Cooked
All meats and poultry
.....3-4 days
Casseroles, meat pies, meat sauces.....2-3 days
Soups.....2-3 days

Miscellaneous Foods

Ground coffee.....2 mo.
Nuts.....4 mo.
Shortening.....12 mo.
Whole wheat flour.....3 mo.

Freezer

(-18°C, 0°F)

Use freezer wrapping or airtight containers. Freeze fresh food at its peak condition.

Dairy Products and Fats

Butter
salted.....1 yr.
unsalted.....3 mo.
Cheese - firm, processed
.....3 mo.
Cream - table, whipping (separates when thawed)....1 mo.
Ice cream.....1 mo.
Margarine.....6 mo.
Milk.....6 wk.

Fish and Shellfish

Fish (fat species: lake trout, mackerel, salmon)...2 mo.
Fish (lean species: cod, haddock, pike, smelt)...6 mo.

Fruits and Vegetables

.....1 yr.

Meat, Poultry and Eggs

Uncooked
Beef roasts, steaks...10-12 mo.
Chicken, turkey
cut up.....6 mo.
whole.....1yr.
Cured or smoked meat
.....1-2 mo.
Duck, goose.....3 mo.
Eggs (whites, yolks).....4 mo.
Ground meat.....2-3 mo.
Lamb chops, roasts....8-12 mo.
Pork chops, roasts.....8-12 mo.
Sausages, wieners.....2-3 mo.
Variety meats, giblets...3-4 mo.
Veal chops, roasts.....8-12 mo.
Cooked
All meat.....2-3 mo.
All poultry.....1-3 mo.
Casseroles, meat pies.....3 mo.

Miscellaneous Foods

Baked cakes, cookies.....4 mo.
Baked pastries, quick bread
.....1 mo.
Bean, lentil, pea, casseroles
.....3-6 mo.
Breads (baked or unbaked, yeast).....1 mo.
Herbs.....1 yr.
Sandwiches.....6 wk.
Soups (stocks, cream).....4 mo.
Unbaked pastry crust.....2 mo.
Unbaked fruit pie.....6 mo.

Know the Difference:

Best Before Date = about QUALITY

Taste or freshness may decline, but food is generally safe if properly stored.

Expiry Date = about SAFETY

After this date, certain foods (e.g., infant formula, nutritional supplements, etc.) are unsafe to sell or consume.

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