

Home Study Course in Food Safety



Section 1. Food Safety in Alberta

FOOD INSPECTIONS

The Alberta Health Services (AHS) food inspection program is carried out by certified Public Health Inspectors (PHIs) / Environmental Health Officers (EHOs) who work for Environmental Public Health. All public food facilities, from hot dog carts, grocery stores, to full service restaurants are inspected.

A Health Inspectors' authority lies within the Alberta Public Health Act. During food inspections, Health Inspectors ensure that operators are following government legislation such as the Alberta Food Regulation. The Food Regulation requires that a food establishment must hold a valid food handling permit issued by AHS. To make an application for a food handling permit, visit the website www.albertahealthservices.ca/eph.asp or contact your local Health Inspector.

There are a few exceptions to the requirement for a food handling permit. Special events, temporary food establishment and community organization functions do not require a food handling permit, although they do require approval from AHS and must follow regulatory requirements to ensure food is handled in a safe manner.

The Public Health Act and the Food Regulation are available online at the Alberta Queen's Printer website at www.qp.gov.ab.ca or by telephone at (780) 427-4952.

Restaurant inspections can be viewed at www.albertahealthservices.ca/eph.asp. Court cases and food establishment closures can also be viewed at this site.

FOOD SAFETY EDUCATION

The Alberta Food Regulation states that food operators are responsible for completing the appropriate food safety training. There is a requirement for one person per shift to have provincially recognized food safety certification if there are six or more food handlers on site. Food handlers include cooks, servers and bartenders. If there are less than six food handlers on site, one person in care and control of the establishment must have certification. This person should be on site most of the time. Information on provincial certification in food sanitation and hygiene can be found at www.albertahealthservices.ca/eph.asp.

The home study course is a short 2–3 hour (mini) course and does not provide provincial certification.

Section 2. Foodborne Illness

Each year an estimated 11 – 13 million Canadians are ill from foodborne illness. Many people do not report foodborne illness to the health department or their doctor.

Foodborne illness, commonly called food poisoning, is caused by consuming food or beverages contaminated with bacteria, the toxins or poison that some bacteria produce, viruses, parasites, or moulds. These are called pathogens or harmful microbes.

Anyone can become ill with foodborne illness. However, some people are at a higher risk for foodborne illness. These include:

- babies or very young children
- seniors
- pregnant women
- sick people
- people with little resistance to illness; for example cancer, transplant and AIDS patients

Common symptoms of foodborne illness:

- diarrhea
- vomiting
- nausea
- stomach cramps
- headache
- fever

A Listeria outbreak in 2008 caused 23 deaths in Canada. The outbreak was linked to ready-to-eat deli meat products contaminated at a Canadian food plant.

Listeriosis is a rare but serious foodborne illness and can result in death. Pregnant women, the elderly and people with weakened immune systems are at the greatest risk of becoming ill.

Information on Listeria and other foodborne illnesses can be found at:
Canadian Food Inspection Agency, Causes of Foodborne Illness,

<http://www.inspection.gc.ca/english/fssa/concen/>

Symptoms can last for several hours, days or months. Foodborne illness can cause mild illness or very serious illness. People may have to stay off work. Sometimes people have to go to the hospital. Foodborne illness can even cause death.

FACTS

- Food that contains harmful microbes (germs) or their toxins (poison) may look, taste, and smell normal.
- In many cases, foodborne illness is not caused by the last meal or food eaten. It can take time for symptoms to develop. With *E. coli* O157:H7 infection (a type of foodborne illness), it can take 2-10 days for the signs of illness to appear. It can take 6-72 hours for the symptoms of *Salmonella* infection to appear.
- It takes only a small number of microbes to cause some types of foodborne illness. Two examples are *Shigella* infection and *E.coli* O157:H7 infection.
- The harmful microbes that cause foodborne illness can also be spread by contact with another person, touching an animal, and swimming or wading in recreational pools.
- When two or more people have symptoms of foodborne illness after eating the same food or at the same facility, it is called an outbreak. Some outbreaks are small. Others are very large. In 1996, a *Salmonella* outbreak in Calgary, Alberta caused illness in more than 100 people.
- Foodborne illness is very expensive for health services, the foodservice industry, and society. Each year in Canada, \$12–15 billion dollars are spent on foodborne illness.

For more information on foodborne illness, go to the Foodborne Illness Chart on page 34.

REVIEW

1. Name 2 groups of people who are at high risk for foodborne illness.

2. List 4 common symptoms of foodborne illness.

3. Food that contains harmful microbes (foodborne illness organisms) or their toxins (poison) can taste normal. True_____ False_____

4. What causes foodborne illness?

ANSWERS:

1. Babies, young children, seniors, pregnant women, sick people, and people who have little resistance to illness.
2. Diarrhea, vomiting, stomach cramps, nausea, headache and fever.
3. True. Food that is contaminated with food borne illness microbes can look, taste and smell normal.
4. Foodborne illness is caused by consuming food or beverages contaminated with bacteria, the toxins or poison that some bacteria produce, viruses, parasites, or moulds. These are called pathogens or harmful microbes.

Section 3. The Causes of Foodborne Illness

MICROBES

Microbes are very small organisms that live all around us, but we cannot see them. (Micro means very small.) They are on plants, animals and people and in the air, soil, and water. Microbes are sometimes called germs.

Most microbes do not harm us. Some microbes are good for us, such as the bacteria used to make yogurt. Only a small number of microbes cause foodborne illness. These are called disease causing or pathogenic microbes.

The presence of some harmful microbes is enough to cause foodborne illness. Other harmful microbes need time and the right conditions to increase in number or produce toxins (poison) before they cause illness.

Parasites, moulds, viruses and bacteria are examples of microbes that can cause foodborne illness.

Parasites

Parasites are microbes that live in, or on, other organisms. Parasites do not grow in food. They are destroyed by heating and freezing.

Some parasites are too small to be seen, such as *Giardia* and *Cryptosporidium*. They can cause waterborne illness when someone drinks untreated water. Make sure that water is safe to drink when you are camping or hiking outdoors. You may have to boil it first to make it safe to drink.

Other parasites are worms that you can see, such as roundworms and tapeworms.

How to control parasites:

- Wash your hands after using the toilet and before preparing food.
- Cook food to safe temperatures.
- Use safe water supplies.
- Wash all fruit, vegetables and salad greens.

Moulds

Moulds cause food to spoil. Some moulds can also produce toxins (poison). Some good moulds are used to ripen certain cheeses.

Moulds can grow on acidic food like oranges and tomatoes. They also grow in food with a lot of sugar, such as jam. They like warm, moist conditions and a good supply of air.

How to control moulds:

- Store food at the proper temperatures and in a dry area.
- Use food quickly. Check best before dates.
- Check food carefully for mould. If you see any mould, the safest thing to do is throw it out.
- Clean and sanitize utensils, containers and any surfaces that touched mouldy food.

Viruses

Viruses are the smallest of all the microbes. Viruses do not grow in food. They can only grow in a living cell.

Viruses can be spread through contaminated food and water, by a person handling food, or from one person to another. Norovirus and Hepatitis A are two viruses that cause foodborne illness.

How to control viruses:

- Wash your hands after using the toilet and before preparing food.
- Wash all fruit, vegetables and salad greens.
- Use safe water supplies.
- Cook food to safe temperatures.

Bacteria

Bacteria are found everywhere in our environment. Although most bacteria are harmless or even beneficial, some are harmful and can cause foodborne illness. Harmful bacteria are called pathogens. These pathogens are commonly found in human and animal waste, in soil, and on raw meat, poultry and fish.

Examples of foodborne illness bacteria:

- *Campylobacter*
- *Clostridium botulinum* (Botulism)
- *Clostridium perfringens*
- *E. coli* O157:H7
- *Listeria monocytogenes*
- *Salmonella*
- *Shigella*
- *Staphylococcus aureus* (Staph)

Bacteria need certain things to grow: (FAT TOM)

- **F**ood
- **A**cidity (pH is a measurement of acidity or alkalinity)
- **T**emperature
- **T**ime
- **O**xygen (Air)
- **M**oisture (Water)

Food

Harmful bacteria grow very well in food that is rich in proteins, vitamins and minerals. Meat, poultry, fish, eggs, dairy products, cooked vegetables and cooked grains are great sources of food for bacteria. These foods are called “potentially hazardous” because bacteria can grow on them. If these foods are not safely stored and prepared, they could cause foodborne illness.

Harmful bacteria have also been found on salad greens and fruit.

Acidity (pH)

This is the amount of acidity or alkalinity in a food. Lemons, limes and vinegar are examples of highly acidic foods. Highly acidic foods stop bacteria from growing, but do not kill them. Bacteria prefer foods that are only slightly acidic, such as meat, poultry and fish.

Temperature and Time

Bacteria need the right temperature to grow. When conditions are right, bacteria can multiply every fifteen to twenty minutes. Most foodborne illness bacteria like temperatures between 4°C and 60°C (40°F to 140°F). This range of temperatures is called the “**Danger Zone**”. The longer food is in the Danger Zone, the larger the number of bacteria that can grow.

If the temperature is at 4°C (40°F) or colder, bacteria can survive but may grow slowly. If the temperature is too hot, at 60°C (140°F) or hotter, bacteria will stop growing. The Alberta Food Regulation requires specific temperatures for storing, cooling, freezing, heating and hot holding potentially hazardous food.

Oxygen (Air)

Bacteria need the right kind of air to live. Most bacteria grow only if they have oxygen. Other bacteria can only grow if there is no oxygen, for example *Clostridium botulinum*, the bacteria that causes botulism.

Moisture (Water)

Bacteria need water. The foods associated with foodborne illness, such as meat, fish, poultry, eggs, dairy products, fruit, vegetables and salad greens, have a lot of water in them.

How to control bacteria:

- Keep potentially hazardous food out of the Danger Zone.
- Keep food cold, at 4°C (40°F) or colder.
- Keep food hot, at 60°C (140°F) or hotter.
- Cook food to safe temperatures.
- Chill hot food quickly.
- Wash your hands.
- Clean and sanitize utensils, equipment and food preparation surfaces.

HOW FOODBORNE ILLNESS MICROBES ARE SPREAD

Foodborne illness microbes come from many sources: animals, people, soil, water, food, air, equipment, utensils and other objects.

Animals

- Animals can be a source of harmful microbes. Raw meat, poultry and fish can be a source of bacteria such as *Salmonella*, *Campylobacter* and *E. coli O157:H7*. Everyone needs to wash their hands, and wash and sanitize kitchen surfaces and utensils after handling raw meat, poultry and fish.
- Insects and mice can carry bacteria and viruses on their bodies. If you have insects or mice in your food facility, you need to call a licensed pest control operator.

People

- People can carry harmful microbes in their intestinal tract, such as *Salmonella* and *E. coli* bacteria. If hands are not washed well after using the toilet, these microbes can be spread to anything the person touches, such as food, another person or a surface. This way of spreading microbes is called the “fecal–oral route”.
- Foodservice staff who handle raw meat, poultry and fish can spread harmful microbes to other food. Wash your hands before you touch other food in the kitchen.
- People may have bacteria called *Staphylococcus aureus* on their skin and in their nose and throat. This bacteria can be spread to food by coughing or sneezing, or by touching food if you have infected cuts or sores on your hands. This bacteria can also be spread to food if you blow your nose and then touch food without washing your hands.

Soil

- Harmful microbes may be found in soil. Vegetables and fruit that grow in soil may have harmful microbes on their outer surfaces. *Salmonella* and *E. coli* bacteria have been found on the outside of cantaloupes and tomatoes.

Water

- Untreated water from lakes, streams and rivers can be a source of harmful microbes. Some examples are *E.coli O157:H7*, and parasites such as *Cryptosporidium* and *Giardia*. Water used in food service must be safe to drink.

CHEMICALS

Chemical food poisoning can result from eating naturally poisonous foods. For example, certain types of mushrooms (such as the *Amanita* species) may contain natural poisons. Chemical food poisoning may also be caused if food is contaminated with chemicals.

Some California high school students became ill very quickly after drinking punch. Their symptoms included nausea, vomiting, cramps, dizziness and headache. The diagnosis: zinc poisoning. The punch was made and stored in a galvanized metal container with a corroded interior. The container was not intended for food.

How to prevent chemical food poisoning:

- Buy your food from licensed suppliers.
- Wash fruit, vegetables and salad greens.
- Use approved food-safe cookware and equipment.
- Use safe amounts of food additives such as MSG (monosodium glutamate).
- Do not store chemicals in food containers and do not store food in chemical containers.
- Label all chemicals.
- Use chemicals safely. Read the labels.
- Store chemicals away from food.

Allergic Reactions to Food

Eating certain foods or ingredients can cause allergic reactions in a small number of people. These reactions can be minor or life-threatening.

The following foods account for 90% of all food-related reactions:

- milk and dairy products
- eggs
- wheat
- soy
- peanuts
- tree nuts (examples are almonds, brazil nuts and cashews)
- shellfish and fish

Reduce the risk of allergic reactions:

- Have a plan for medical emergencies.
- Make sure all staff know the ingredients that are used in the facility. Someone with a peanut allergy may ask if the facility uses peanut oil. If staff or management don't know the answer, tell the customer. The customer can then make other choices.
- Prevent cross contamination. Tiny bits of food left on hands, a knife, spoon, cutting board or dishcloth can spread to other food and cause allergic reactions.

REVIEW

1. Name 1 way to control viruses in foodservice.

2. List 2 ways to control bacteria in foodservice.

3. Name 2 bacteria that cause foodborne illness.

4. Give 2 examples of potentially hazardous food.

5. State the temperature range of the Danger Zone.

_____ °C (_____ °F) to _____ °C (_____ °F)

ANSWERS:

1. Wash your hands, cook food to safe temperatures, wash fruits, vegetables and salad greens.
2. Keep potentially hazardous food out of the Danger Zone; keep food cold, below 4°C (40°F) or hot, above 60°C (140°F).
3. *Salmonella*, *E. coli* O157:H7, *Shigella*, *Staphylococcus aureus*.
4. Meats, poultry, fish, eggs, dairy products, cooked vegetables, and cooked grains.
5. 4°C – 60°C (40°F – 140°F).

Section 4. How to Prevent Foodborne Illness

THE TOP 5 FOOD HANDLING MISTAKES THAT CAUSE FOODBORNE ILLNESS*

1. Ill Food Handlers

Many foodborne illnesses are caused by ill food establishment employees. People with symptoms of nausea, vomiting and/or diarrhea should not handle or prepare food for others. Food establishment employees often return to work too soon after being ill or they return to work while still suffering from symptoms.

2. Temperature Abuse

Potentially hazardous foods that are stored in the temperature Danger Zone (between 4°C and 60°C) allow bacteria to grow rapidly. Do not keep potentially hazardous foods in the temperature Danger Zone for longer than 2 hours. Keep hot foods hot and cold foods cold.

3. Inadequate Cooking

Foodborne illnesses are caused when raw foods, such as meat, poultry and fish, are not thoroughly cooked. Often a thermometer is not used to check the internal temperature of the cooked food. Foodborne illness can also occur when leftover foods are not reheated to an internal temperature of at least 74°C.

4. Cross Contamination

Cross contamination is a major cause of foodborne illness. It can occur when dirty equipment or utensils are used to handle or prepare food. Cross contamination can also happen when the same cutting board that is used to prepare raw meat is used to prepare cooked or ready-to-eat foods; raw meats are stored too close to or above ready-to-eat foods; and, hands are not washed properly after handling raw meats and poultry.

5. Improper Cooling of Cooked Food

When hot foods take too long to cool, bacteria can grow rapidly. Hot foods are often left to cool in large stock pots or deep containers instead of shallow, metal containers. Rapid cooling techniques can prevent foodborne illnesses from occurring. Rapid cooling techniques include using an ice bath, an ice wand, stirring frequently or using shallow metal containers.

*Based on Alberta Health Services, Edmonton Zone statistics, 2007

To Prevent Foodborne Illness, Follow Two Key Principles When Handling Food:

1. Keep food out of Danger Zone temperatures.
2. Protect food from cross contamination.

Practical ways to do this are given under the Eight Steps to Safe Food

THE EIGHT STEPS TO SAFE FOOD

Step 1 — Buying and Receiving Food

- Buy from approved suppliers.
- Make sure food is delivered at safe temperatures.
- Check new food supplies for: best before dates, expiry dates, signs of spoilage, damage and insects.

To review current food recalls and allergy alerts or to sign up for free, automatic email notices on food recalls and allergy alerts, go to the following link:

Canadian Food Inspection Agency, Food Recalls and Allergy Alerts, <http://www.inspection.gc.ca/english/corpaffr/recarapp/recaltoce.shtml>

Step 2 — Storing Food

- Put fresh and frozen foods in refrigerators, coolers and freezers as soon as they are delivered.
- Follow the FIFO rule (First In, First Out). Use food supplies in the order they were received.
- Keep refrigerators and coolers at 4°C (40°F) or colder. Keep freezers at –18°C (0°F) or colder. A thermometer needs to be in each fridge and freezer to measure the temperature.
- Maintain good air circulation in refrigerators, coolers and freezers. Do not overfill with food.
- Store raw meat, poultry and fish below cooked or ready-to-eat foods such as salads, sandwiches and cakes.
- Do not store food on the floor of walk-in coolers or dry storage areas.

Step 3 — Preparing Food

- Wash your hands before preparing food.
- Start with clean and sanitized utensils, cutting boards, equipment and work surfaces.
- Wash fruits, vegetables and salad greens with cool, running water to remove dirt, insects, harmful microbes and pesticides.
- Leafy products like lettuce, spinach, parsley and cilantro may need several rinses in clean water. Salad mixes have a short shelf-life. Check the “Best Before Date” and use them up quickly.
- For more information on washing fruits and vegetables, go to the following link: Canadian Food Inspection Agency, Food safety facts for fresh fruits and vegetables, <http://www.inspection.gc.ca/english/fssa/concen/specif/fruvege.shtml>

Thaw frozen food safely:

- In the refrigerator or walk-in-cooler. Place the frozen food on a tray or plate and put it on the bottom shelf.
- In cold running water. Use large sinks. Clean and sanitize the sink after the food is thawed.
- In a microwave oven, and cook immediately after food is thawed.
- Thawing at room temperature is not safe.

Food Preparation and the Danger Zone

- Work quickly with food so that it spends only a short amount of time in the Danger Zone, 4°C (40°F) – 60°C (140°F).
- Put the food in the cooler or cook it and serve immediately.
- Do not store or display food in the Danger Zone.
- Follow the two hour rule: The total time that food is in the Danger Zone, from receiving to service, should never be more than 2 hours. Otherwise, it must be thrown away.

Food Preparation and Cross Contamination

Cross contamination is the spread of bacteria, viruses or parasites from one food to another, by hands, utensils or equipment. Direct contamination occurs if raw food touches cooked or ready to eat food or if a food handler sneezes or coughs into food. To avoid cross contamination:

- Wash your hands when you come into the kitchen and after handling raw meat, poultry and fish.
- Keep raw meat, poultry and fish away from cooked food or ready-to-eat food.
- Use separate knives, tongs, spoons, ladles and scoops for raw and cooked or ready-to-eat food.
- Use separate cutting boards for raw and cooked or ready-to-eat food.
- Use a clean spoon each time you taste food. Do not stick your fingers in food.
- Clean and sanitize all equipment, utensils and surfaces that touch food.
- Change aprons and uniforms that are soiled with blood from raw meat and poultry.
- Change dish cloths and wiping cloths often. When not in use, store cloths in a sanitizing solution. Change the solution after the breakfast rush, the lunch rush and the dinner rush. Change the solution if it is dirty or soiled. (See page 25 for directions on making sanitizing solutions)

Here is an example of cross contamination. In 1998, more than 150 customers became ill after eating at a Minnesota restaurant. Kitchen staff prepared raw chicken and then prepared the lettuce for 200 salads, without washing their hands.

The outbreak was caused by *Campylobacter* bacteria. These bacteria can be found on raw or undercooked chicken.

Step 4 — Cooking Food

- Cook or heat food to safe temperatures. Cooking food to temperatures of 74°C (165°F) will kill most bacteria.
- Measure the temperature of cooked food with a thermometer. Clean and sanitize the stem of the thermometer before each use.



Cleaning a food thermometer with an alcohol wipe

Step 5 — Cooling Food

- Cool food quickly to 4°C (40°F) or colder to reduce the risk of foodborne illness. Food should cool from 60°C (140°F) to 20°C (70°F) or less within 2 hours and from 20°C (70°F) to 4°C (40°F) or less within 4 hours.
- It is not safe to leave hot food at room temperature to cool, or to put large amounts of hot food in the cooler. In both cases, the food does not cool quickly enough and stays in the Danger Zone for a long time.
- Salads, sandwiches and desserts also need to be cooled quickly to 4° C (40°F) or colder.

Three ways to cool food quickly:

1. Fill a large sink with lots of ice. Add cold water. Place pots or containers of hot food in the ice water bath. Stir often. Add ice as necessary. Tip: Use ice wands to stir containers of hot food.
2. Put large amounts of food into smaller containers or shallow pans no more than 10 cm (4 in) deep, and place in the cooler. **Do not cover the containers until the food has cooled.** Use metal containers or pans instead of plastic, if possible.
3. Cut large pieces of meat or poultry into smaller pieces. Put in shallow pans and refrigerate. Cover when cooled.

Step 6 — Hot and Cold Holding of Food

- Food served at buffets or salad bars needs to be handled safely.
- Hot holding units such as steam tables must keep food at 60°C (140°F) or hotter.
- Cold holding units must keep food at 4°C (40°F) or colder. If ice is used to cool foods, the ice must come up the sides of the containers to the level of the food.
- Measure the temperature of food every hour to make sure it is not in the Danger Zone.
- Do not add fresh portions of food to old food.
- Use sneeze guards (plastic shields) or covers to protect food on buffets and salad bars.
- Have tongs or serving spoons for each food container.

Step 7 — Reheating Food

- Reheat leftover food quickly to 74°C (165°F) or higher within 2 hours. This includes food made in advance for banquets and catered meals.
- Bring soups, stews, gravies and stock to a boil. Stir often.
- Do not reheat food more than once.
- Hot holding equipment should not be used to reheat food. Food should already be hot when placed in hot holding equipment

Step 8 — Serving Food

Setting the table:

- Pick up cutlery by the handles.
- Do not touch the rim of glasses or cups.
- Throw out chipped or cracked glassware and dishes.

Serving food safely:

- Do not touch food or drinks with your fingers.
- Use tongs or a scoop to pick up ice. Do not use your hands or a glass.
- Throw away food that falls on the floor.
- Wash and sanitize cutlery that falls on the floor.
- Keep serving stations clean.
- Prevent cross contamination.
- Clean and sanitize.
- Follow good personal hygiene standards.

Clearing tables:

- Throw away food left on a customer's table such as open food like bread.
- Wash and sanitize tables.
- Wash your hands after touching dirty dishes and cutlery.

Single service dishes and cutlery:

- Use disposable (single service) cutlery and dishes only once.
- Store single service cutlery with the handles up, or facing the same way. Customers can then pick up the cutlery by the handles.

Summary: Key Food Safety Tips

- Cook food to safe temperatures. Check temperatures with a thermometer.
- Cool food quickly to safe temperatures.

REVIEW

1. Refrigerators and walk-in coolers should be kept at _____°C (_____°F) or colder.

2. Freezers should be kept at _____°C (_____°F).

3. List 2 ways to prevent cross contamination.

4. List 2 ways to cool hot food quickly.

5. Hot foods must be held at temperatures at _____°C (_____°F) or hotter.

6. Cold foods must be held at temperatures at _____°C (_____°F) or colder.

7. Food should be reheated to _____°C (_____°F) within _____ hours.

ANSWERS:

1. 4°C (40°F)
2. -18°C (0°F)
3. See pages 12-13 for a list
4. The following methods may be used to cool food quickly:
 - put pots or container of hot food in an ice water bath
 - put food in shallow pans and place in the cooler
 - leave containers uncovered in the cooler to speed up cooling
 - cut large cuts of meat into smaller pieces
 - use an ice wand
5. 60°C (140°F)
6. 4°C (40°F)
7. 74°C (165°F) within two hours

CLEANING AND SANITIZING

Cleaning removes food and grease from utensils, dishes, food preparation surfaces and equipment. Wash with hot water and soap and then rinse. Sanitizing reduces the number of harmful microbes to a safe level. Sanitizing is done with chemicals or hot water. There are 3 chemical sanitizers approved for use in Alberta:

- **Chlorine or sodium hypochlorite** (bleach is an example): 100 parts per million or ppm. To make a 100 ppm chlorine sanitizing solution, add 15 ml (1 tablespoon) of bleach (5.25% chlorine) per 4.5 litres (gallon) of water. For a smaller batch, use ½ teaspoon of bleach per liter of water. Mixed bleach solutions are unstable. A fresh solution needs to be made at least daily.
- **—Quats**” (quaternary ammonium compounds): 200 ppm. Mix according to the manufacturer’s recommendations.
- **Iodine** (iodophor compounds): 12.5 – 25 ppm. Mix according to the manufacturer’s recommendations.

The strength or concentration of a chemical sanitizer is measured in parts per million or ppm. If you sanitize with chemicals, you need to test the strength of the sanitizer with test strips.

If hot water is used for sanitizing, measure the temperature of the water. It should be over 77°C (170°F). This temperature can only be maintained if there is a booster heater in the third compartment.



Test strips

Sanitizing requires three things:

- a clean and rinsed surface
- the correct strength of sanitizer or the correct water temperature
- the correct contact time of the sanitizer on a surface (at least two minutes)

Dishwashing

In foodservice, dishwashing is done manually or by machine. Dishwashing has 4 steps: wash, rinse, sanitize and air dry.

1. Manual Dishwashing

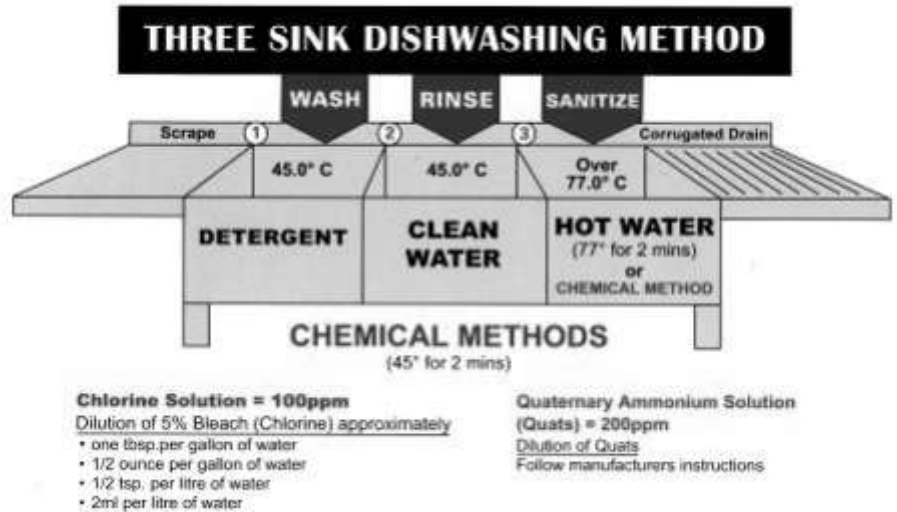
A. Scrape and rinse the dishes. Soak cutlery in detergent and warm water.

B. Sink #1 Wash: Fill the sink with hot water (45°C/113°F). Add detergent.

C. Sink #2 Rinse: Fill the sink with hot water (45°C/113°F). Rinse the dishes to remove soap and food scraps.

D. Sink #3 Sanitize: Use chemicals or hot water. Soak for 2 minutes.

E. Air dry.



Chemicals

- Fill the third sink with hot water (45°C/113°F).
- Add chlorine (100 ppm), quats (200 ppm) or iodine (12.5– 25 ppm). Note: 15 ml or 1 tablespoon of bleach (5.25% chlorine) added to 4.5 litres (1 gallon) of water approximately gives a concentration of 100 ppm of chlorine.
- Check the concentration of the sanitizer with a test strip for that chemical. Instructions are on the paper label. Chlorine test strips should be dipped in the solution and immediately compared with the colour chart for 100 ppm.
- Soak the dishes for two minutes in the sanitizer, then air dry on a drain rack. **Do not dry with a cloth towel.**

Hot Water

- Fill the sink with hot water over 77°C (170°F). You will need a special water heater, baskets to hold the hot dishes and a thermometer to check the water temperature.
- Let the dishes soak for two minutes, then air dry.

2. Machine Dishwashing (also called Mechanical Dishwashing)

The temperature of the wash and rinse water depends on the **type of sanitizer** used.

See the chart below.

Type of Dish-washer	Type of Sanitizer	Wash Water Temperature	Rinse Water Temperature
High Temperature	Hot water	60°C (140°F)	Rinse water temperature needs to be 82°C.
Low Temperature	Chemicals: Chlorine 100 ppm Quats 200 ppm Iodine 12.5 - 25 ppm	45°C (113°F)	Follow the manufacturer's recommendations.

Cutting Boards

- Clean and sanitize cutting boards and chopping blocks after each use.
- Wash with warm, soapy water. Rinse.
- Apply a 100 ppm solution of chlorine or 200 ppm solution of quats.
- Air dry.
- Both finished hardwood and plastic boards are acceptable if they are in good condition. Throw away cracked boards or boards with deep grooves. Plastic boards can be washed in the dishwasher.

Garbage

- Keep garbage cans clean and covered.
- Empty garbage bags or containers often.
- Wash your hands after touching garbage.

Pest Control

Pests such as mice, flies and cockroaches can spread harmful microbes to food and food preparation surfaces. Control pests by removing their basic needs of food, shelter and water.

- Keep your kitchen clean.
- Store food off the floor.
- Close food containers tightly.
- Get rid of clutter.
- Clean up spills quickly.
- Keep outside doors closed. Repair screens on doors and windows. Ensure gaps under doors are sealed.
- Keep the area outside your restaurant clean and free of garbage.
- Do not use pesticides on your own. Call a pest control operator.

Follow safety guidelines around chemical products:

- Store chemicals away from food products.
- Never mix bleach and ammonia.
- Label all chemical containers.
- Read labels carefully before buying and using chemicals.
- For more information on Material Safety Data Sheets go to this link: Workplace Hazardous Materials Information System (WHMIS), Canadian Centre for Occupational Health and Safety, http://www.ccohs.ca/oshanswers/legisl/intro_whmis.html

REVIEW

1. Chlorine is an approved sanitizer.

True _____ False _____

2. Single service utensils and dishes should only be used once.

True _____ False _____

3. List 2 ways to keep mice out of your facility.

ANSWERS:

1. True
2. True
3. Keep your kitchen clean. Store food off the floor. Repair screens. Close food containers. Close outside doors.

PERSONAL HYGIENE

Personal hygiene is very important. It helps stop the spread of harmful microbes and protects food, customers and staff. Here are two key guidelines:

1. Work only when you are well

Do not work in food service if you have symptoms such as diarrhea or vomiting, a cold or a sore throat. You are at higher risk of spreading foodborne illness. Alberta Health Services may require that you stay off work if you have a confirmed foodborne illness such as *Salmonella* or *E. coli* O157:H7.

The fecal-oral route is a common way of transferring pathogens to food. This occurs when a food handler does not wash their hands properly after using the toilet and then handles food or objects which then enter another person's mouth.

2. Wash your hands

Your kitchen needs to have at least one handwashing sink with soap and paper towels.

Wash your hands:

- at the beginning of a shift
- whenever you come back into the kitchen
- before preparing food
- after touching raw meats, poultry and fish
- after touching dirty utensils or equipment
- after using the toilet
- before and after eating
- after touching garbage
- after smoking
- after blowing your nose, coughing or sneezing into your hands
- after touching money



How to Wash Your Hands:

1. Wet your hands.
2. Put soap on your hands.
3. Rub your hands together for at least 20 seconds. Wash your wrists too.
4. Use a nail brush to scrub under your nails, the back of your hands and between your fingers.
5. Rinse your hands with warm water.
6. Dry your hands with a paper towel.

Gloves in Foodservice

- Gloves do not replace hand washing.
- Gloves can become contaminated, just like hands.
- Start with new disposable gloves with each new task.
- Wash and dry your hands before you put on gloves.
- Wash your hands after you remove your gloves.
- Throw your disposable gloves away after each use.

Hand Sanitizers

Key points about alcohol-based hand sanitizers:

1. Hand sanitizers do not replace washing with soap and warm water. Note: Alcohol-based hand sanitizers can be used as an extra step after handwashing.
2. Hand sanitizers must have an alcohol content of at least 63%.
3. Hand sanitizers work best on visibly clean hands. Grease, food particles or dirt will reduce the effectiveness of the sanitizer.
4. Add the product to the palm of one hand, dip all of your fingertips into the sanitizer and rub your hands together to distribute the sanitizer. Hand sanitizer should cover all parts of your hands and fingers. Keep rubbing your hands until they are dry, about 15–30 seconds. Do not rinse off the sanitizer.

PERSONAL HYGIENE

Checklist for food handlers

- ✓ Be clean. Complete personal cleanliness is essential when working in food preparation areas.
- ✓ Wear clean, readily washable work clothing. Working dress should not be worn outside of the food-service establishment.
- ✓ Keep hair and /or beards clean and suitably controlled or covered.
- ✓ Wash hands with soap and hot water before starting work. Always wash hands after using the toilet and whenever hands become soiled.
- ✓ Cut finger nails short and keep them scrubbed and clean at all times.
- ✓ When working with food, use tools such as ladles, tongs, or scoops instead of hands whenever possible.
- ✓ Do not smoke or chew tobacco in food preparation areas.
- ✓ Do not brush teeth or hair, apply cosmetics, or change clothing in the food preparation area.

REVIEW

1. Name 3 times when you should wash your hands in foodservice.

2. List 2 personal hygiene tips for foodservice staff.

ANSWERS:

See the list on page 22.

See the list on page 24.

Appendix A: Foodborne Illness Chart

BACTERIA	SOURCE/SPREAD	SYMPTOMS	PREVENTION
<i>Bacillus cereus</i> <i>This bacterium causes two types of foodborne illness.</i>	Type 1 is linked with boiled or fried rice that is stored in the Danger Zone after cooking.	<ul style="list-style-type: none"> • Illness occurs in 1 –6 hours. • Vomiting is the main symptom. 	<ul style="list-style-type: none"> • Keep food out of the Danger Zone. • Cool food quickly, including cooked rice, to 4°C (40°F) or colder • Hold hot food to 60°C (140°F) or hotter. • Reheat food quickly to 74°C (165° F) within 2 hours.
	Type 2 is associated with cereal products, soups, puddings, sauces, meats, vegetables, refried beans.	<ul style="list-style-type: none"> • Illness occurs in 6 –15 hours. • Diarrhea is the main symptom. 	
<i>Campylobacter</i>	Outbreaks have been linked to contaminated water supplies, unpasteurized milk, raw or undercooked poultry, meat or shellfish.	<ul style="list-style-type: none"> • Illness occurs in 2 –5 days. • Diarrhea, stomach cramps, fever, nausea and vomiting. 	<ul style="list-style-type: none"> • Prevent cross contamination. • Wash your hands: <ul style="list-style-type: none"> ⇒ before handling food ⇒ after touching raw poultry and meat ⇒ after handling pets and farm animals • Clean and sanitize food preparation surfaces, equipment and utensils. • Cook poultry and meat to safe temperatures.
<i>Clostridium botulinum</i> <i>This bacterium causes an illness called “botulism”, a rare but serious illness.</i>	Outbreaks have been linked to inadequate processing of commercial and home-canned low acid food.	<ul style="list-style-type: none"> • Illness occurs in 12–36 hours. • Nausea, vomiting, diarrhea, double vision, droopy eyelids, difficulty speaking, swallowing and breathing, muscle paralysis. 	<ul style="list-style-type: none"> • Do not use cans that are bulging. • Use only commercially canned food in food service. • Store cans and vacuum-packed food according to label requirements. • Do not feed honey to babies less than 1 year of age.
<i>Clostridium perfringens</i> <i>It is often called the “buffet bug”.</i>	Found in the soil. Illness has been linked to cooked meats, meat products, poultry and gravies that were stored in the Danger Zone after cooking.	<ul style="list-style-type: none"> • Illness usually occurs in 10–12 hours. • Abdominal cramps, diarrhea. • Illness lasts 1 day or less. 	<ul style="list-style-type: none"> • Keep foods out of the Danger Zone. • Cook to safe temperatures. • Hold hot food above 60°C (140°F). • Cool food quickly to 4°C (40°F). • Reheat food quickly to 74°C (165° F).
<i>E. coli</i> O157:H7 <i>It takes only a few of these bacteria to cause illness.</i>	<ul style="list-style-type: none"> • Source: animals (mainly cattle). • Illness has been linked to undercooked ground beef; unpasteurized milk, apple juice and cider; cold cuts such as dry salami; lettuce and other raw fruits and vegetables; and raw sprouts • Transmission has also been linked to contaminated water, petting zoos/farms, and person to person. 	<ul style="list-style-type: none"> • Illness occurs in 2 –10 days. • Severe stomach cramps, diarrhea (may be watery or bloody), vomiting or mild fever may occur. • The illness lasts 7 –10 days. • A few people (especially young children or the elderly) may develop kidney failure. 	<ul style="list-style-type: none"> • Cook ground meats to 71°C (160° F). • Avoid cross contamination: <ul style="list-style-type: none"> • wash your hands after handling raw meats. • clean and sanitize all food contact surfaces. • store raw meats below and separate from cooked and ready to eat foods. • Wash vegetables, salad greens and fruit.

BACTERIA	SOURCE/SPREAD	SYMPTOMS	PREVENTION
<p>Listeria monocytogenes</p> <p>This bacterium causes an illness called "Listeriosis".</p>	<ul style="list-style-type: none"> Associated with raw or contaminated milk, soft cheeses, vegetables and ready-to-eat meats and fish. Found in soil, water, mud. Can be spread from mother to fetus. 	<ul style="list-style-type: none"> Illness occurs in 3 – 70 days. Vomiting, nausea, cramps, diarrhea, severe headache, constipation and persistent fever. In rare cases infection of the brain or blood poisoning occurs. 	<ul style="list-style-type: none"> Pregnant women and immunocompromised individuals should avoid ready-to-eat foods, smoked fish and unpasteurized soft cheeses. Read the label. Reheat leftovers to 74°C. Wash all raw vegetables. Cook meats to safe temperatures.
<p>Salmonella</p> <p>This bacterium causes an illness called "Salmonellosis".</p>	<ul style="list-style-type: none"> Commonly associated with raw and undercooked poultry, meat and fish. Also linked to melons and raw alfalfa, bean and radish sprouts. Spread through cross contamination and from person-to-person. 	<ul style="list-style-type: none"> Illness occurs in 12–36 hours. Headache, stomach cramps, nausea, diarrhea, fever and sometimes vomiting. May cause dehydration, especially in infants. 	<ul style="list-style-type: none"> Wash your hands: <ul style="list-style-type: none"> ⇒ after using the toilet ⇒ before preparing food ⇒ after handling raw meat and poultry ⇒ after handling pets or animals Wash all vegetables, salad greens and fruit, including those that will be peeled. Cook foods to safe temperatures. Clean and sanitize all food contact surfaces that touched raw poultry & meats. Store raw meats below cooked and ready-to-eat foods.
<p>Shigella</p> <p>It takes very few bacteria to cause illness.</p>	<ul style="list-style-type: none"> Source: mainly humans. Spread through food and water contaminated with feces. Can be spread from person to person. 	<ul style="list-style-type: none"> Illness occurs in 1 –3 days. Stomach cramps, diarrhea, fever, nausea and vomiting. 	<ul style="list-style-type: none"> Wash your hands: <ul style="list-style-type: none"> ⇒ after using the toilet ⇒ after changing diapers ⇒ before preparing food Wash all vegetables, salad greens and fruit, including those that will be peeled.
<p>Staphylococcus aureus (Staph)</p> <p>Bacteria produce a toxin in food if left in the danger zone.</p>	<ul style="list-style-type: none"> Source: mainly human skin, nose and throat. found in high numbers in infected cuts, boils and acne. Spread through contact with food, people or coughing/sneezing. 	<ul style="list-style-type: none"> Illness occurs in 2 –4 hours. Nausea, cramps, vomiting, diarrhea. Illness lasts 1–2 days. 	<ul style="list-style-type: none"> Good personal hygiene: <ul style="list-style-type: none"> wash your hands after coughing, sneezing or blowing your nose cover up cuts with a bandage and a glove Reduce direct hand contact with ready-to-eat foods and cooked foods.
VIRUSES	SOURCE/SPREAD	SYMPTOMS	PREVENTION
<p>Hepatitis A (HAV)</p>	<ul style="list-style-type: none"> Common sources are contaminated water, shellfish and produce (salads). Can be spread from person to person. Can be spread to food by infected food handlers. 	<ul style="list-style-type: none"> Illness occurs in 28–30 days. Fatigue, fever, loss of appetite, nausea and abdominal discomfort. Jaundice (yellow skin or eyes) follows in a few days. Infections may be mild, especially in children. 	<ul style="list-style-type: none"> Wash your hands: <ul style="list-style-type: none"> ⇒ after using the toilet ⇒ after changing diapers ⇒ before preparing food Wash all vegetables, salad greens and fruit, including those that will be peeled.

VIRUSES	SOURCE/SPREAD	SYMPTOMS	PREVENTION
<p>Norovirus</p> <p>It takes very few microbes to cause illness. Commonly called the “stomach flu” or the “24 hour flu”.</p>	<ul style="list-style-type: none"> • Common sources are contaminated water and ice, shellfish and salad ingredients. • Can spread from person to person. • Can be spread by touching contaminated surfaces and then touching the mouth. 	<ul style="list-style-type: none"> • Illness occurs in 24–48 hours. • Nausea, vomiting, diarrhea, abdominal pain, headache, fever. • Illness lasts 24–48 hours. 	<ul style="list-style-type: none"> • Wash your hands: <ul style="list-style-type: none"> ⇒ after using the toilet ⇒ before preparing food or touching ready-to-eat food • Clean and sanitize food preparation surfaces. • Cook food to safe temperatures.
PARASITES	SOURCE/SPREAD	SYMPTOMS	PREVENTION
<p>Cryptosporidium</p>	<ul style="list-style-type: none"> • Contaminated water and food. • Exposure to infected persons and animals. 	<ul style="list-style-type: none"> • Illness occurs in about 7 days. • Diarrhea, cramping and abdominal pain. Children may have vomiting and loss of appetite. 	<ul style="list-style-type: none"> • Wash your hands: <ul style="list-style-type: none"> ⇒ after using the toilet ⇒ after changing diapers ⇒ before preparing food • Use safe water supplies.
<p>Giardia</p>	<ul style="list-style-type: none"> • Contaminated water and food. • Can be spread from person to person (especially in institutions and day cares), and from animals and pets to people. 	<ul style="list-style-type: none"> • Illness occurs in 3–25 days. • Abdominal cramps, bloating, diarrhea, fatigue, and weight loss. 	<ul style="list-style-type: none"> • Wash your hands: <ul style="list-style-type: none"> ⇒ after using the toilet ⇒ after changing diapers ⇒ before preparing food • Use safe water supplies.

For more information on foodborne illness or food safety, go to these web links:

Foodborne Pathogens, Gateway to Government Food Safety Information (USA)

<http://www.foodsafety.gov>

Canadian Partnership for Consumer Food Safety Education

<http://www.canfightbac.org/en/>

Consumer Centre, Canadian Food Inspection Agency

<http://www.inspection.gc.ca/english/fssa/concen/concene.shtml>

It's Your Health, Health Canada

<http://www.hc-sc.gc.ca/hl-vs/iyh-vsv/index-eng.php>

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