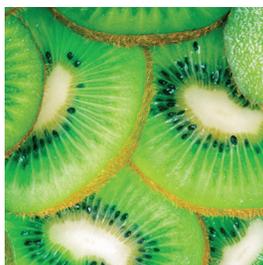


SERVING IT SAFE

THIRD EDITION



Acknowledgments

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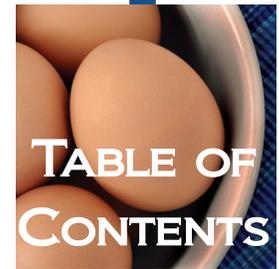
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INTRODUCTION

Getting the Most from *Serving It Safe*

In work environments, individual employees can make a big difference in positive as well as negative ways. This is especially true in foodservice where an employee can introduce a food safety hazard at any point in the food production process. Foodservice personnel are the single most critical element in keeping the foodservice operation safe and sanitary.

All foodservice personnel have a lot at stake as they prepare and serve food each day.

- Serving food that is improperly stored, prepared, cooked, or held may cause customers to become seriously, even fatally, ill.
- Unsafe foodservice practices also place employees in danger.
- The good reputation of a child nutrition program must be built on serving safe food.

Some ways to ensure food safety are to

- **empower** employees with the knowledge and skills they need to prepare and serve foods safely;
- **help** them realize the key role they each play every day in protecting students' health and well-being;
- **hold them responsible** for preparing and serving food safely.

The technical material presented in *Serving It Safe* is based primarily on

- *Food Code*
- *ServSafe Coursebook*
- *ServSafe Essentials*



The *Food Code* is a reference document for regulatory agencies responsible for overseeing food safety in retail food establishments such as restaurants and grocery stores and institutions such as nursing homes and child care centers. The *Food Code* is updated periodically; state, local, and tribal jurisdictions may use the *Food Code* as a model for their sanitation codes.

The reader may notice that in some cases this edition of *Serving It Safe* recommends a more conservative approach to food safety practices than the *Food Code*. In such instances, the recommendation will be noted as “best practice.” The *Food Code* suggests minimum standards. A foodservice operation may select a more conservative approach to ensure a margin of safety. Recommended temperatures listed in this edition of *Serving It Safe* reflect the *Food Code* and may be different than local or state requirements.

State and local public health department codes may have requirements different than those presented in this document. *Serving It Safe* should be adapted to include state and local public health department code requirements and school district policies and procedures.

Serving It Safe Contents

The six chapters of *Serving It Safe* provide foodservice personnel at all levels with an up-to-date source of information for managing a safe and sanitary foodservice operation. The Table of Contents for *Serving It Safe* can be used to locate information about food safety.

Chapter 1: Food Safety Is Top Priority describes the responsibilities of foodservice personnel to prepare and serve safe food to customers including students, school faculty and staff, and visitors. The chapter describes why food safety is important and gives general guidance on how foodservice personnel can assure the preparation and service of safe foods.



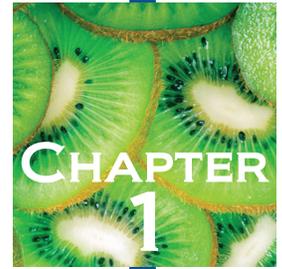
Chapter 2: Prevent Foodborne Illness—Understanding Microorganisms introduces the causes and prevention of foodborne illness. The chapter also describes how to respond when symptoms of foodborne illness are reported.

Chapter 3: Basic Facts About Microorganisms includes a description of the most common foodborne illnesses caused by bacteria, viruses, molds and yeasts, and parasites. Bacteria and viruses are the microorganisms of greatest concern in foodservice, and the chapter describes how the growth of these microorganisms can be prevented or controlled.

Chapter 4: A Clean and Sanitary Foodservice Facility provides the foodservice director and manager with guidance on promoting food safety through good personal hygiene and common sense when working near food or with food. The chapter also includes information on maintaining a clean and sanitary environment for the preparation and service of food.

Chapter 5: A Process for Preventing Foodborne Illness explains the Eight Steps of the Foodservice Process and how to prevent foodborne illness at each step.

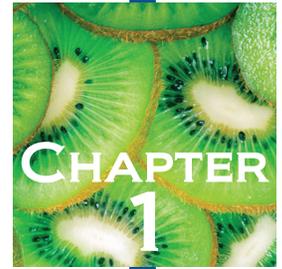
Chapter 6: Food Safety Programs in Schools describes the Process Approach and explains why food safety programs are needed in schools. The chapter also identifies both managers' and employees' responsibilities for a food safe program.



FOOD SAFETY IS TOP PRIORITY

In this chapter, find answers to the following questions:

Why is food safety a top priority?	5
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FOOD SAFETY IS TOP PRIORITY

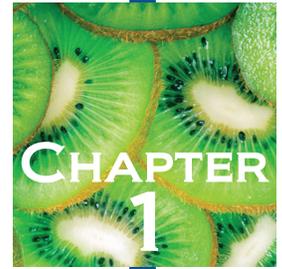
Why is food safety a top priority?

Food safety is the responsibility of every person who is involved in foodservice. Serving safe food to children and adults who participate in child nutrition programs is a top priority for every foodservice employee regardless of the job assignment. Every action in foodservice has the potential to impact the safety of the food, whether during purchasing, storing, preparing, holding, serving, or cleaning.



In 2001, the Centers for Disease Control and Prevention (CDC) estimated that 76 million cases of foodborne illness occur each year in the United States. Foodborne illness is considered a major public health problem. For certain highly susceptible groups, such as seniors, young children, pregnant women, and the immune-compromised, foodborne illnesses can be fatal. In fact, the CDC estimates that there are 325,000 hospitalizations and 5,000 deaths related to foodborne illnesses each year. However, for most people, a foodborne illness results in discomfort lasting several days or longer.

Foodservice employees should know that a foodborne illness could occur in any operation. Just because a foodborne illness has not occurred in a foodservice operation does not mean it will never occur. To prevent a foodborne illness, all employees must practice good food safety habits on a routine basis. In addition to human suffering, an outbreak of foodborne illness can result in a damaged reputation and financial loss.



Foodservice employees have many opportunities throughout the day to ensure that the food served is safe to eat. In order to serve safe food, every foodservice employee must follow guidelines to maintain a safe foodservice environment.

What is a foodborne illness and foodborne outbreak?

Foodborne Illness

A **foodborne illness**, commonly referred to as food poisoning, is a disease carried to people by food or water. Although a person may become ill and show symptoms that go with a specific kind of foodborne illness, a foodborne illness can only be confirmed with a laboratory analysis that identifies the source of the illness.

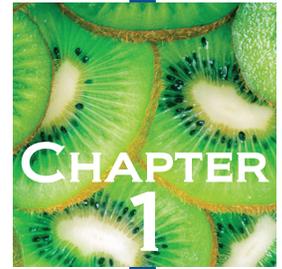
Foodborne Outbreak

A **foodborne outbreak** is an incident in which two or more people experience the same illness symptoms after eating a common food. A foodborne illness is confirmed when a laboratory analysis shows the source of illness to be a specific food. For example, it would be a foodborne outbreak if two or more students who ate undercooked hamburger patties in the school cafeteria became sick and their symptoms were confirmed by the state public health department to be caused by *E. coli* 0157:H7.

What must be done to keep food safe?

Americans have a safe food supply. However, food can become contaminated at any stage in the foodservice process, from field or pasture to the customer's plate.

Foodborne illnesses are caused by eating a contaminated food or drinking a contaminated beverage. The first step in preventing a



foodborne illness is to prevent the food or beverage from becoming contaminated and thus unsafe. Any food or beverage can be contaminated (made unsafe).

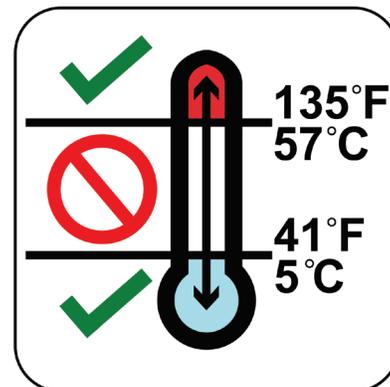
There are three types of hazards (or contaminants) that can cause a food to be unsafe.

- Biological (microorganisms)
- Chemical
- Physical

Know About Biological Hazards

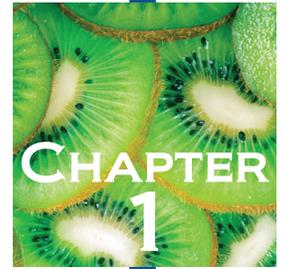
Understand What Causes Biological Contamination

Bacteria or other microorganisms that have contaminated food cause most foodborne illnesses. These microorganisms are more likely to grow in the temperature danger zone. The **temperature danger zone** is between 41 °F and 135 °F and refers to the internal temperature of food. The harmful microorganisms, called **pathogens**, can come from a variety of sources.



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- **People** spread organisms from their bodies to food by unclean hands, coughing, or sneezing. Food can be contaminated before or during processing, in the kitchen during preparation, or during service. In fact, most foodborne illnesses are caused by bacteria or other microorganisms spread by people who handle food.
- **Unsanitary facilities and equipment** may spread harmful organisms to people or food.



- **Disease-spreading pests**, such as cockroaches, flies, or mice, which are attracted to food preparation areas, may contaminate food, equipment, or service areas.

Prevent Contamination from Microorganisms

More information about the causes and prevention of foodborne illnesses from microorganisms is provided in Chapter 3: Basic Facts About Microorganisms.

Know About Chemical Hazards

Understand What Causes Chemical Contamination

A foodborne illness can result from a harmful chemical getting into a food that is then eaten by a person. Foodservice establishments use a variety of chemicals to clean and sanitize and for pest control.

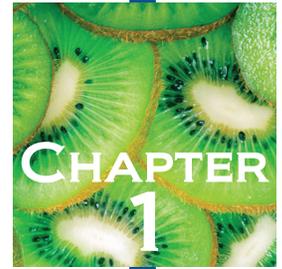
If handled inappropriately, the chemicals necessary to maintain a sanitary facility can contaminate food and make people sick.

Employees who handle hazardous chemicals incorrectly also risk injury due to exposure.

Hazardous chemicals include

- sanitizers,
- pesticides,
- whitening agents,
- detergents,
- polishes,
- glass cleaners,
- caustics, and
- cleaning and drying agents.





Prevent Chemical Contamination

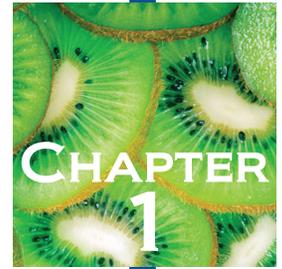
Chemical contamination of food and personal injury can be prevented if chemicals are handled and stored properly.

Use the guidelines below to help prevent chemical contamination.

- Teach employees how to use chemicals.
- Store chemicals in original containers away from food to prevent accidental misuse as well as leakage into food.
- Make sure labels clearly identify chemical contents of containers.
- Use Materials Safety Data Sheets (MSDS) to ensure that all chemicals are stored and used correctly. MSDS should be readily accessible to all employees.
- Always measure chemicals in accordance with manufacturer's recommendations.
- Allow only authorized personnel to have access to cleaning chemicals.
- Always test sanitizing solutions.
- Wash hands thoroughly after working with chemicals.
- Wash fresh produce that will be served whole, peeled, or cooked in cold, running water. Scrub thick-skinned produce with a brush designed for food preparation.
- Monitor procedures used by pest control operators to be sure pesticides do not contaminate food. Only professional operators should apply pesticides.



Metals are another potential source of contamination. Highly acidic foods, such as tomatoes or lemons, can react with metals during



cooking or storage, causing the metal to leach out into the food. To prevent this problem

- use metal containers and metallic items only for their intended uses;
- do not use galvanized containers to prepare or cook acidic foods like lemonade, tomato products, and salad dressing;
- avoid enamelware, which can chip and expose underlying metal;
- do not use metal mixing bowls for holding hot foods;
- never store food in an open can; transfer to an appropriate, covered storage container and label; and
- use only commercial foodservice equipment (look for the National Sanitation Foundation (NSF) International mark or the Underwriters Laboratories' (UL) sanitation classification listings of commercial foodservice equipment that comply with those of NSF International).

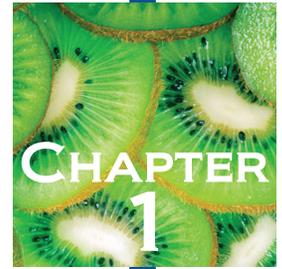


Know About Physical Hazards

Understand What Causes Physical Contamination

A food can be contaminated by a foreign object getting into the food accidentally. Physical contaminants include dirt, hair, nail polish flakes, insects, broken glass and crockery, nails, staples, metal or plastic fragments, and bits of packaging materials. Bits of bone in ground beef would be considered a physical contaminant because it is a foreign object that should not be in the food. Some physical contaminants may get into the food during processing and some may accidentally get into the food during final preparation. Either way, physical contaminants can be harmful to the customer. Every effort should be made to avoid any foreign object in the food.

Because physical hazards are easily seen, customers commonly report



them. Most physical food contamination can be prevented when foodservice personnel wear proper clothes and shoes, use hair restraints, avoid wearing nail polish and artificial nails, and use other common sense precautions. Teach employees to be aware of potential physical contaminants.

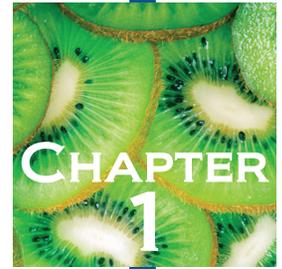
Prevent Physical Contamination

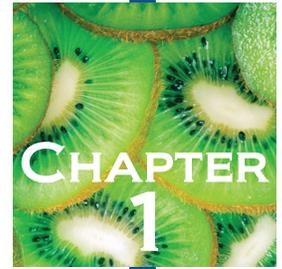
Use the guidelines below to help prevent physical contamination.

- Use a commercial scoop rather than a glass for portioning ice.
- Designate a source of ice for use in beverages and foods. Do not cool food items in the same ice that will be consumed.
- In a preparation area, store toothpicks and non-edible garnishes on lower shelves so they cannot fall into food.
- Place shields on lights.
- Clean can openers regularly and keep the blades sharp and in good repair.
- Remove staples and nails from boxes in the receiving area when food is received.
- Avoid repairing equipment temporarily with items that could potentially fall into food.
- Clean and sanitize equipment on a regular basis.
- Do not wear nail polish or artificial nails when working with food.
- Wear a hair restraint when working with food.
- Do not wear jewelry other than a plain ring, such as a wedding band, when preparing or serving food.
- Avoid wearing earrings that could fall into food.
- Do not carry a pencil or pen behind the ear since it could fall into food.
- Use only food containers or bags that are approved for

food storage.

- Never reuse a single-use container.
- Have routine pest control maintenance administered by licensed personnel.





Summary

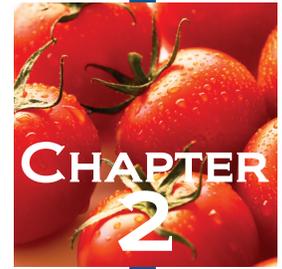
CHAPTER 1: Food Safety is Top Priority provides an explanation of three types of hazards that can contaminate food: biological (microorganisms), chemical, and physical. The first line of defense against a foodborne illness is to prevent contamination of food.

Bacteria or other microorganisms that have contaminated food cause most foodborne illnesses. These microorganisms are more likely to grow in the temperature danger zone. The temperature danger zone is between 41 °F and 135 °F and refers to the internal temperature of food. The harmful microorganisms, called pathogens, can come from a variety of sources.

Foodborne illness can also result from a harmful chemical getting into a food that is then eaten by a person. Foodservice establishments use a variety of chemicals to clean and sanitize and for pest control.

Most physical food contamination can be prevented when foodservice personnel wear proper clothes and shoes, use hair restraints, avoid wearing nail polish and artificial nails, and use other common sense precautions. Because physical hazards are easily seen, customers commonly report them.

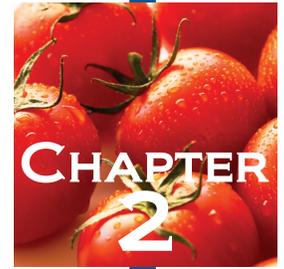
Teach employees to be aware of potential contaminants. Every foodservice employee is responsible for following all sanitation guidelines to prevent a foodborne illness.



PREVENT FOODBORNE ILLNESS— UNDERSTANDING MICROORGANISMS

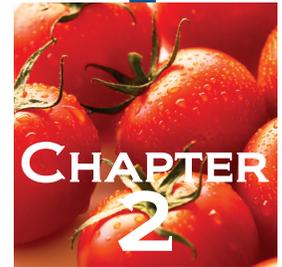
In this chapter, find answers to the following questions:

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PREVENT FOODBORNE ILLNESS— UNDERSTANDING MICROORGANISMS



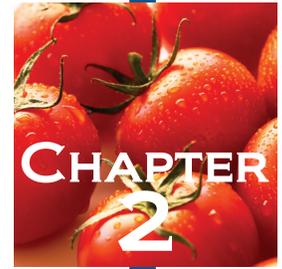
In Chapter 1, the three main types of contaminants were described: harmful microorganisms in food, harmful chemicals in foods, and harmful physical objects in food. This chapter will provide a closer look at foodborne illness caused by harmful microorganisms.

Bacteria and other microorganisms are everywhere such as in the soil, in saliva, under fingernails, on doorknobs, or on towels. Some bacteria protect from infection, help digest food inside the body, and break down organic materials in the environment. Penicillin, a powerful antibiotic, was originally developed from mold. However, some microorganisms are dangerous to humans when consumed and are the primary causes of foodborne illness. Harmful bacteria and viruses cause most foodborne illness.

What happens in the body after a contaminated food has been eaten?

When a food with harmful microorganisms is ingested, there is a period of time before symptoms of the foodborne illness begin. The amount of time varies with the microorganism, how many were in the food, and the individual's physical condition. Many different harmful microorganisms produce the same symptoms including diarrhea, stomach cramping, nausea, and vomiting. Because symptoms are similar, a laboratory test and a trained health department official are necessary to identify the specific microorganism.





How do harmful microorganisms contaminate foods?

Harmful microorganisms may contaminate food

- during receiving;
- during preparation and serving;
- during preparation techniques such as cooking and cooling;
- by cross-contamination of raw meat, poultry, seafood, or eggs with other foods;
- from employees to food by unwashed hands, coughing, or sneezing;
- from unsanitary facilities and equipment to people or food; and
- from disease-spreading pests, such as cockroaches, flies, and mice.

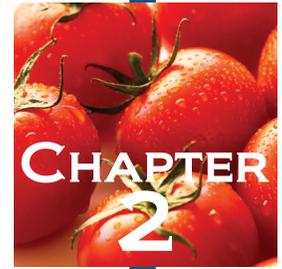
How food is handled after it has been contaminated can make a big difference in whether the food will cause a foodborne illness. To control the growth of harmful microorganisms, foodservice employees must control the conditions necessary for growth. All foodservice employees are responsible for handling every food according to guidelines to prevent

- contamination and
- growth of microorganisms if the food should become contaminated.

What are the main causes of a foodborne illness?

Knowing what can cause a foodborne illness is the first step in preventing it. Foodborne illnesses are caused by one or more of the factors described below.

- Poor personal hygiene
- Abuse of the time-temperature relationship
- Cross-contamination



Poor Personal Hygiene

To prevent foodborne illness, foodservice personnel must follow procedures for good personal hygiene. Everyone has bacteria on their skin, hair, eyes, nose, mouth, and hands. Some bacteria cause foodborne illnesses. Foodservice personnel can contaminate food and food contact surfaces and cause foodborne illnesses.

Poor personal hygiene can cause food contamination when an employee

- does not wash hands after using the restroom.

Example: Failure to wash hands properly after using the restroom presents a serious risk of fecal contamination.

- coughs or sneezes on food.

Example: A cook is preparing chef salad and sneezes on the food.

- prepares food with an open sore or cut, touches the wound, and then touches food.

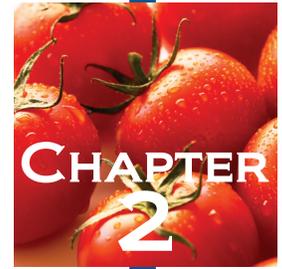
Example: An employee burned her forearm and it became infected. While preparing sandwiches, she touches her open wound and then continues preparation of the sandwiches.

Abuse of the Time-Temperature Relationship

To prevent foodborne illness, it is important to control the time that food is in the **temperature danger zone**.

The temperature danger zone is between 41 °F to 135 °F and refers to the internal temperature of food. Check with state or local public health departments for additional information on time and temperature abuse.



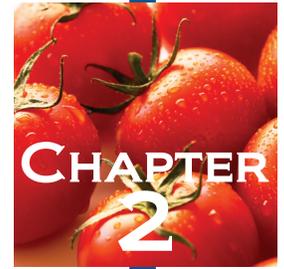


Time-temperature relationship problems occur because

- food is not stored, prepared, or held at required temperatures.
Example: The holding cabinet in a cafeteria is not set to hold hot foods at 135 °F or above.
- food is not cooked or reheated to temperatures high enough to kill harmful microorganisms.
Example: Chili is not reheated to 165 °F or above for 15 seconds.
- food is not cooled to low enough temperatures fast enough.
Example: Hot turkey gravy is stored in a deep, one-gallon storage container and is not cooled properly, so the internal temperature of the gravy remains in the temperature danger zone too long for food safety.
- food is prepared in advance of service and proper temperature control is not maintained.
Example: Spaghetti sauce is prepared for the next day and when it is removed from the refrigerator to be heated for service, the internal temperature is 60 °F.

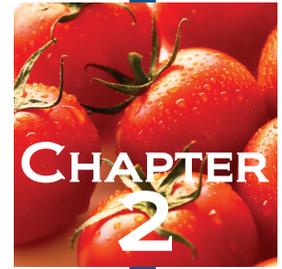
It is easy for time in the temperature danger zone to add up quickly. For best practice, a foodservice operation should document temperatures and maintain written procedures. Follow state and local public health department recommendations to control time and temperature at each stage of food production.

The following scenario is an example of how a food could be exposed to temperatures in the temperature danger zone at several stages.



SCENARIO I

- A delivery truck arrives at 9:15 a.m. on Monday morning. The truck driver sees that the manager is on the phone and decides to unload the cases of food and supplies on the dock while he waits. A former employee stops in to visit and the truck driver, manager, and employee reminisce about the past.
- At 10:30 a.m. the manager checks in the order and notices the 100 pounds of ground beef does not feel cold. He accepts the delivery and tells the driver not to worry about it.
- The manager is on his way to get a cart to transport the ground beef to the refrigerator when a cook asks a question about the upcoming menu. The manager stops to talk.
- The cart with the ground beef is rolled into the refrigerator at 11:00 a.m.
- On Tuesday, the cook is making “Maggie’s Meatloaf” for lunch on Wednesday. She rolls the cart with the 100 pounds of ground beef to her work area. When she reads the recipe, she discovers she will only need 40 pounds. She decides she will put away the remaining 60 pounds of ground beef in the refrigerator when she is finished making the meatloaf. She decides this is more efficient since it will be one less trip to the refrigerator.
- She places the meatloaf in 6-inch steam table pans, then covers, labels, dates, and places the meatloaf and remaining ground beef in the refrigerator.
- On Wednesday, she cooks the meatloaf. After about 20 minutes of cooking, she opens the oven door and decides it needs about 5 more minutes. She feels it is not necessary to take the internal temperature since this is how she has always cooked it. It is a favorite among students and staff.



For best practice, a foodservice operation should document temperatures and maintain written procedures.

SCENARIO II

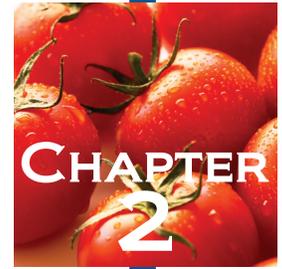
Cold sandwiches are made and planned for service at a special Saturday meeting with parents and teachers. The sandwiches will be removed from cold temperature control at 11:30 a.m. and cooled on ice until all are consumed or until 1:30 p.m., whichever comes first. Temperatures are monitored and documented every 30 minutes. A foodservice employee will be on hand to serve the food and ensure that the written procedures are followed.

Cross-Contamination

To prevent foodborne illness, avoid transferring harmful microorganisms from a surface to food or from one food to another food. This is known as **cross-contamination**.

Cross-contamination can occur when

- an undercooked food is added to another food that is not cooked further.
Example: Undercooked scrambled eggs are added to an existing pan of scrambled eggs on a steam table.
- a food-contact surface is not cleaned and sanitized as necessary for food safety.
Example: Before each use with a different type of raw animal food.
Example: Each time there is a change from working with raw foods to working with ready-to-eat foods.
Example: Between uses with raw fruits and vegetables and with potentially hazardous foods.



- raw meat touches or drips fluids onto a prepared food.
Example: Storing raw meats in a refrigerator on a shelf above cooked or ready-to-eat foods.
- a food employee's hands touch a food and then touch a prepared food that is ready-to-eat and will not be cooked.
Example: Washing potatoes and then immediately preparing lettuce salad without washing hands.

How can foodborne illness caused by microorganisms be prevented?

The three primary ways of preventing foodborne illness are listed below.

- Practice good personal hygiene.
- Control time and temperature of foods.
- Prevent cross-contamination.

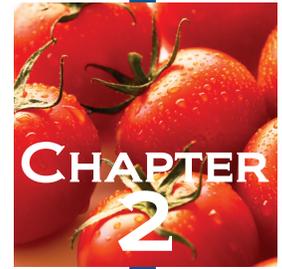
Practice Good Personal Hygiene

Every person who works in or around food has the potential of contaminating a food with bacteria and viruses that are present on our bodies. Not only are bacteria on our bodies, they are present on common items that we handle regularly, such as money, pens, pencils, and doorknobs. These bacteria can easily spread to food. The personal hygiene, dress, and general good health habits of foodservice employees play a crucial role in keeping these bacteria away from the food they prepare and serve.

It is the manager's responsibility to establish procedures for good personal hygiene and to make sure that everyone follows them.

Good personal hygiene includes certain practices.

- Bathe daily.
- Shampoo hair frequently.



- Wear freshly laundered work clothes or uniforms daily and change aprons after they become soiled.
- Keep fingernails clean, trimmed, and unpolished. Best practice is not to wear fingernail polish or artificial fingernails.
- Treat and bandage wounds and sores. When hands are bandaged, clean, single-use gloves should be worn at all times to protect the bandage and keep it from falling into food.
- Wash hands correctly and often.
- Wash hands before putting on gloves or changing into a new pair.
- Change gloves each time a new task is begun.

More detail about good personal hygiene can be found in Chapter 4: A Clean and Sanitary Foodservice Facility.

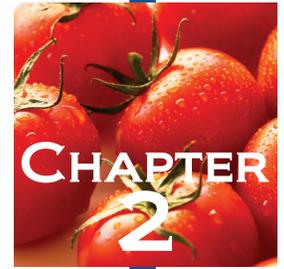
Control Time and Temperature of Foods

Know the rules of time-temperature control. The relationship between time and temperature is critical in the prevention of foodborne illness and for the assurance of food quality.

Harmful microorganisms grow and multiply at temperatures between 41 °F and 135 °F, the temperature range referred to as the temperature danger zone.

Whenever a food is in the temperature danger zone too long, it can become unsafe. Many authorities suggest that food should remain in the temperature danger zone a minimum amount of time not to exceed 4 hours.

Best practice is to keep food at or below 41 °F or at or above 135 °F.



Temperature Danger Zone

- The temperature danger zone is between 41 °F and 135 °F. Follow state and local public health department requirements.
- During any point of the food production process when food could be in the temperature danger zone, the internal temperature must be documented. Follow state and local public health department recommendations to control time and temperature at each stage of food production.
- The time period when the food could be in the temperature danger zone includes the receiving process, storing, cooking, preparing, holding, serving, reheating, and cooling.
- When heating or cooling foods, use procedures to pass them through the temperature danger zone as quickly as possible.

Cooling Food

For best practice, cool foods to take them through the temperature danger zone rapidly.

Cool cooked hot food from 135 °F to 70 °F within 2 hours and from 70 °F to 41°F in an additional 4 hours for no more than a total cooling time of 6 hours.

If the food has not reached 70 °F within 2 hours, it must be reheated immediately to 165 °F for 15 seconds.

Use the right tools to monitor and document the internal temperature of foods.

For details on safe cooling, see Chapter 5: A Process for Preventing Foodborne Illness.

TOOL 1: FOOD THERMOMETERS

Accurate food thermometers are the only tools that can judge the internal temperature of a food product. Neither the length of time a food has been cooked nor the appearance of a food is a good indicator of safety and doneness. Every foodservice employee who is responsible for preparing or serving food should have easy access to a food thermometer and be taught to calibrate and use it correctly.

The two most common types of food thermometers used to determine the internal temperature of food are the bi-metallic stemmed thermometer and the digital thermometer.

- **Bi-metallic stemmed thermometers with instant-read dials measure temperatures from 0 °F to 220 °F.**

This type of thermometer is most commonly used in foodservice operations and is referred to as a food thermometer in this document. It should have an adjustable calibration nut and an easy-to-read temperature marking. A dimple marks the end of the sensing area.



- **Digital thermometers measure temperature with a metal probe and display the temperature on a digital readout.**

This type of thermometer is available in various styles from a pocket-size up to a panel-mounted display. Many digital thermometers have interchangeable temperature probes used to measure temperature of different items.



Determine the safe internal temperature when food is

- received (milk, produce, frozen food),
- in hot-holding cabinets,
- being cooked,
- on the service line,
- cooled for later cold storage,
- leftover, or
- reheated.

TOOL 1: FOOD THERMOMETERS

How to Use a Food Thermometer

- Clean and sanitize the stem of the thermometer after every use.
- After washing the stem, sanitize the stem with a sanitizing solution or a sanitizing wipe. Allow to air dry.
- Store in a clean and sanitized case.
- The clean case should be sanitized by immersing in a sanitizing solution.
- For digital thermometers, remember to check and change batteries on a routine basis.
- Measure the internal temperature of a food by inserting the stem of the thermometer into the center and thickest part of the food.
- Insert the thermometer into the center of the food far enough to cover the sensor.
- Avoid pockets of fat in meat and touching bone.
- Wait for the dial or digital indicator to stop (about 15 seconds) and then read the temperature.
- Insert the thermometer again in a different part of the food for a second reading and a third time to confirm the internal temperature meets requirements.
- Clean and sanitize the thermometer before inserting it into the next food.
- Use the food thermometer to check the temperature of refrigerated foods during the receiving process. Refrigerated foods should be delivered at or below 41 °F, except as specified in local laws governing milk, shell eggs, and molluscan shellfish.
- Packaged foods—Insert the thermometer between two packages without puncturing the packages.
- Milk—Open a carton and insert the thermometer at least two inches into the milk. Record the temperature
- Use a food thermometer to check the temperature of frozen foods if necessary. Insert the stem of the food thermometer between frozen packages. Frozen foods should be delivered frozen solid.
- Calibrate the food thermometer on a routine basis. Teach employees how to calibrate a food thermometer and establish a routine of having each thermometer calibrated at the beginning of the workday. If a food thermometer is dropped, calibrate prior to using it to be sure the temperature reading is accurate.

TOOL 1: FOOD THERMOMETERS

How to Calibrate a Food Thermometer

Use these methods to calibrate food thermometers.

Ice-Point Method

The ice-point method is used most often unless a thermometer cannot register a temperature of 32 °F (0 °C).

1. Fill a glass with crushed ice. Add water until the glass is full.
2. Place the thermometer in the center of the glass of ice water, not touching the bottom or sides of the glass.
3. Agitate the glass of ice water to ensure even temperature distribution throughout. Wait until the indicator stops.
4. The temperature should register 32 °F. If it does not, adjust the calibration nut by holding it with pliers or a wrench and turning the face of the thermometer to read 32 °F. If using a digital thermometer with a reset button, adjust the thermometer to read 32 °F while the metal probe is in the ice water, or replace the battery.

Boiling-Point Method

This method may be less reliable than the ice-point method because of variation due to high altitude.

Use this method to calibrate food thermometers with scales beginning at 32 °F.

1. Using a deep pan, bring water to a boil.
2. Place the thermometer in the center of the boiling water, not touching the bottom or sides of the pan. Wait until the indicator stops.
3. The temperature should register 212 °F. If it does not, adjust the calibration nut by holding it with pliers or a wrench and turning the face of the thermometer to read 212 °F. If using a digital thermometer, push the reset button while the metal probe is in the boiling water. Replace the battery if needed. Follow work safety procedures.
4. The boiling point of water is lower at high altitudes. For each 550 feet above sea level, the boiling point of water is 1 °F lower than the standard of 212 °F. For example, in a kitchen located at 5,500 feet above sea level, water would boil at 202 °F. The indicator on a dial food thermometer inserted into boiling water would need to be adjusted to the temperature 202 °F at the higher altitude of 5,500 feet.

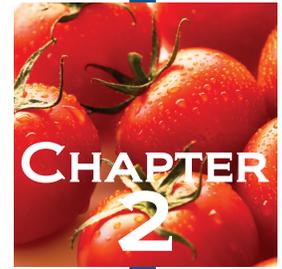
TOOL 2: DAILY TEMPERATURE FORM— INTERNAL FOOD TEMPERATURES

Before food is placed on the service line, it is recommended that the internal temperature be measured and documented to be sure that hot food is at or above the required internal temperature for the type of food product. Hot food placed in a holding cabinet or on the service line should be held at or above 135 °F and cold food should be held at or below 41 °F. See Appendix 5 for a chart of the recommended internal temperatures and holding time for frequently served food items.

If food is held in a holding cabinet or on the service line more than 30 minutes, it is best practice to check and document the internal temperature every 30 minutes to be sure it is at the safe level. Some foodservice operations record the internal temperatures of food in holding cabinets or on the service lines on a temperature form that includes the date, name of food, time, internal temperature, and the foodservice employee's initials.

A Daily Temperature Form – Internal Food Temperatures is provided in Appendix 3.

Daily Temperature Form—Internal Food Temperatures				
Date	Food Item	Time / Temperature / Initials	Time / Temperature / Initials	Time / Temperature / Initials
Example: 4/2	Spaghetti sauce	11:30 am / 165 °F / JS	12:00 noon / 142 °F / JS	12:30 pm / 140 °F / JS



Prevent Cross-Contamination

One of the most common causes of foodborne illness is cross-contamination which is the transfer of bacteria from

- hand to food,
- food to food, or
- equipment to food.

Microorganisms live throughout the kitchen and can easily move around by attaching themselves to people, food, and equipment. Cross-contamination can occur anywhere in a foodservice operation but can be prevented by physical barriers or by food safety procedures.

Hand-to-Food Cross-Contamination

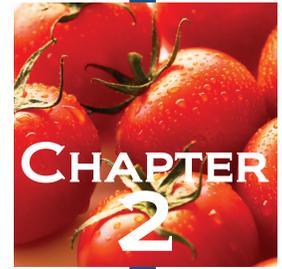
Hand-to-food cross-contamination occurs when contaminated hands handle cooked or ready-to-eat foods. Bacteria are found throughout the body—on hair, skin, and clothing; in the mouth, nose, and throat; in the intestinal tract; and on open wounds, sores, scabs or scars. These bacteria often end up on the hands where they can easily spread to food. People can also pick up bacteria by touching raw food and then handling cooked or ready-to-eat food.

How to Prevent Hand-to-Food Cross-Contamination

Follow these guidelines to prevent hand-to-food cross-contamination:

- Wash hands properly, frequently, and at appropriate times.
- Wash hands before putting on single-use gloves and change gloves frequently.





- Cover cuts, sores, and wounds.
- Keep fingernails short, unpolished, and clean (no artificial nails).
- Avoid wearing jewelry except for a plain ring, such as a wedding band.
- Use prosthetic devices safely.

Wash hands properly, frequently, and at appropriate times.

Hand washing is one of the most critical aspects of good personal hygiene in foodservice. Clean hands are necessary to prevent contamination of food during preparation and service.

When to wash hands

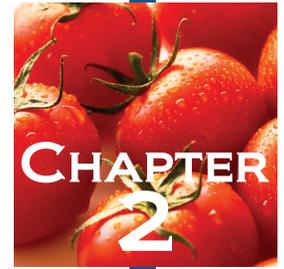
Wash hands whenever hands are soiled and before

- beginning food preparation,
- putting on disposable gloves, and
- serving customers.



Wash hands after

- arriving at work and after breaks;
- using the restroom and then again at the kitchen hand washing sink;
- eating, drinking, smoking, or chewing tobacco or gum;
- using the telephone;
- using a handkerchief or a tissue;
- handling inventory;
- handling raw food;
- touching or scratching areas of the body, such as ears, mouth, nose, or hair;
- coughing or sneezing;



- clearing or cleaning tables;
- clearing, scraping, or washing dirty plates or utensils;
- handling garbage;
- handling money on the cafeteria line;
- touching dirty aprons, clothing, or dirty surfaces; and
- using cleaning chemicals.

Remember to post appropriate hand washing signs as required by state and local public health departments.

How to wash hands

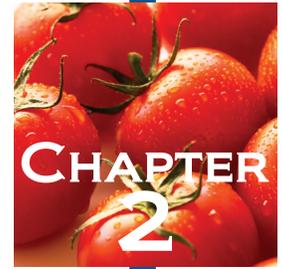
- Use the hand washing sink with running water at approximately 100 °F and liquid soap.
- Lather hands and exposed arms.
- Rub hands together for at least 20 seconds.*
- Wash hands thoroughly, paying close attention to fingernails.
- Rinse in clean, running water.
- Dry hands using a paper towel or air dryer, not a cloth or apron.
- Turn off the faucet with the paper towels used to dry your hands.

*An easy way to determine if hands are rubbed and lathered for 20 seconds is to sing one verse of “Old MacDonald.”

Wash hands before putting on single-use gloves and change gloves frequently.



Increasing emphasis is being placed on the importance of avoiding bare-hand contact with ready-to-eat food. By using single-use gloves on clean hands, a barrier is placed between the foodservice employee and the food. Gloves are only one kind of barrier. Others include tongs and deli paper. Follow the regulations of the state and local public health department.



How to use single-use gloves correctly

- Wash and dry hands.
- Put on clean gloves.
- Use the gloves as if they are a serving utensil.
- Change gloves if they become torn or soiled or if you begin working with a different food.
- Never wash and reuse gloves.

Cover cuts, sores, and wounds.

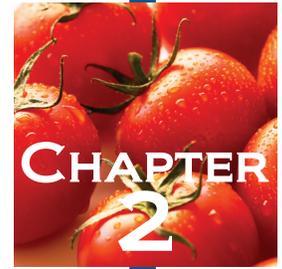
Cuts, burns, or any kind of break in the skin could harbor harmful microorganisms that can contaminate food and cause a foodborne illness. Cover the wound with a clean, impermeable bandage, and then place a clean, single-use glove over the bandage. Some foodservices have a policy that anyone with an open wound cannot work with food until the injury completely heals.

Avoid wearing nail polish and artificial nails.

Fingernails should be kept short, unpolished, and clean. Both nail polish and artificial nails pose considerable danger around food and should not be worn by anyone handling food according to best practices for food safety. Nail polish can harbor microorganisms between the nail and the polish and can also flake off in food. Nail polish can also mask dirty fingernails. Foodservice employees should not wear any type of nail polish or nail ornament. Best practice is that artificial fingernails (fake nails, acrylic nails, press-on nails) should not be worn by anyone handling food. The artificial nail harbors bacteria and other microorganisms between the real nail and artificial nail. Furthermore, the nail can break off in food.

Avoid wearing jewelry except for a plain ring, such as a wedding band.

The foodservice environment is no place to wear jewelry. The only jewelry permitted is a plain ring, such as a wedding band. It is difficult



to maintain clean hands when wearing rings because bacteria can hide on the finger underneath the ring and also in a ring setting. Jewelry such as rings with settings, bracelets, or earrings can fall off in food or get caught in equipment causing an injury to the wearer. For the use of medical information jewelry, follow the recommendations from the state or local public health department.

Use prosthetic devices safely.

A foodservice employee who wears a prosthetic device should follow the guidance of state and local public health department regulations to ensure that the device is used in a safe and sanitary manner.

Food-to-Food Cross-Contamination

Food-to-food cross-contamination happens when harmful microorganisms from one food, such as unwashed produce, contaminate other foods. Bacteria in raw meat and poultry can be spread to other foods, utensils, and surfaces. A common mistake is to leave thawing meat on a top shelf in the refrigerator where it can drip onto foods stored below.

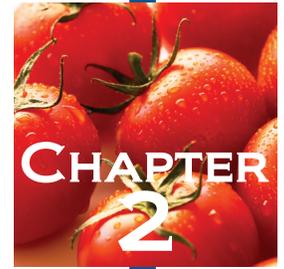
How to Prevent Food-to-Food Cross-Contamination

- Store cooked foods and foods that will not be cooked in the refrigerator on a higher shelf than raw foods.

Example: Store cooked spaghetti on a higher shelf than raw ground beef.

- While the *Food Code* does not prohibit mixing leftover food with fresh food in controlled situations, it is strongly recommended and best practice not to mix leftover food and fresh food to protect the quality, appearance, and potential safety of a food.

Example: Do not mix leftover tuna salad with a fresh batch of tuna salad.



- Wash fresh fruits and vegetables in cold running water before peeling.

Example: Wash cantaloupes before removing the rind.

- Wash all fresh produce that will be served whole, peeled, or cooked in cold, running water.

Example: Wash apples before service.

- Do not let raw meat and raw fruits or vegetables be prepared on the same surface at the same time. The two foods should not come into contact with each other.

Example: Do not clean or portion raw chicken on the same surface as lettuce.

Equipment-to-Food Cross-Contamination

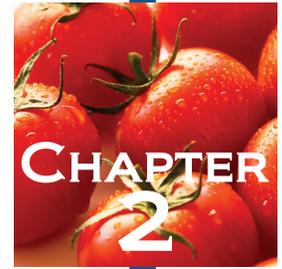
Bacteria may pass from equipment to food when the equipment that has touched food has not been properly cleaned and sanitized before being used to prepare another food. For example, cross-contamination can occur when a meat slicer used for slicing deli meats is then used for slicing fresh tomatoes.

How to Prevent Equipment-to-Food Cross-Contamination

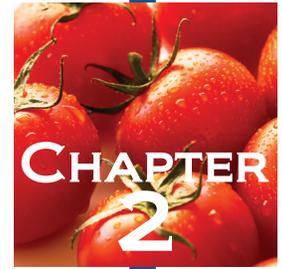
- Use separate cutting boards for different foods, such as meats and fresh fruits and vegetables. Cutting boards should be cleaned and sanitized after each use.



- If possible, prepare raw foods in a separate area from fresh foods that will not be cooked. For example, designate a special work surface for raw meat preparation away from the work surface used for salads and desserts.



- Clean and sanitize equipment, work surfaces, and utensils after preparing each food.
- Use specific containers for various types of food products. Clearly label the containers with contents and date. For example, designate specific containers for thawing raw chicken, meat salad, and grated cheese.
- If cleaning cloths are permitted for use by the state sanitation code, follow guidelines for use and maintenance in a sanitizing solution. Make sure cloths or towels used for wiping spills are not used for any other purpose. Cleaning cloths should be rinsed after each use and stored in a clean sanitizing solution.
- Wash and sanitize the can opener on a regular schedule every day.
- Clean and sanitize food preparation equipment such as the food slicer after each use. For example, clean and sanitize the slicer after slicing ham for sandwiches.
- Never reuse single-use containers, such as old mayonnaise jars or single-use plastic containers.
- Never reuse plastic wrap or aluminum foil. Throw it away after one use.
- Touch dishes, trays, flatware, glasses, or serving utensils by contacting only the outside surface. Never touch the surface where food will be placed or where a person's mouth will touch.
- When a new pan of food is added to the steam table, use a clean, sanitized utensil, not the utensil used in the previous pan.
- Sanitize wiping cloths during and in-between use so they will not be a source of cross-contamination. A wiping cloth that has been used to clean a surface where raw food has been prepared can easily carry bacteria to other areas, including to cooked food. A good rule is to place wiping cloths in a clean, sanitizing solution when not in use. Remember to check sanitizing solution concentration at different intervals during the day.



Follow state and local public health department regulations for use and concentration levels of sanitizing solutions. Follow manufacturer's label directions for correct mixing procedures, storage, and specific first aid information.

What are the responsibilities of the foodservice manager and employees?

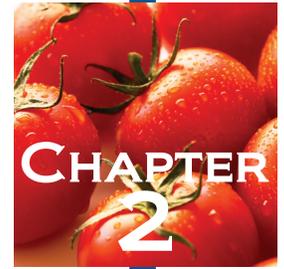
Everyone in the foodservice operation plays an important role in the prevention of foodborne illnesses. Like any other aspect of a job, more knowledge helps prevent problems.

Responsibilities of the Foodservice Manager

The foodservice manager is responsible for

- knowing and implementing the state and local public health department regulations regarding food sanitation and safety,
- solving problems of noncompliance cited on sanitation inspections,
- maintaining up-to-date knowledge regarding food safety and sanitation,
- training and coaching employees regarding food safety, and
- holding employees responsible for following food safety requirements and guidelines.

The foodservice manager should use available resources to learn more about preventing foodborne illnesses. There are many excellent resources in addition to this book. Appendix 1: Resources for Food Safety Information provides a list of printed resources and Internet addresses for Web sites.



Responsibilities of Foodservice Employees

Foodservice employees are responsible for

- learning about food safety, and
- following food safety requirements and guidelines.

Food safety is everyone's responsibility. A foodborne illness can occur in any foodservice facility when food safety requirements and guidelines are not followed.

How should the foodservice manager respond if symptoms of foodborne illness are reported to the foodservice operation?

The manager is responsible for responding correctly and demonstrating leadership in this emergency situation. It is important to know and follow state and local public health department and school district guidelines.

TOOL 3: GUIDELINES FOR THE FOODSERVICE MANAGER WHEN FOODBORNE ILLNESS IS SUSPECTED

Follow school district guidelines and cooperate with state and local officials. The general guidelines that follow will be helpful in handling any emergency.

- **Keep calm and cooperate with the health department.** Keep a level head. Do not panic. There are many reasons that students may not be feeling well other than eating food from the foodservice operation. Remaining calm will help you respond rationally and systematically to the situation and may help keep everyone involved from overreacting.
- **Talk with your supervisor immediately for additional guidance.** To avoid panic and sympathy symptoms, ask the principal and teachers not to discuss the problem with anyone except the school nurse.
- **Stop serving the suspect food.** If you have an idea which food caused a foodborne illness, stop serving it or using it as an ingredient.
- **Keep samples of suspect foods** in the original containers, in clean containers that have been boiled, or in unused plastic bags. Store the samples of suspect foods in the refrigerator until the health agency evaluates the epidemiological evidence and, if necessary, makes further arrangements to get samples. At least a half-pint or whatever food is remaining must be kept. Having samples of food could help determine the cause of a foodborne illness and could also help determine that the illness was not caused by food from your operation. Securely wrap samples of the suspect foods in containers using a heavy plastic bag. Label the bag with contents and date. Mark “DO NOT USE AND DO NOT DISCARD.” Store where it will not be mistaken for edible food. If possible, save the container, box or case, wrapping, and metal clips used on the original packaging. Save the food label and invoice to help locate the vendor who supplied the suspect foods.

Be familiar with state and local public health department requirements since some states require that schools routinely keep sample trays of all foods served.

TOOL 3: GUIDELINES FOR THE FOODSERVICE MANAGER WHEN FOODBORNE ILLNESS IS SUSPECTED

- **Cooperate with the health department to gather information.** Follow directions from the local health department. Health professionals may ask you to gather information about the foods that were served and how they were handled.

Gather information from your own kitchen.

Determine the foods on the menu and any other foods that were served but were not on the written menu. Have available the daily production record and the temperature forms.

Determine how the foods were handled before and during preparation.

Have available the storage temperature forms from the freezer and refrigerator to document storage temperatures. See Appendix 4 for an example.

Ask employees how long the foods were in the preparation process. Have documentation available. Were the suspect foods prepared and then refrigerated or heated quickly as necessary to keep foods out of the temperature danger zone? How were internal temperatures monitored?

- **Report the information you were asked to assemble.** Report all the information you have gathered to your supervisor/district director and principal or other person in charge, regardless of whether or not it is a good report.

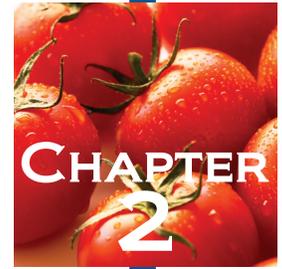
If you have found a particular area that could have caused a foodborne illness, alert your supervisor/district director and principal to the potential problem.

If a problem has been identified, you or your supervisor/district director should report this to the local health department. If more than two persons (non-related) who ate a common food report being ill at the same time, it should be reported to the health authorities (local health department).

TOOL 3: GUIDELINES FOR THE FOODSERVICE MANAGER WHEN FOODBORNE ILLNESS IS SUSPECTED

- **Only health professionals should give medical advice.** If a foodborne outbreak is suspected, cooperate with the health department and health professionals. Take every report of possible foodborne illness seriously and follow the appropriate steps. Be careful not to diagnose, interpret symptoms, or suggest treatments.
- **Direct all media inquiries to the appropriate designated school district representative.**
- **For those students who have reported symptoms of foodborne illness, parents should be contacted by personnel designated by the school or school district.**

Know the school's procedure and who to contact when there is a report of a potential foodborne illness.



Summary

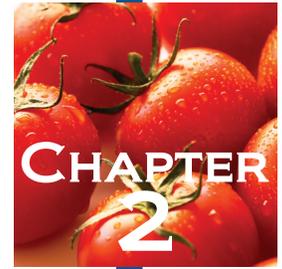
CHAPTER 2: Prevent Foodborne Illness—Understanding Microorganisms describes how consuming a food or beverage contaminated with harmful microorganisms causes foodborne illness. The main causes of foodborne illness include poor personal hygiene, allowing food to remain in the temperature danger zone too long, and cross-contamination.

To prevent foodborne illness, every foodservice operation should establish procedures to ensure safe food and make sure everyone follows them. Foodservice employees should wash hands properly, frequently, and at the appropriate times.

Understanding the time and temperature relationship helps to implement procedures to reduce microorganism growth. Cool hot foods rapidly. Use a food thermometer to determine the internal temperature of food at every stage of the foodservice process: receiving, storing, preparing, cooking, holding, serving, reheating, and cooling. Document internal temperatures of cold and hot foods and calibrate thermometers often.

Remember to check sanitizing solution concentration at different intervals during the day. Follow state and local public health department regulations for the concentration level and use of sanitizing solutions. Follow the manufacturer's label directions for correct mixing procedures, storage, and specific first-aid information.

Guidelines have been provided to prevent cross-contamination through hand-to-food, food-to-food, and equipment-to-food contact. Remember, preventing foodborne illness is the responsibility of the manager and all foodservice employees.



Wash hands whenever hands are soiled and before beginning food preparation, putting on disposable gloves, and serving customers.

To wash hands correctly

- Use the hand washing sink with running water at approximately 100 °F and liquid soap.
- Lather hands and exposed arms.
- Rub hands together for at least 20 seconds.*
- Wash hands thoroughly, paying close attention to fingernails.
- Rinse in clean, running water.
- Dry hands using a paper towel or air dryer, not a cloth or apron.
- Turn off the faucet with the paper towels used to dry your hands.

*An easy way to determine if hands are rubbed and lathered for 20 seconds is to sing one verse of “Old MacDonald.”

PREVENT FOODBORNE ILLNESS QUESTIONNAIRE

Rate your foodservice facility using the Prevent Foodborne Illness Questionnaire below.

Make plans to improve procedures to prevent foodborne illness. Check the box that best describes the current status of each item in your foodservice program.

OK: This is being done right now and no changes are needed.

Improve: This is not being done and improvement is needed. Write your plans for improving this food safety procedure on the back of this page.

	OK	Improve
<i>Practice good personal hygiene.</i>		
Rules for good personal hygiene have been established.	<input type="checkbox"/>	<input type="checkbox"/>
All foodservice employees have been informed of the rules and follow the rules.	<input type="checkbox"/>	<input type="checkbox"/>
Employee personal hygiene practices are observed.	<input type="checkbox"/>	<input type="checkbox"/>
Follow-through for correction is made on a routine basis.	<input type="checkbox"/>	<input type="checkbox"/>
<i>Control time and temperature of foods.</i>		
Procedures are in place to minimize the time that a food is in the temperature danger zone during receiving, storing, preparing, cooking, holding, and serving.	<input type="checkbox"/>	<input type="checkbox"/>
Every foodservice employee who is responsible for the receiving, storing, preparing, cooking, or serving of food has access to a food thermometer. Employees have been taught how to calibrate and use thermometers correctly.	<input type="checkbox"/>	<input type="checkbox"/>
A food thermometer is used to determine the internal temperatures of certain foods during the receiving process.	<input type="checkbox"/>	<input type="checkbox"/>
Internal temperatures for hot and cold foods are documented.	<input type="checkbox"/>	<input type="checkbox"/>
A food thermometer is used on a regular basis to determine the internal temperatures of foods in hot-holding cabinets.	<input type="checkbox"/>	<input type="checkbox"/>
A food thermometer is used to determine the internal temperatures of cooked foods to determine when cooking is complete.	<input type="checkbox"/>	<input type="checkbox"/>

PREVENT FOODBORNE ILLNESS QUESTIONNAIRE

	OK	Improve
<i>Control time and temperature of foods. (continued)</i>		
A food thermometer is used on a regular basis to determine the internal temperatures of foods held on the service line.	<input type="checkbox"/>	<input type="checkbox"/>
A food thermometer is used to determine the internal temperatures of foods that are being cooled for later cold storage.	<input type="checkbox"/>	<input type="checkbox"/>
A food thermometer is used to determine the internal temperatures of foods that are reheated.	<input type="checkbox"/>	<input type="checkbox"/>
Hot foods are cooled correctly. (Cool cooked hot food from 135 °F to 70 °F within 2 hours and from 70 °F to 41 °F or below in an additional 4 hours for a total cooling time of 6 hours. If the food has not reached 70 °F within 2 hours, it must be reheated immediately to 165 °F for 15 seconds.)	<input type="checkbox"/>	<input type="checkbox"/>
<i>Prevent cross-contamination.</i>		
Best practice (includes when and how to) for hand washing is followed by everyone.	<input type="checkbox"/>	<input type="checkbox"/>
Single-use gloves are used correctly.	<input type="checkbox"/>	<input type="checkbox"/>
Cuts, sores, and wounds are cleaned and covered. The employee wears clean, single-use gloves.	<input type="checkbox"/>	<input type="checkbox"/>
Employees avoid wearing nail polish and artificial nails.	<input type="checkbox"/>	<input type="checkbox"/>
Employees avoid wearing jewelry except a plain ring, such as a wedding band.	<input type="checkbox"/>	<input type="checkbox"/>
An employee who wears a prosthetic device follows the guidance of the state and local public health department to ensure food safety.	<input type="checkbox"/>	<input type="checkbox"/>
Employees who are ill do not work with food.	<input type="checkbox"/>	<input type="checkbox"/>
Prepared foods or ready-to-eat foods are stored on higher shelves in the refrigerator than raw foods (meat, poultry).	<input type="checkbox"/>	<input type="checkbox"/>
A leftover food is never mixed with a freshly prepared food.	<input type="checkbox"/>	<input type="checkbox"/>
All fresh produce that will be served whole, peeled, or cooked is washed in cold, running water.	<input type="checkbox"/>	<input type="checkbox"/>

PREVENT FOODBORNE ILLNESS QUESTIONNAIRE

	OK	Improve
<i>Prevent cross-contamination. (continued)</i>		
Cutting boards are cleaned and sanitized after each use.	<input type="checkbox"/>	<input type="checkbox"/>
A separate preparation area has been designated for the preparation of raw meats and other foods, such as fresh fruits and vegetables; or the preparation area is sanitized before being used.	<input type="checkbox"/>	<input type="checkbox"/>
Equipment, work surfaces, and utensils are cleaned and sanitized after each use. State sanitation guidelines are followed for the use of wiping cloths.	<input type="checkbox"/>	<input type="checkbox"/>
A regular schedule is set up for washing and sanitizing the can opener.	<input type="checkbox"/>	<input type="checkbox"/>
Single-use food containers are not reused.	<input type="checkbox"/>	<input type="checkbox"/>
Plastic wrap and aluminum foil are used once.	<input type="checkbox"/>	<input type="checkbox"/>
Employees touch dishes, trays, flatware, glasses, or handles of serving utensils by contacting only the outside surface.	<input type="checkbox"/>	<input type="checkbox"/>



BASIC FACTS ABOUT MICROORGANISMS

In this chapter, find answers to the following questions:

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BASIC FACTS ABOUT MICROORGANISMS

What are the most common causes of foodborne illnesses?



Most foodborne illnesses are caused by harmful microorganisms—tiny, living organisms that are so small they can be seen only with a microscope. There are three groups of microorganisms: pathogens, fungi, and parasites.

Pathogens are harmful microorganisms that cause some form of illness. Consuming a food or beverage contaminated with pathogens is the main cause of foodborne illness.

- **Bacteria** are the group of pathogens of greatest concern in foodservice.
- **Viruses** represent another group of pathogens that can cause foodborne illness.

Spoilage microorganisms include two groups of **fungi**: molds and yeasts. These microorganisms spoil food and may cause illness. More details about spoilage microorganisms can be found in later sections of this chapter.

Foodborne illness can also be caused by **parasites**. These are small organisms that live in a host organism such as cattle, swine, or fish. Proper cooking can kill parasites. More details about pathogens and parasites can be found in later sections of this chapter.



What are the major foodborne illnesses caused by bacteria, and how can they be prevented?

Bacteria are responsible for most outbreaks of foodborne illness. The word “bacteria” is actually the plural of the Latin word “bacterium.”

- A bacterium is a living organism made up of a single cell that can grow and reproduce.
- Some bacteria actually cause disease while other bacteria produce poisons, called “toxins,” as they multiply.
- Some bacteria produce thick-walled spores that are resistant to boiling, freezing, and some sanitizing solutions.



Being familiar with the harmful microorganisms that cause most foodborne illness is important in learning how to prevent foodborne illness. Major foodborne illnesses and the harmful microorganisms that cause them are described on the following pages.

Botulism (BOT-u-li-zum)

Bacteria: *Clostridium botulinum*

Foodborne botulism is a life-threatening illness caused by consumption of food contaminated with preformed neurotoxin produced by *Clostridium botulinum*. The bacteria and its toxin can be destroyed with thorough cooking at high temperatures. Although cases of botulism are not often seen, when untreated it can cause death. Symptoms usually begin from 18 to 36 hours after eating the contaminated food. Symptoms may begin with diarrhea or constipation; weakness; dizziness; double vision or blurred vision; difficulty speaking, swallowing, and breathing; and paralysis. Death can occur if the illness is not treated immediately and properly.



Foods Involved in Outbreaks

Foods most often associated with botulism include home-canned foods, improperly processed foods, and foods not stored at the proper temperature. Some specific examples include sausages; meat products; canned low-acid foods such as certain vegetables; fresh or roasted garlic-and-oil products not intended for immediate use; leftover, tightly wrapped foods such as foil-wrapped baked potatoes; and sautéed onions in butter sauce.

Prevention

- Discard bulging cans, containers with a bulging jar lid, cans that spurt liquid when opened, dented cans, and cracked jars.
- Do not use home-canned foods in a foodservice establishment.
- Do not mix and then store oil and garlic; buy only treated oil and garlic products and keep them refrigerated.
- Follow rules for time and temperature control.
- Sauté onions as needed. Do not sauté and then store unrefrigerated for later use.
- Do not store leftover baked potatoes in foil wrapping. Unwrap and cool correctly.
- Cool cooked hot foods from 135 °F to 70 °F within 2 hours and from 70 °F to 41 °F in an additional 4 hours for no more than a total cooling time of 6 hours. If the food has not reached 70 °F within 2 hours, it must be reheated immediately to 165 °F for 15 seconds.



Campylobacteriosis or *Campylobacter jejuni* (CAM-py-lo-BAC-ter-i-osis Je-jun-i)

Bacteria: *Campylobacter jejuni*

After eating a food with these bacteria, symptoms are typically experienced in 2 to 5 days. Symptoms include diarrhea (watery or bloody), fever, nausea, vomiting, abdominal pain, headache, and muscle pain. The symptoms can last from 7 to 10 days and relapses are common.

Foods Involved in Outbreaks

Foods that can be contaminated with these bacteria include unpasteurized milk and dairy products, raw poultry, raw beef, and non-chlorinated or fecal-contaminated water. Birds and flies can also carry these bacteria and contaminate foods.

Prevention

- Practice good personal hygiene.
- Follow hand washing guidelines.
- Follow procedures for avoiding cross-contamination.
- Cook all poultry, meat, and other foods to the required safe internal temperature and test with a food thermometer.
- Maintain good pest control.
- Use only pasteurized dairy products.
- Use water from approved sources.



E. coli Infection (e-CO-ly)

Bacteria: *Escherichia coli* O157:H7

E. coli O157:H7 is a bacterium that produces Shiga toxin, a poisonous substance that causes severe symptoms. *E. coli* infection is characterized by severe cramping and diarrhea, which begins as watery but may become bloody. Sometimes vomiting occurs. Some young children with this illness develop a Hemolytic Uremic Syndrome (HUS) that causes kidney failure and permanent loss of kidney function leading to death. The symptoms can be seen from 2 to 5 days after eating the contaminated food and last about 8 days.

Foods Involved in Outbreaks

These dangerous bacteria are found in the intestinal tract of animals, particularly cattle and humans. Foods that may be contaminated with these bacteria include raw or undercooked ground beef, raw milk or dairy products, unpasteurized apple cider or juice, imported cheeses, dry salami, and uncooked fruits and vegetables.

Prevention

- Practice good personal hygiene.
- Follow procedures for avoiding cross-contamination.
- Cook all poultry, meat, and other foods to the required safe internal temperature and test with a food thermometer.
- Use only pasteurized milk, dairy products, or juices.
- Wash all fresh produce, which will be served whole, peeled, or cooked, in cold, running water.
- Cool cooked hot foods from 135 °F to 70 °F within 2 hours and from 70 °F to 41 °F in an additional 4 hours for no more than a total cooling time of 6 hours. If the food has not reached 70 °F within 2 hours, it must be reheated immediately to 165 °F for 15 seconds.



Listeriosis (lis-TIR-ee-o-sis)

Bacteria: *Listeria monocytogenes*

Listeriosis is a serious foodborne illness with early symptoms similar to flu, including the sudden onset of fever, muscle aches, and sometimes diarrhea or vomiting. The severity of the symptoms may vary. If the infection spreads to the nervous system, the symptoms may include headaches, stiff neck, confusion, loss of balance, or convulsions. The symptoms may be seen as early as 3 days or as late as 70 days, but usually appear about 3 weeks after eating contaminated food.

Listeriosis can be particularly dangerous for pregnant women and their unborn babies. Foodborne illness caused by *Listeria* in pregnant women can result in premature delivery, miscarriage, fetal death, and severe illness or death of a newborn from the infection.

Foods Involved in Outbreaks

Listeria bacteria can be found in soil and ground water, on plants, and in the intestinal tracts of humans and animals. These bacteria can contaminate unpasteurized milk and cheeses, ice cream, raw vegetables, raw and cooked poultry, all raw meats, raw fish, prepared and cooled ready-to-eat foods, deli meats, luncheon meats, hot dogs, and certain soft cheeses such as feta, Brie, blue-veined cheese, and Mexican-style cheeses (for example: queso blanco fresco). *Listeria* bacteria can grow at refrigerated temperatures as low as 37.4 °F, as well as in damp environments.

Prevention

- Practice good personal hygiene.
- Follow procedures for avoiding cross-contamination.
- Cook all poultry, meat, and other foods to the required safe internal temperature and test with a food thermometer.



- Use only pasteurized milk, dairy products, or juices.
- Wash all fresh produce, which will be served whole, peeled, or cooked, in cold, running water.
- Clean and sanitize food contact surfaces.
- Keep equipment, food preparation surfaces, and facilities dry.

Perfringens (per-FRING-ens)

Bacteria: *Clostridium perfringens*

Severe abdominal cramping and diarrhea characterize *perfringens* foodborne illness. Usually there is no vomiting. The symptoms show up from 8 to 24 hours after eating the contaminated food. They are typically over in 24 hours. The bacteria can be found in the intestinal tracts of humans and animals and can live in soil. These bacteria grow only in little or no oxygen.

Foods Involved in Outbreaks

Clostridium perfringens bacteria are called the cafeteria germs because many foodborne outbreaks result from food left for long periods on steam tables at improper temperatures or at room temperatures. Foods usually associated with this kind of foodborne illness are cooked meat and poultry, gravy, and beans. The bacteria grow when contaminated foods are not cooked to the right temperature or are not cooled properly. Cooking to required internal temperatures destroys bacteria, but some toxin-producing spores may survive.

Prevention

- Practice good personal hygiene.
- Follow procedures for avoiding cross-contamination.



- Cook all poultry, meat, and other foods to the required safe internal temperature and test with a food thermometer.
- Cool cooked hot foods from 135 °F to 70 °F within 2 hours and from 70 °F to 41 °F in an additional 4 hours for no more than a total cooling time of 6 hours. If the food has not reached 70 °F within 2 hours, it must be reheated immediately to 165 °F for 15 seconds.

Salmonellosis (SAL-mon-el-osis)

Bacteria: *Salmonella*

Symptoms of this foodborne illness can occur as early as 8 hours after eating a contaminated food or up to 72 hours later. Symptoms include stomach cramps, headache, nausea, chills, fever, diarrhea, and sometimes vomiting. For infants and seniors (older adults), severe dehydration may result. The illness usually lasts 1 to 2 days.

Foods Involved in Outbreaks

The *Salmonella* bacterium is found in a variety of foods that have been contaminated by soil, insects, and the intestinal wastes from domestic or wild animals and from humans. Foods most often associated with *Salmonella* bacteria include raw meats and poultry; eggs, milk, and dairy products; fish; shrimp; yeast; coconut; sauces and salad dressing; cake mixes; cream-filled desserts and toppings; dried gelatin; peanut butter; cocoa and chocolate; sliced fresh fruits and vegetables such as melons, strawberries, and tomatoes; raw sprouts; and other produce.

Prevention

- Practice good personal hygiene.
- Follow procedures for avoiding cross-contamination.



- Cook all poultry, meat, eggs, and other foods to the required safe internal temperature and test with a food thermometer.
- Cool cooked hot foods from 135 °F to 70 °F within 2 hours and from 70 °F to 41 °F in an additional 4 hours for no more than a total cooling time of 6 hours. If the food has not reached 70 °F within 2 hours, it must be reheated immediately to 165 °F for 15 seconds.

Shigellosis (bacillary dysentery) (SHIG-a-losis)

Bacteria: *Shigella*

These bacteria come from the human intestinal tract and are found in polluted water and are spread by flies and by food handlers with poor personal hygiene. Symptoms begin after 12 to 50 hours and last from a few days up to 2 weeks. Symptoms include abdominal pain, diarrhea containing blood and mucus, fever, nausea, vomiting, chills, fatigue, and dehydration.

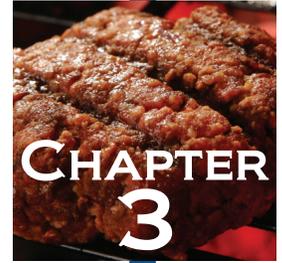
Foods Involved in Outbreaks

The foods most often involved in outbreaks include meat salads, potato and pasta salads, lettuce and other raw vegetables, milk and dairy products, and moist and mixed foods.

Prevention

- Practice good personal hygiene.
- Follow procedures for avoiding cross-contamination.
- Use water from approved sources.
- Control flies.
- Cool cooked hot foods from 135 °F to 70 °F within 2 hours and from 70 °F to 41 °F in an additional 4 hours for no more than a total cooling time of 6 hours. If the food has not reached 70 °F within 2 hours, it must be reheated immediately to 165 °F for 15 seconds.

Staphylococcus (STAFF-y-lo-COC-us)



Bacteria: *Staphylococcus aureus*

Staphylococcus aureus produces an enterotoxin (or toxin) that can cause foodborne illness. A **toxin** is a poisonous substance produced by a living organism such as bacteria. Symptoms of staphylococcal foodborne illness begin soon after eating the contaminated food and include nausea, vomiting, stomach cramping, and exhaustion. Victims usually recover in 2 or 3 days.

Foods Involved in Outbreaks

Humans and animals are the main carriers of these bacteria. In fact, it is estimated that half or more of all healthy people have “staph” bacteria present on their skin and hair and in their nose and throat. Food handlers are usually the main source of food contamination with these bacteria. Foods that are most often associated with outbreaks include leftovers, meat and poultry, eggs and products containing eggs, milk and dairy products, meat salads and potato salad, salad dressings, and sandwich fillings.

Prevention:

- Practice good personal hygiene.
- Follow procedures for avoiding cross-contamination.
- Cover a burn, cut, or wound with a waterproof bandage and wear single-use disposable gloves while preparing and serving food.
- Cook all poultry, meat, and other foods to the required safe internal temperature and test with a food thermometer.
- Refrigerate food at 41 °F or below.
- Cool cooked hot foods from 135 °F to 70 °F within 2 hours and from 70 °F to 41 °F in an additional 4 hours for no more than a total cooling time of 6 hours. If the food has not reached 70 °F within 2 hours, it must be reheated immediately to 165 °F for 15 seconds.



What are the major foodborne illnesses caused by viruses, and how can they be prevented?

Viruses are another type of pathogen that can contaminate food and beverages. Unlike bacteria, viruses cannot reproduce outside a living organism because they are not complete cells. Therefore, they do not multiply in food but may be transported on food, food surfaces, and utensils. Once inside a human host, they can reproduce and cause foodborne illness.



Viral outbreaks are most commonly associated with poor personal hygiene or a contaminated water supply. However, they can also be food-related. For example, eating raw or undercooked shellfish such as oysters, mussels, and clams that have been harvested from polluted water may cause viral foodborne illnesses. As a result, seafood should always be purchased from vendors with approved health-inspected facilities.

Prevention of viral contamination includes good personal hygiene, correct hand washing, good employee health (no fever and no diarrhea), and no bare-hand contact with ready-to-eat food.

Some common viruses and the foodborne illnesses they cause are described on the following pages.



Gastroenteritis from Noroviruses

Virus: Norwalk and Norwalk-Like Viral Agents

These viruses cause a foodborne illness with symptoms of nausea, vomiting, diarrhea, abdominal pain, headache, and mild fever. These viruses come from the human intestinal tract and are transmitted through water or food. Only the common cold is reported more frequently than viral stomach upset. The symptoms begin from 1 to 2 days after the contaminated food or water is eaten. They last for 1 to 3 days.

Foods Involved in Outbreaks

Contaminated drinking water and shellfish are sources of these viruses as is shellfish from contaminated water. Other foods that can be contaminated, often by dirty hands, include raw vegetables, fresh fruits, and salads.

Prevention

- Practice good personal hygiene.
- Follow procedures for avoiding cross-contamination.
- Wash all fresh produce, which will be served whole, peeled, or cooked, in cold, running water.
- Use water from approved sources.
- Obtain shellfish from approved health-inspected sources and cook thoroughly.
- Cook all foods to required safe internal temperatures and test with a food thermometer.



Hepatitis A (HEP-a-tie-tus)

Virus: *Hepatovirus* or Hepatitis A virus

This virus is found in the human intestinal tract and urinary tract and also in contaminated water. The symptoms begin with a fever and also include fatigue, headache, nausea, loss of appetite, vomiting, stomach pain, and later jaundice (yellow skin and eyes). Symptoms may be seen 10 days to almost 2 months after the contaminated food or water is consumed.

Foods Involved in Outbreaks

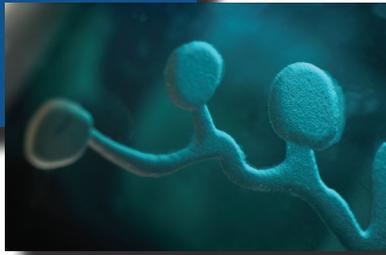
Foods involved in Hepatitis A outbreaks have usually been contaminated by food handlers, either in processing plants or foodservice facilities. Water, ice, and most foods can be contaminated. Foods that are of particular concern are those that will not receive further cooking such as deli meats, sandwiches, fruit and fruit juices, milk and dairy products, raw fruits and vegetables, and salads.

Prevention

- Practice good personal hygiene.
- Follow procedures for avoiding cross-contamination.
- Wash all fresh produce, which will be served whole, peeled, or cooked, in cold, running water.
- Use water from approved sources.
- Cook all foods to the required safe internal temperature and test with a food thermometer.



What are the major foodborne illnesses caused by fungi, and how can they be prevented?



Yeasts, molds, mildew, and mushrooms are all types of fungi found naturally throughout the environment. The two kinds of fungi that typically cause spoilage in a foodservice operation are molds and yeasts.

Bacteria and viruses can cause foodborne illness before food spoilage is evident. Molds and yeasts actually cause food spoilage.

Molds

Although individual mold cells are microscopic, they grow quickly and soon become visible to the naked eye. Molds spoil food, causing discoloration, and an unpleasant smell and taste. Most people have seen mold on bread and on cheese.

Molds can grow on almost any food in any condition—moist, dry, acidic, non-acidic, salty, sweet, cold, and warm. A few cheeses, such as Brie, are processed to have a natural and safe mold coating. Examples of foods that are susceptible to mold include fruits, vegetables, meats, cheeses, and breads.

Toxins can be dangerous.

Certain molds can be dangerous to humans. They produce toxins, some of which have been linked to cancer in animals and to rare, isolated incidents of foodborne illness. Other molds can cause serious infection and allergies. Aflatoxin, which is produced by two specific molds, can cause liver disease.



Discard molded food.

Discard any food with visible mold unless the mold is a natural part of the food such as Brie, Camembert, Gorgonzola, or bleu cheese.

Although the cells and spores of molds can be killed by heating foods to 140 °F for 10 minutes, the *toxins are heat stable* and are not destroyed.

Yeasts

Jellies, honey, syrup, and fruit juices often harbor sugar-loving yeasts. While there is no evidence that yeasts found in food cause illness, they do spoil food, as evidenced by bubbles and an alcoholic smell or taste. Any food that has an unnatural color or smell should be discarded.

What are the major foodborne illnesses caused by parasites, and how can they be prevented?

A parasite is a living organism that depends on nutrients from a living host to complete its life cycle. Ranging in size from tiny, single-celled organisms to worms visible to the naked eye, parasites are more and more frequently being identified as causes of foodborne illness in the United States. Parasites can live in many animals that are used for human food including pigs and hogs, cattle, poultry, and fish. Parasites can be transmitted from animals to humans, from humans to humans, or from humans to animals. The illnesses they can cause range from mild discomfort to debilitating illness and possibly death.

This section describes three foodborne illnesses caused by parasites. Information on other common parasites can be obtained from USDA's Meat and Poultry Hotline (800-535-4555).



Cyclosporiasis (SIGH-clo-SPOR-UH-sis)

Parasite: *Cyclospora cayetanensis*

This tiny parasite is responsible for an increasing number of foodborne illnesses. Symptoms include watery diarrhea, stomach cramps, nausea, vomiting, muscle aches, low-grade fever, and fatigue. Some cases are without symptoms. The symptoms appear about 7 days after the parasite has been ingested and can last from 7 to 30 days.

Foods Involved in Outbreaks

The parasite may be in contaminated water, or it may be in or on anything that has touched the stool of a person or animal with cyclosporiasis. In recent years, outbreaks have involved berries from outside the United States, mixed lettuce products, and fresh herbs.

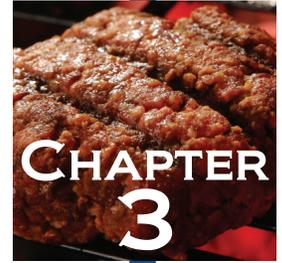
Prevention

- Practice good personal hygiene.
- Follow procedures for avoiding cross-contamination.
- Wash all fresh produce, which will be served whole, peeled, or cooked, in cold, running water.
- Use water from approved sources.
- Purchase food from reputable sources.

Giardiasis (GEE-are-DYE-uh-sis)

Parasite: *Giardia duodenalis*

This microscopic parasite is found all over the world and can live in the intestines of animals and people. It is most frequently associated with waterborne illness but can cause foodborne illness. Symptoms



include diarrhea, stomach cramps, and nausea. The symptoms appear from about 1 to 2 weeks after the parasite has been ingested and can last from 4 to 6 weeks. Sometimes there are no symptoms.

Foods Involved in Outbreaks

The parasite may be in contaminated water, or it may be in or on anything that has touched the stool of a person or animal with giardiasis. Adults and children in daycare centers are at risk.

Prevention

- Practice good personal hygiene.
- Use only pasteurized milk, dairy products, and juices.
- Wash all fresh produce, which will be served whole, peeled, or cooked, in cold, running water.
- Use water from approved sources.

Trichinosis (TRICK-a-NO-sis)

Parasite: *Trichinella spiralis*

This parasite looks like a small, hairy, round worm. People contract trichinosis by eating undercooked pork or game that is infested with *Trichinella* larvae. Fortunately, there has been much progress in reducing *Trichinella* in grain-fed hogs. As a result, human cases of trichinosis are now on the decline, but it is still important to take precautions. Symptoms of trichinosis include nausea, vomiting, fever, and abdominal pain, followed by headaches, eye swelling, aching joints and muscles, weakness, and itchy skin. The symptoms appear anywhere from 2 to 28 days after eating infected meat. Later symptoms may develop to include sore muscles, a fever, or a rash.



Foods Involved in Outbreaks

Foods that could contain *Trichinella* larvae include undercooked pork and pork sausages. Ground meats could be contaminated through meat grinders that have been used to grind contaminated pork.

Prevention

- Cook all meat to the required safe internal temperature and test with a food thermometer.
- Prevent cross-contamination by washing and sanitizing equipment used in preparation of raw pork products, such as meat grinders and slicers.

How do microorganisms grow?

Stages of Growth

Time	0 min	20 min	40 min	1 hour	1 hr 20 min	10 hr
# cells	1 cell ●	2 cells ●●	4 cells ●●●●	8 cells ●●●●●●●●	16 cells ●●●●●●●●●●●●●●	1 billion cells

Bacteria are considered vegetative because they can grow and reproduce. Under certain conditions, they will reproduce very rapidly. In fact, in an environment that is ideal for growth, a single bacterial cell can turn into *billions* in only 10 to 12 hours!

Certain vegetative bacteria protect themselves by producing a thick-walled spore within the bacterial cell. A spore can become dormant and survive unfavorable environmental conditions such as boiling water, freezing temperatures, and some sanitizing solutions.

Given warmth, moisture, and a little food, bacterial spores may become vegetative and reproduce very easily. The vegetative cell simply enlarges and splits in two; these *offspring* then divide to create two more bacteria, and so on. This type of reproduction results in extremely rapid population growth.



When bacteria multiply, growth happens in 4 phases.

PHASE 1: Lag Phase

When a food is contaminated with bacteria, the bacteria take some time to adjust. They do not grow much but get ready to grow. When the bacteria's requirements for growth are minimized, they remain in the lag phase and rapid growth is prevented.

PHASE 2: Log Phase

When the bacteria's growth requirements are met, they can multiply rapidly by splitting in two. Bacteria in the log phase can double their number every 20 minutes. During this phase, a contaminated food becomes unsafe to eat. Bacteria continue to grow until the conditions they need deteriorate.

For most harmful microorganisms, the number of bacteria needed to cause a foodborne illness is very small.

PHASE 3: Stationary Phase

If bacteria continue to grow, they reach a phase where the conditions are no longer favorable, and they begin to die. When some bacteria are still growing but the same numbers are dying, the bacteria are in the stationary phase.

PHASE 4: Death Phase

This last phase means that more bacteria are dying than are growing.



Heat Kills Bacteria

- Heating foods to recommended safe internal temperatures kills vegetative bacteria and parasites. However, some bacteria can change into a different form called a spore.
- The spore forms a thick wall around the bacteria for protection. The bacteria can then survive conditions such as high or low temperatures, low moisture, and high acidity.
- A spore cannot grow, but when conditions are right again, the spore returns to the vegetative state and begins to grow.
- This explains why it is so important to cook foods to the right temperatures, cool them rapidly to 41 °F or below, and then reheat them to safe temperatures.

Because food handlers never know when a food has been contaminated with harmful microorganisms, the safe way to handle all foods means controlling the conditions needed for the growth of microorganisms.

Control Conditions to Prevent the Growth of Foodborne Microorganisms

Certain conditions affect the growth and reproduction of microorganisms. Except for viruses, all foodborne microorganisms need food, the right amount of acidity, appropriate temperature, time to grow, and water. Some bacteria need oxygen and others thrive without oxygen.

Condition for Growth: Food

How Food Contributes to Growth of Bacteria

Bacteria feed on protein and carbohydrates. Food that contains these ingredients can support growth of foodborne bacteria.

The *Food Code* defines potentially hazardous food as one that is



natural or synthetic and that requires temperature control because it is in a form capable of supporting the

- rapid and progressive growth of harmful microorganisms,
- growth and toxin production of *Clostridium botulinum*, or
- growth of *Salmonella enteritidis* in raw shell eggs.

Potentially hazardous foods include

- animal foods that are raw or heat-treated,
- plant foods that are heat-treated,
- raw seed sprouts,
- cut leafy greens,
- cut melons, and
- garlic-in-oil mixtures that are not modified to prevent the growth of harmful microorganisms.



These groups of food have the potential for contamination because of the way they are produced or processed. They have certain characteristics in common that allow harmful microorganisms to grow. Potentially hazardous foods are usually moist, high in protein, and/or are chemically neutral or slightly acidic.

Everyone should be aware of the potentially hazardous foods that are included on menus.

- All animal products are potentially hazardous (meat, poultry, fish, shellfish, eggs and egg products, milk and milk products).



- Vegetables and plant products may also be hazardous even after they are cooked. This is because cooking destroys protective barriers in plants and converts proteins and carbohydrates into a form more usable by microorganisms. This makes vegetables and plant products, such as potatoes, tofu, beans, winter squash, pasta, stuffed pasta, and rice potentially hazardous once they are cooked.
- Shelf-stable foods are potentially hazardous once removed from their containers.
- If not washed, raw fruits and vegetables may be potentially hazardous (onions, melons, apples, cut leafy greens).
- It is best practice to avoid serving raw seed sprouts and garlic-in-oil mixtures in child nutrition programs.

How to Control the Growth of Bacteria in Food

- Purchase certified, inspected foods from certified, inspected vendors.
- Avoid cross-contamination of a food.
- Cook food to the required safe internal temperature and test with a food thermometer.

Be aware that most any food can be contaminated with harmful microorganisms and has the potential for causing a foodborne illness. Use safe food handling practices for all foods, not just the foods listed as potentially hazardous.

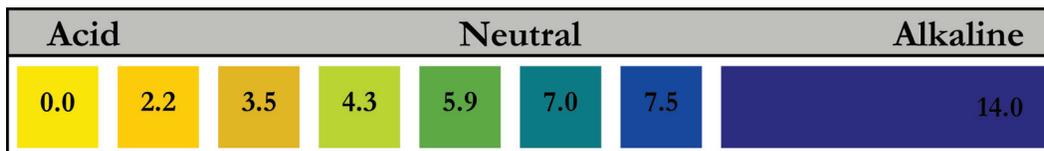


Condition for Growth: Acidity

The indicator known as “pH” indicates the level of acidity or alkalinity of a food or other substance. The pH scale ranges from 0.0 to 14.0, with 7.0 being neutral. A pH less than 7.0 is acidic and a pH of more than 7.0 is alkaline. Distilled water has a neutral pH of 7.0.

How Acidity Contributes to Growth of Bacteria

Bacteria grow best in foods that are neutral or slightly acidic, in the pH range of 4.6 to 7.5. The pH value of meats and many other foods is optimal for bacterial growth. The scale below shows some typical pH values for common foods, but the values are not exact for any one specific food.



If the pH is:

Below 4.6	Bacteria will not grow well.
Between 4.6 and 7.0	Bacteria will thrive.
Between 7.0 and 9.0	Bacteria may survive.

Highly acidic foods, such as vinegar and the flesh of most fresh fruits, inhibit bacterial growth. However, *E. coli* O157:H7 can grow in unpasteurized apple juice that has a pH value of around 4.0.

Although commercially prepared mayonnaise has a pH below 4.6, adding it to a meat salad will not inhibit bacterial growth. The meat will increase the pH of the salad to a level where bacteria can multiply.



How to Control Acidity to Control Growth of Bacteria

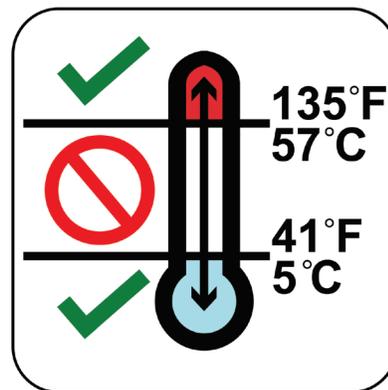
Some food preparation techniques reduce the risk of bacterial growth by making the recipe more acidic. Examples of such techniques include using salad dressing made with vinegar, oil, or garlic or marinating meat or poultry in a mixture including fruit juice or vinegar.

Condition for Growth: Temperature

How Temperature Contributes to Growth of Bacteria

Given a little time and a nice warm environment, bacteria multiply rapidly. The temperature range between 41 °F and 135 °F is known as the temperature danger zone.

Holding foods in the temperature danger zone is one of the primary causes of foodborne illness outbreaks. A few bacteria, such as *Listeria*, can grow and multiply between 32 °F and 45 °F, and some can survive at temperatures as low as 19 °F. For this reason, it is important to monitor the length of time a product is kept in refrigeration. Bacterial spores can survive very hot or very cold temperatures, and when the conditions are right, they can begin to grow again.



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How to Control Temperature to Control Growth of Bacteria

- Control the temperature of food during storing, preparing, holding, cooling, reheating, and serving.
- Check the internal temperature of a food with a food thermometer.
- Store foods at the recommended safe temperatures for dry storage, refrigerator, or freezer storage.



- Cook food to required internal temperature and test with a food thermometer.
- Keep foods out of the temperature danger zone, at or below 41 °F or at or below or above 135 °F.

Condition for Growth: Time

How Time Contributes to Growth of Bacteria

When a food has been contaminated with a microorganism, the bacteria need time to grow. The bacteria grow slowly at first, and then move into a very rapid growth period before the conditions become unfavorable and they begin to die. When a food is in the temperature danger zone, the clock is ticking because bacteria can grow. If allowed to thrive, one bacterium can become more than one million bacteria in just 4 hours.



How to Control Time to Control Growth of Bacteria

- Store received foods as quickly as possible to limit time in the temperature danger zone.
- Do not remove foods for preparation from refrigerator or freezer more than 20 minutes before they will be used.
- Prepare foods as close to the service time as possible.
- Check the temperature of holding cabinets to be sure they will maintain the internal temperature of hot foods at 135 °F or above.
- Cook food to the recommended safe internal temperature.

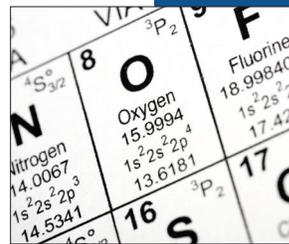


- Cool cooked hot food from 135 ° F to 70 °F within 2 hours and from 70 °F to 41 °F in an additional 4 hours for no more than a total cooling time of 6 hours. If the food has not reached 70 °F within 2 hours, it must be reheated immediately to 165 °F for 15 seconds.
- Mark the date for all foods stored in the refrigerator and freezer so the storage time can be monitored.
- Reheat leftover foods to an internal temperature of 165 °F for 15 seconds.

Condition for Growth: Oxygen

How Oxygen Contributes to Growth of Bacteria

Various microorganisms have different oxygen requirements for growth. Aerobic microorganisms *require* oxygen to grow. Anaerobic microorganisms can grow only when oxygen is *not* present. For example, anaerobic microorganisms, *Clostridium perfringens* and *Clostridium botulinum*, grow without oxygen.



Facultative microorganisms are those that can grow with or without oxygen. Most bacteria that cause foodborne illness are in this group.

How to Control Oxygen to Control Growth of Bacteria

- Although the oxygen requirement is different for various microorganisms, there is no way to control this condition. Rather, it is important to control all the other conditions using the suggestions provided.



- Because *Clostridium perfringens* and *Clostridium botulinum* need an environment without oxygen, it is important to cool foods quickly in shallow pans. In this instance, by using the time-temperature relationship principle, you can control the growth if the food has been contaminated.

Condition for Growth: Moisture

How Moisture Contributes to Growth of Bacteria

Bacteria need water for growth. Because they cannot take in solids, bacteria get their nutrients from water solutions. Most fresh foods contain the ideal amount of water for bacterial growth.



Sugar products, cereal products, dried fruits, jams, and jellies have low moisture levels and are, therefore, resistant to bacteria.

How to Control Moisture to Control Growth of Bacteria

Lower the amount of moisture in food through freezing, dehydrating, adding sugar or salt, or cooking. Remember, bacteria remain alive and can become potentially hazardous when moisture is added in cooking. For example, dry foods such as beans, pasta, and rice become vulnerable to bacteria when cooked.

By controlling the conditions necessary for growth, it is possible to prevent foodborne illness even when harmful microorganisms have contaminated a food.

Summary

CHAPTER 3: Basic Facts About Microorganisms describes the major foodborne illness caused by bacteria, viruses, fungi, and parasites. Because harmful microorganisms are responsible for most cases of foodborne illness, it is important for foodservice personnel to be familiar with how microorganisms contaminate food, grow, and reproduce.

Bacteria are the microorganisms of greatest concern in a foodservice. Controlling the conditions they need to grow can control the growth of bacteria: food, acidity, time, temperature, oxygen, and moisture.



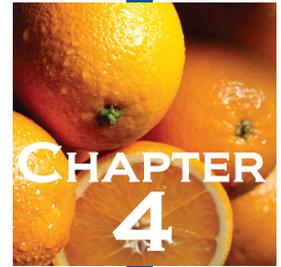
CHECK YOUR KNOWLEDGE

GROWTH OF HARMFUL MICROORGANISMS

Directions: This is a self-assessment for you to determine your own level of knowledge. Place the letter of the one best answer for each item in the box provided.

1. A pathogen is
- A harmful microorganism
 - Any microorganism
 - Always a harmful bacteria
 - All of the above
2. The one way to be sure that bacteria are killed is to
- Cook at low temperature for a long period of time
 - Keep the food out of the danger zone
 - Freeze the food for four hours
 - Heat to the required safe temperature for the required time
3. The conditions that favor the growth of most foodborne microorganisms (excluding viruses) are
- Food, acidity, temperature, time, oxygen, moisture
 - Food, time, and temperature
 - Food and temperature
 - Food, temperature, and moisture
4. Which of the foods listed below would not be considered a potentially hazardous food?
- Lemon
 - Sliced melon
 - Baked potato
 - Cooked rice
5. Bacteria grow best at what pH level?
- Very alkaline
 - Very acidic
 - Neutral to slightly acidic
 - Water
6. A food is in the temperature danger zone when the internal temperature is between
- 165 °F to 212 °F
 - 41 °F to 135 °F
 - 65 °F to 165 °F
 - 0 °F to 40 °F
7. When cooling a hot food from 135 °F down to 41 °F, it must be reheated immediately to 165 °F for 15 seconds if it has not reached 70 °F within
- 1 hour
 - 2 hours
 - 4 hours
 - 6 hours
8. Which of the following foods would be most likely to support bacterial growth if contaminated?
- Dry rice
 - Cooked rice
 - Fresh fruit
 - Bread
9. All of the following behaviors would help prevent foodborne illness except
- Washing hands
 - Avoiding jewelry except a plain ring, such as a wedding band
 - Wearing closed toe shoes
 - Using single-use gloves correctly
10. Four types of pathogens that cause foodborne illness include
- Bacteria, viruses, fungi, and parasites
 - Viruses, fungi, bone chips, larvae
 - Bacteria, viruses, fungi, insecticide
 - All of the above

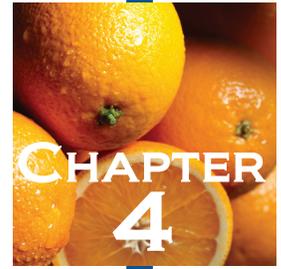
ANSWERS: 1-a; 2-d; 3-a; 4-a; 5-c; 6-b; 7-b; 8-b; 9-c; 10-a



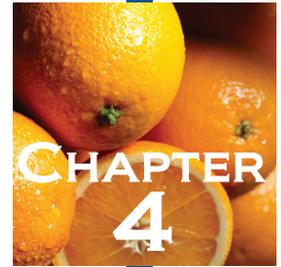
A CLEAN AND SANITARY FOODSERVICE FACILITY

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A CLEAN AND SANITARY FOODSERVICE FACILITY

How can food safety be promoted through personal hygiene and work attire?

Every person who works in the foodservice facility is responsible for having good personal hygiene and clean work attire. This is important for the manager, cooks, servers, dishwashers, and cashiers. Full-time and part-time employees are equally responsible for food safety. In fact, food safety begins with each person.

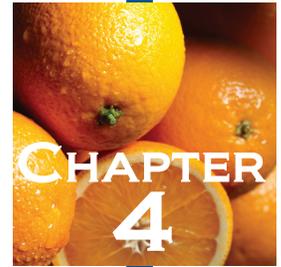


Know Why Personal Hygiene and Work Attire Are Important

Bacteria are present on and in human bodies—hands, hair, throat, and intestines. They are also on clothing and on common items that are handled regularly, such as money, pens, and pencils. The simple act of patting one’s hair or rubbing one’s ear can contaminate hands with *staphylococci* bacteria. If not washed, hands can contaminate a food and cause foodborne illness. Anyone can contaminate food with a harmful microorganism and not even know it! The personal hygiene, attire, and general health habits of foodservice employees play a crucial role in keeping harmful microorganisms away from the food.

A foodservice employee’s hands can contaminate food

- after touching anything that could contaminate hands;
- by being sick with a stomach or intestinal illness that includes vomiting and/or diarrhea or other symptoms;



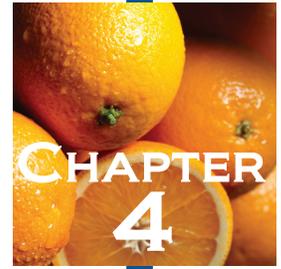
- after caring for a person with a stomach or intestinal illness;
- by having an uncovered infected burn, wound, or other injury;
- when taking prescribed or over-the-counter medicines (the medicine can get into the food or on hands).

A person who feels completely healthy may be the host of a harmful microorganism and not know it. Some foodborne illnesses do not cause symptoms until the most infectious stage has passed (Hepatitis A). Some harmful organisms remain in a person's body after the symptoms have disappeared (*Salmonella* bacteria).

Use Guidelines for Good Personal Hygiene

Food handlers must have the highest standards of personal hygiene because they have the potential of making many people sick when their standards are lowered.

- Wash hands properly, frequently, and at appropriate times.
- Keep fingernails trimmed, filed, and maintained so the edges and surfaces are cleanable and not rough. Best practice is not to wear fingernail polish or artificial fingernails.
- Keep hair and body clean. Bathe every day.
- Wash hands before putting on single-use gloves. Change gloves frequently.
- Avoid bare-hand contact with ready-to-eat food.
- Maintain good health.
- Treat and bandage wounds and sores. When hands are bandaged, single-use gloves must be worn at all times to protect the bandage and to keep it from falling into food.
- When feeling ill, alert the foodservice manager and avoid working with food.



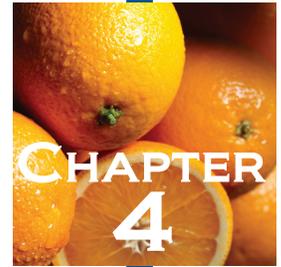
Washing hands correctly and frequently is one of the most important ways that foodservice employees can promote food safety. For details on when and how to wash hands correctly, see Chapter 2.

Dress for Food Safety Success

An important part of good personal hygiene is clean and appropriate dress. Every foodservice employee should wear a uniform made of a material that can withstand hot water during laundering.

It is important to

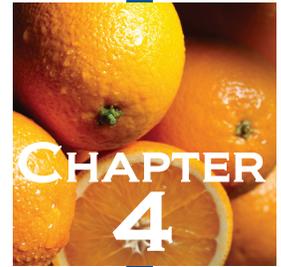
- wear a clean, appropriate uniform every day. Change uniforms as often as necessary to prevent bacteria on soiled clothing from spreading to the hands and then to food.
- wear a clean apron when preparing food and take it off when leaving the food preparation area. An apron should be removed to go on break, eat lunch, smoke, or use the restroom.
- change an apron if it becomes soiled.
- avoid wearing jewelry other than a plain ring, such as a wedding band, when preparing or serving food. For the use of medical information jewelry, follow the recommendations from the state or local public health department.
- wear a hair restraint to keep hair and particles in the hair from falling into food.
- wear comfortable, low-heeled, closed-toe shoes with soles that prevent slipping.



Use Common Sense as a Guide When Working With Food

- Know when and how to wash hands. Avoid using a food preparation sink or a three compartment sink to wash hands.
- Taste food the correct way. Place a small amount of food from the food container into a small bowl. Step away from the food container. Taste the food with a teaspoon. Remove the used bowl and teaspoon to the dish room. Never reuse a bowl or spoon already used for tasting. Wash hands immediately after tasting.
- Never taste a food that includes a raw ingredient of animal origin. For example, never taste cookie dough that includes raw eggs.
- Follow the foodservice rules for when to eat, smoke, use tobacco, or chew gum. Do not eat, smoke, use tobacco, or chew gum when preparing foods.
- When feeling ill, alert the foodservice manager and avoid working with food.
- Do not work with food when experiencing nausea, vomiting, diarrhea, fever, sore throat, or jaundice (yellow skin and eyes), or after caring for someone at home with those symptoms.
- Do not work with food after being diagnosed with a foodborne illness until no longer contagious.

The manager should not allow foodservice employees to work with or around food if they have any of the following symptoms: fever; diarrhea; vomiting; sore throat; jaundice (yellow skin and eyes); or persistent sneezing, coughing, or runny nose. The *Food Code* explains that the foodservice manager must exclude from the establishment any foodservice employee who has been diagnosed with illness due to *Salmonella* Typhi, *Shigella* spp., Shiga toxin-producing *E. coli*, or Hepatitis A virus, and must notify the local regulatory agency. Employees may return when they are no longer contagious. Follow state and local regulations regarding when employees may return to work.



How can a food-safe facility be operated?

A food-safe foodservice begins with a facility that is clean and in good repair. The entire facility, including both work areas and equipment, should be designed for easy cleaning and maintenance.

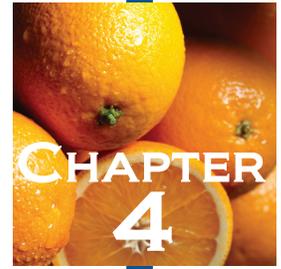
It is important to eliminate hard-to-clean work areas and faulty or overloaded refrigerators or other equipment. Also, get rid of dirty surroundings and any conditions that will attract bugs or other pests. Remember, the easier the workplace is to clean, the more likely it will stay that way.

Know the Characteristics of a Food-Safe Facility

Food-safe facilities are designed for easy cleaning and maintenance. The workflow prevents clean and soiled items from crossing paths during food production and service.

- Floors, walls, and ceilings are free of dirt, litter, and moisture.
- The service line and serving stations are clean and neat.
- Exhaust fans and hoods are clean and operating properly.
- All types of storage areas, such as the dry storage room, the refrigerators, and the freezers, are in excellent condition. There is **no** damage or spoilage, **no** broken or torn packages, and **no** bulging or leaking cans. Floors are clean, dry, and uncluttered.
- Cleaning supplies and chemicals are stored away from food supply areas. Measuring utensils used for chemicals are stored with the chemical and are never used with or near food.
- Restrooms are convenient, clean, adequately stocked with soap and paper towels, and have warm running water.





- Garbage is kept away from food preparation areas.
- Garbage containers are leak-proof, waterproof, pest-proof, durable, easy to clean and sanitize, and have tight-fitting lids.
- Spills are cleaned immediately.
- Garbage is disposed of properly and promptly.
- There is no evidence of infestation from bugs or other pests.

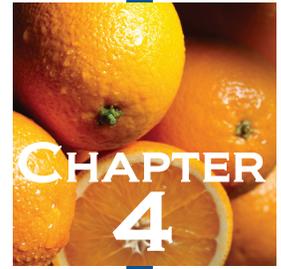
A food-safe facility has scheduled procedures for cleaning and maintaining

- floors, walls, and ceilings;
- service lines and dispensers;
- ventilation;
- restrooms;
- trash collection areas; and
- pest control.

Maintain Clean Floors, Walls, and Ceilings

Establish routine cleaning procedures for walls, floors, and ceilings. The facility should be free of dirt, litter, and moisture. Corners and hard-to-reach places should also be cleaned routinely.

- Clean walls around food preparation and cooking areas daily with a cleaning solution or by spraying with a pressure nozzle.
- Sweep or vacuum floors daily, then clean them using a spray method or by mopping. Mark the area being cleaned with signs or safety cones to prevent an accident. Avoid creating dust or water splashes during food preparation times. Set aside a routine cleaning time after the main hours of food preparation. Spills should be cleaned immediately.



- Swab ceilings, instead of spraying them, to avoid soaking lights and ceiling fans. Clean light fixtures with a sponge or cloth. Establish a routine cleaning schedule based on the needs of the foodservice.

Maintain a Clean and Sanitary Service Line and Serving Stations

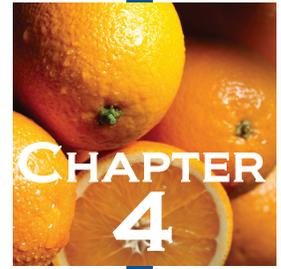
Establish a routine daily cleaning schedule for the service lines and serving stations.

- Assign an employee to set up and maintain each service line or serving station for each meal service.
- Clean and sanitize the hot and cold wells of the service line after every meal.
- Clean and sanitize dispensers, such as beverage dispensers or coffee machines after every use. Follow equipment cleaning guidelines.
- Clean and sanitize milk coolers. Follow equipment cleaning guidelines.
- Clean up spills immediately.

Maintain Good Ventilation



Good ventilation is a critical factor in maintaining a clean foodservice environment. Ventilation removes steam, smoke, grease, and heat from food preparation areas and equipment, helps maintain indoor air quality, and reduces the possibility of fires from accumulated grease.



Good ventilation eliminates condensation and other airborne contaminants. It also reduces

- the accumulation of dirt in the food preparation area;
- odors, gases, and fumes; and
- mold growth by reducing humidity.

To promote good ventilation, be sure to

- use exhaust fans to remove odors and smoke;
- use hoods over cooking areas and dishwashing equipment;
- check exhaust fans and hoods regularly to make sure they are clean and operating properly;
- clean hood filters routinely according to the instructions provided by the hood manufacturer.

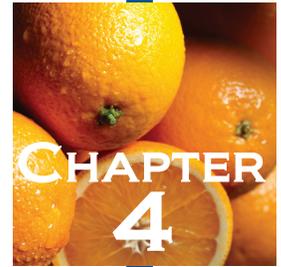
Maintain Clean Employee Restrooms

Restrooms should be convenient, sanitary, and adequately stocked with the following:

- warm water at 100 °F for hand washing,
- liquid soap,
- nail brush (follow state and local public health department recommendations),
- disposable paper towels and/or air blowers,
- toilet paper, and
- covered trash container that opens with a foot pedal.



Clean restrooms daily and keep the doors closed. Remove trash daily.



Maintain Clean and Neat Trash Collection Areas

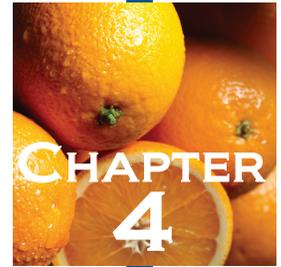
- Garbage must be kept away from food preparation areas. It should not be allowed to accumulate anywhere except in designated garbage storage areas.
- Garbage containers must be leak-proof, waterproof, pest-proof, durable, and easy to clean and sanitize.
- Garbage containers should be cleaned and sanitized frequently and thoroughly, inside and out.
- Trash receptacles should be emptied often so garbage does not overflow from containers.

Maintain an Effective Pest Control Program

Cleanliness and good maintenance are keys to preventing pest infestation. By nature, the foodservice environment is prone to problems with bugs and other pests. Pests may be brought in when food and other supplies are delivered. They may also enter the building through gaps in floors or walls. Prevention is critical in pest control.

- Have an ongoing pest prevention program and regular pest control by a licensed pest control operator. This is best practice for every institutional foodservice operation.
- Keep pests out by doing the following:
 - Fill openings or cracks in walls and floors with putty, plastic wood, or a similar product.
 - Fill openings around pipes or equipment fittings.
 - Screen all windows, doors, and outer openings. Keep them in good repair.
 - Use self-closing doors that open outward.
 - Inspect food supplies before storing or using them.





- Keep food in labeled containers approved for food storage. These containers should have tight-fitting lids.
- Do not store food or containers directly on the floor.
- Remove and destroy any food that is infested.
- Maintain proper temperatures in storage areas.
- Clean grease traps regularly to prevent a grease build-up that could cause a drain blockage. Drain blockage could lead to overflow which causes an unpleasant odor, contamination, and attracts pests.
- Install an air door at foodservice entrances to prevent bugs from flying in.

In the event of infestation, the foodservice manager should alert a licensed pest control operator so immediate steps can be taken to eliminate the pests.

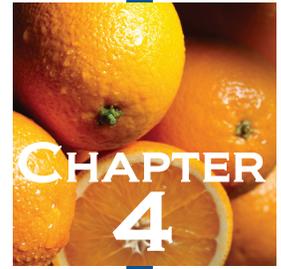
What kinds of pests are seen most often in a foodservice facility?

In a foodservice environment, the three most common pests are cockroaches, flies, and rodents.

Cockroaches live and breed in holes, damp places, behind boxes, in seams of bags, and in folds of paper. They like any place that is dark, warm, moist, and hard to clean.

Cockroaches' hairy legs are full of debris and disease-causing organisms such as bacteria, fungi, parasite eggs, and viruses. One female cockroach produces *millions* of offspring in her lifetime.

Since cockroaches generally search for food at night, seeing one in the daytime is a sign of a major infestation.



Other signs of infestation include

- a strong, oily odor;
- feces that look like large grains of pepper; and
- brown, dark brown, dark red, or black capsule-shaped egg cases.

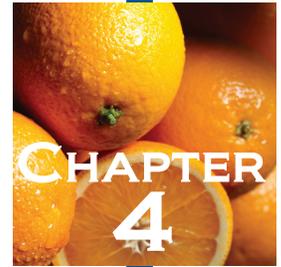
Flies feed on human and animal wastes and garbage and can transport a wide range of foodborne illnesses. They can enter a building through holes the size of a pinhead and can contaminate food with their mouth, footpads, hair, or feces. One female can produce thousands of offspring in one breeding season.

Flies are attracted to places protected from the wind and to edges such as garbage can rims. They lay their eggs in warm decaying material protected from sunlight and are fond of human waste areas. In warm summer weather, flies can mature from larvae to adults in only 6 days.

Rodents carry many disease-causing organisms and parasites. In fact, one fecal dropping from a rat can contain *several million* bacteria. When rodents leave feces, urine, and other filth on food products and around the facility, these organisms can be easily transmitted to people.

Rodents are prolific breeders, producing as many as 50 offspring in a span of 1 year. They tend to hide during the day, but can be spotted by telltale signs. These signs include the following:

- droppings;
- gnawing;
- tracks on dusty surfaces;
- nesting materials; and
- holes in baseboards, wall board, and in other wood.



How should smallware be cleaned and sanitized?

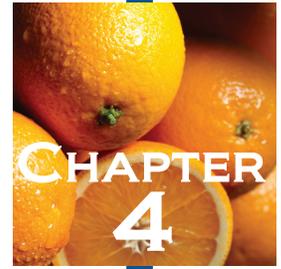
Smallware is a collective term used to include dishes, flatware, preparation and serving utensils, measuring devices, cooking pots and pans, and other small equipment that can be moved to the three-compartment sink or dishwasher for cleaning and sanitizing. Follow state and local public health department regulations on how to clean and sanitize smallware. The information below is for general guidance.

All surfaces that come in contact with food must be cleaned and sanitized. To **clean** a surface means to remove visible food particles—what can be seen on the surface. To **sanitize** a surface means to use either a chemical or heat to reduce the number of microorganisms or other contaminants to a level that is not harmful. The first step is cleaning; the second step is sanitizing.



USE A SANITIZER TEST KIT

A test kit designed for a specific sanitizer should be used to check the concentration of the sanitizing solution. A foodservice supplier who sells sanitizers may also have the test kits for each type of sanitizer. Mix, use, and test the sanitizing solution as recommended by the state and local public health department. Refer to the manufacturer's directions for specific mixing, storing, and first-aid instructions. When a sanitizing solution is exposed to air, detergent, and food particles, the solution becomes less effective. Sanitizing solutions should be tested frequently.



Select from Two Methods of Sanitizing — Chemical or Heat

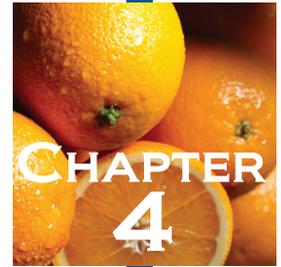
Chemical Sanitizing

Chemical sanitizing can be accomplished by immersing an object in, or wiping it down with, a sanitizing solution and allowing the solution to remain in contact with the surface for a specified amount of time. Use only EPA approved (Environmental Protection Agency) chemical sanitizers for food-contact surfaces. Household bleach can be used as a sanitizer only if the label indicates it is EPA registered.

Mix, test, and use the sanitizing solution as recommended by the state and local public health department. Refer to the manufacturer's directions for specific mixing, storing, and first-aid instructions.

The three most common chemical sanitizers are

- **Chlorine** – This sanitizer is the most commonly used and is the least expensive. It is effective in hard water, but is inactivated by hot water above 120 °F. Chlorine bleach solutions must be tested regularly and changed as necessary to ensure that the solution is working to sanitize. Using too much chlorine in a solution can pit stainless steel and aluminum surfaces, while using too little will not sanitize the surface.
- **Iodine** – Iodine is more expensive and less effective than chlorine. However, an iodine sanitizing solution is not as quickly deactivated by food particles as a chlorine solution.
- **Quaternary Ammonium Compounds (Quats)** – This sanitizer is not as quickly deactivated by food particles as a chlorine solution, is noncorrosive to metal surfaces, and nonirritating to skin. However, it leaves a film on surfaces and does not kill certain types of microorganisms.



Chlorine Sanitizing Solution for Equipment, Food-Contact Surfaces, and Utensils

Rule-of-thumb mixtures for chlorine sanitizing solutions

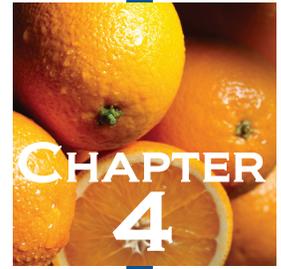
50 PPM solution for immersion 1 tablespoon (1/2 fluid ounce) 5% chlorine commercial bleach mixed with 4 gallons of water. The solution should be in contact with the surface to be sanitized for 7 seconds at temperatures between 75 °F and 115 °F. Be aware that very hot water may prevent chlorine bleach from sanitizing.

This sanitizing solution can be used to sanitize a food thermometer after every use. For details on using, cleaning, and sanitizing food thermometers see Chapter 2.

100 PPM solution for immersion 1 tablespoon (1/2 fluid ounce) 5% chlorine commercial bleach mixed with 2 gallons of water

200 PPM solution for immersion 1 tablespoon (1/2 fluid ounce) 5% chlorine commercial bleach mixed with 1 gallon of water

Use the manufacturer's label directions for specific information on mixing, storing, and first aid. Test with a test kit.



Heat Sanitizing

Heat sanitizing involves exposing equipment to high heat for an adequate length of time. This may be done manually by immersing equipment into water maintained at a temperature of 171 °F to 195 °F for at least 30 seconds. In a dishwashing machine, a good rule of thumb is to wash at 150 °F and rinse at 180 °F. But remember, temperature may vary depending on the type of machine used and requirements of the state and local public health department.

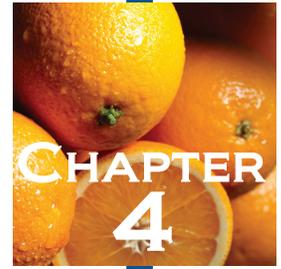
Thermometers and heat-sensitive tapes and labels are available for determining whether adequate sanitation temperatures have been achieved.

Sanitize Smallware in a Three-Compartment Sink

- To properly clean and sanitize smallware, the kitchen must have a sink with at least three separate compartments for manually cleaning, rinsing, and sanitizing, or a mechanical dishwasher that functions properly.
- There should be a separate area for scraping and rinsing food and debris into a garbage container or disposal before washing and a separate drain board for clean and soiled items.

TOOL 4: MANUALLY SANITIZE SMALLWARE IN A THREE-COMPARTMENT SINK

- Step 1** **Clean and sanitize sinks** that will be used for washing and sanitizing smallware.
-
- Step 2** **Scrape and rinse food** into garbage container or disposal. Pre-soak items, such as flatware, as necessary.
-
- Step 3** **In the first sink**, immerse and **wash** the smallware in a clean detergent solution at 110 °F or the temperature specified on the cleaning agent manufacturer's label directions. Use a brush or a cloth to loosen and remove any remaining visible food particles.
-
- Step 4** **In the second sink**, **rinse** the smallware using clear, clean hot water (110 °F) to remove all traces of food, debris, and detergent.
-
- Step 5** **In the third sink**, **sanitize**.
- CHEMICAL:** Immerse the clean items in a chemical sanitizing solution at the appropriate temperature for the correct amount of time. Be sure all surfaces of the clean items are covered with hot water or the sanitizing solution. Follow manufacturer's label directions for mixing the sanitizing solution and using the required contact time for sanitizing. Check the concentration of the chemical sanitizer at regular intervals using a test kit. Be aware that hot water deactivates some chemical sanitizers, so read and correctly follow the manufacturer's directions for using the chemical. Always read the Material Safety Data Sheet before using a chemical.
- OR**
- HEAT:** Immerse or spray rinse clean items in hot water at 171 °F to 195 °F for at least 30 seconds. Some state public health department codes require a temperature of 180 °F.
- If soapsuds disappear in the first compartment or remain in the second, the water temperature cools, or water in any compartment becomes dirty with food particles or cloudy from grease, empty the compartment and refill it.
-
- Step 6** **Air dry all items on a drain board.** Wiping can re-contaminate equipment and can remove the sanitizing solution from the surfaces before it has finished working.
-
- Step 7** **Store.** Make certain all smallware is dry in order to avoid retaining moisture that fosters bacterial growth.



Sanitize Smallware in a Mechanical Dishwasher

When sanitizing smallware (dishes, trays, flatware, glasses) in a dishwasher, follow the manufacturer's directions. Check the temperature of the water in the wash and rinse cycles.

The temperature may vary depending on the type of dishwashing machine used and requirements of the state and local public health department.

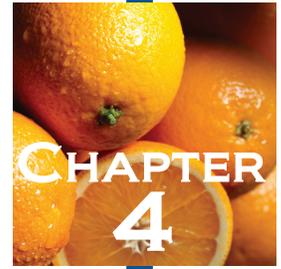
Check Dishwasher Temperatures

Although dishwashers have temperature gauges for each compartment, it is useful to confirm that the gauge is accurate using another type of thermometer. There are two types of thermometers that can be used to confirm the accuracy of dishwasher thermometer gauges.

- Waterproof maximum/minimum-registering thermometer
- Self-adhering temperature-sensitive label

A **waterproof maximum/minimum-registering thermometer** is a type of thermometer that is placed in a dish rack to go through the dishwasher cycle with soiled trays and flatware. It is set to register the highest temperature of the cycle to confirm that the required temperature is reached in a sanitizing rinse cycle.

Another tool for checking the temperature is a **self-adhering temperature-sensitive label**. This type of sensor attaches to the surface of a clean dish/tray and changes color to record the dishware surface temperature during dishwashing. Labels are available for various temperatures. For example, to determine whether the temperature in the final sanitizing rinse of a dishwasher reaches 180 °F, a single temperature 180 °F label could be attached to a clean tray to go through the cycle. When the temperature has been reached, the label changes color. The label can be removed from the tray at the end of the dishwasher cycle and placed in a log to document temperature.



Before using or purchasing either of these types of thermometers to confirm the temperature in a dishwasher, check with the state and local public health department on what is recommended. Be knowledgeable about the correct use of each thermometer to decide which one best meets the needs of the foodservice operation.

How should large equipment be cleaned and sanitized?

To keep large or in-place equipment free of harmful levels of bacteria or other contaminants, it is necessary to clean and sanitize all surfaces that will come into contact with food. This is especially important after any possible contamination such as slicing a deli meat on a slicer or mixing a meat salad in a mixer.

Wash, rinse, and sanitize tables, stoves, sinks, slicers, choppers, mixers, and large cooking utensils after each use. This rule also applies to equipment used to clean other food contact surfaces.

Scrub surfaces, such as cutting boards, with a detergent solution and a stiff-bristled nylon brush. Then rinse in clear, clean water and sanitizing solution after every use. For the use and care of wooden cutting boards, surfaces, or utensils, follow state and local public health department recommendations. Synthetic cutting boards can be sanitized in a three-compartment sink or in a dishwasher, depending on their size. Follow state and local public health department recommendations.

Use the Chemical Method to Sanitize Equipment

Immerse or wipe down with commercial sanitizer. Follow manufacturer's label directions for mixing and using the sanitizer. Use a test kit to test for correct concentration. Always read the Material Safety Data Sheet before using a chemical.

TOOL 5: SANITIZE IN-PLACE EQUIPMENT

Read and follow the manufacturer's directions for cleaning and sanitizing the piece of equipment. Follow the general steps described below.

- Step 1** **Unplug electrically powered equipment**, such as meat slicers and mixers.

- Step 2** **Remove loose food particles** and scraps.

- Step 3** **Wash, rinse, and sanitize** any removable parts using the manual immersion method in a three-compartment sink.

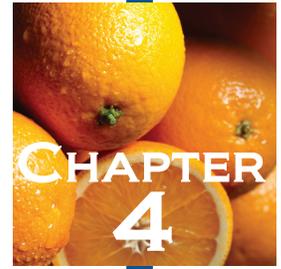
- Step 4** **Wash the remaining food-contact surfaces and rinse** with clean water. Wipe down with a chemical sanitizing solution mixed according to the manufacturer's directions.

- Step 5** **Clean surfaces that do not come in contact with food** using a clean wiping cloth. Allow all parts to air dry before reassembling. Clean the wiping cloth before and during use by rinsing it in a sanitizing solution.

- Step 6** **Re-sanitize the external food-contact surfaces** of the parts that were handled when the equipment was reassembled.

CAUTION:

All equipment should be kept clean and sanitized. Although some equipment is not used for food preparation, all equipment that has any contact with food should be cleaned and sanitized on a routine basis. Follow manufacturer's directions to clean and sanitize cabinets, shelf racks, dish dollies, dish and tray dispensers, pan racks, bakery racks, food holding equipment, equipment used to transport foods, and ice machines. Remember to keep all food preparation equipment and utensils free from dirt, dust, and other forms of contaminations.



Who is responsible for food safety?

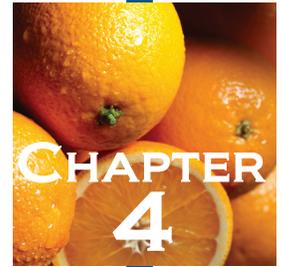
Food safety is everyone's responsibility. To have a safe environment for food preparation and service, every person in foodservice must be committed to high standards of sanitation.

Manager's Responsibilities

- Know requirements for maintaining a sanitary foodservice.
- Use a daily, weekly, and monthly cleaning schedule to assign routine cleaning tasks.
- Establish standard procedures for cleaning specific areas of the foodservice facility such as the restroom, storeroom, refrigerators and freezers, preparation area, dining area, and service line.
- Teach and coach employees on how to maintain a sanitary foodservice.
- Hold employees responsible for cleaning and sanitizing assigned areas using the procedures that have been established.
- Have routine inspections to ensure that sanitation standards are met. Use the Food Safety Checklist in Chapter 5 or an inspection form developed specifically for the foodservice organization.
- Take pride in operating a clean and sanitary foodservice facility.

Employees' Responsibilities

- Follow standard procedures for cleaning and sanitizing specific areas of the foodservice facility.
- Ask the manager for help as needed to know how to clean and sanitize assigned areas.
- Take pride in operating a clean and sanitary foodservice facility.



Summary

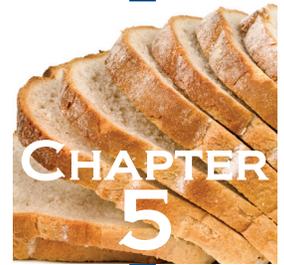
Chapter 4: A Clean and Sanitary Foodservice Facility describes how to operate a food-safe operation.

Food safety begins with the foodservice personnel who demonstrate good personal hygiene habits.

A food-safe operation has procedures for cleaning and maintaining floors, walls and ceilings; service lines and dispensers; ventilations; restrooms; and trash collection areas. An effective pest control program is necessary for cleanliness and maintenance of a safe operation.

The foodservice must have procedures for cleaning and sanitizing smallware and large equipment. A test kit designed for a specific sanitizer should be used to check the concentration of the sanitizing solution. A foodservice supplier who sells sanitizers may also have the test kits for each type of sanitizer. Mix, use, and test the sanitizing solution as recommended by the state and local public health department. Refer to the manufacturer's directions for specific mixing, storing, and first-aid instructions. When a sanitizing solution is exposed to air, detergent, and food particles, the solution becomes less effective. Sanitizing solutions should be tested frequently.

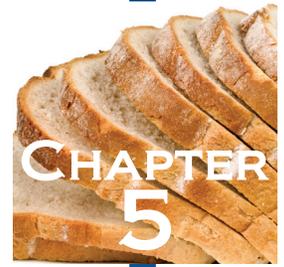
The manager and employees share responsibilities for knowing and using standard procedures for a clean and sanitary foodservice facility.



A PROCESS FOR PREVENTING FOODBORNE ILLNESS

In this chapter, find answers to the following questions:

How can foodborne illness be prevented during the Eight Steps of the Foodservice Process?	101
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A PROCESS FOR PREVENTING FOODBORNE ILLNESS

How can foodborne illness be prevented during the Eight Steps of the Foodservice Process?



The foodservice manager and employees should understand what needs to be done at each step of the foodservice process to keep food safe. This chapter explains how each step of the foodservice process affects food safety and provides guidelines for ensuring

food safety in each step. The guidelines can be used to implement a food safety program in each step of the process. Always follow state and local public health department regulations and the policies and procedures of the state agency, district, and individual school sites.

A food safety program based on Hazard Analysis and Critical Control Point (HACCP) principles is required for all schools participating in the National School Lunch and the School Breakfast programs. For more information on developing a food safety program, go to www.nfsmi.org or www.fns.usda.gov.

Eight Steps of the Foodservice Process

Step 1: Purchasing

Step 2: Receiving

Step 3: Storing

Step 4: Preparing

Step 5: Cooking

Step 6: Holding and Serving

Step 7: Cooling

Step 8: Reheating



Step 1: Purchasing



Know How Purchasing Affects Food Safety

The goal of purchasing is to obtain wholesome, safe foods to meet menu requirements. Safety in this step is primarily the responsibility of the food vendors. It is the job of the person responsible for purchasing to choose the vendors wisely.

Follow Food Safety Guidelines for Purchasing

Guidelines for the Vendor

- Meet federal and state health standards.
- Use a standardized procedure for food sanitation in the operations.
- Train employees in sanitation.
- Have clean delivery trucks with adequate refrigeration and freezer units.
- Deliver foods packaged in protective, leak-proof, durable packaging.
- Deliver foods at the correct temperatures.
- Organize deliveries to separate raw products from processed foods and produce.
- Provide a written policy/procedure on handling returns/recalls related to food safety upon request.

Guidelines for the Purchaser

- Work with the vendor to establish a food delivery schedule for each site.
- Tell the vendor what is expected.



- Request the vendor to provide a printed copy of the standardized procedure for food sanitation to ensure the safety of the products they sell. Include food safety standards in the purchase specification agreement.
- Request a copy of the vendor's most recent health inspection report.
- Inform the vendor that the purchaser will conduct unannounced sanitation inspections of trucks. Good vendors will cooperate with inspections and should adjust their delivery schedules to avoid busy periods at schools so that incoming foods can be received and inspected properly.
- Visit the warehouse periodically, if possible, to see that it is clean and organized.
- Reject all products that do not meet requirements.

Step 2: Receiving

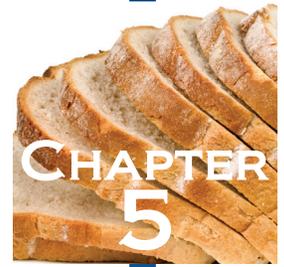
Know How Receiving Affects Food Safety



The person who receives a food delivery is responsible for controlling the quality and the safety of the foods that are accepted. To ensure food safety and food quality, employees who are responsible for receiving deliveries must be trained to accept only the products that meet specifications, quality standards, and sanitation requirements.

Goals of Receiving

- Make sure foods are fresh and safe when they enter the foodservice operation.
- Transfer foods to proper storage as quickly as possible.



Follow Food Safety Guidelines for Receiving

Train employees for receiving duties.

Train one or more employees to follow the established receiving procedures.

Organize the physical space used for receiving.

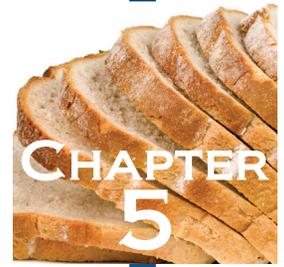
- Have a pen and hard surface on which to write.
- Have a food thermometer for documenting temperatures on delivery.
- Have a clean cart or hand truck for transporting goods from the receiving area to storage.
- Have the receiving ticket or market order ready when the delivery is scheduled.
- Have a product specification list, if this is used by your organization.
- Keep the receiving area well lighted and clean to discourage pests.

Inspect the delivery truck when it arrives.

- Make sure the truck looks and smells clean.
- Check the interior temperature to see if it is appropriate for the foods being delivered. Some suppliers have temperature-recording monitors in their delivery trucks.

Inspect foods immediately upon delivery.

- Inspect food items to be sure they meet temperature requirements, food specifications, and food quality standards. Guidance for evaluating foods during receiving is provided in the next section.
- Check for separation between raw and ready-to-eat or prepared foods during transport.
- Mark all items for storage with the date of arrival or the use-by date.



- Check expiration dates of milk, eggs, and other perishable goods.
- Check to be sure shelf dates have not expired.
- Make sure frozen foods are in airtight, moisture-proof wrappings.
- Reject foods that have been thawed and refrozen. Signs of thawing and refreezing include large ice crystals, solid areas of ice, or excessive ice in containers.
- Reject cans that have any of the following signs of deterioration: swollen sides or ends, flawed seals or seams, dents, or rust.
- Use a food thermometer to check the temperature of refrigerated and frozen foods including dairy products, fresh meat, fish, and poultry products. When eggs are delivered, the interior temperature of the truck should be 45 °F or lower.
- Examine packaging for content damage and insect infestations.
- Reject dairy, bakery, and other foods delivered in flats or crates that are dirty.
- Remove empty containers and packing material immediately to a separate trash or recycling area.

RECEIVING CHECKLIST

Evaluate Meat and Poultry During Receiving

✓ Check Meat

Quality, Appearance, Texture

- USDA Inspection stamp (ask vendor for proof for packaged meats)
- Firm and elastic to the touch
- Should not feel slimy, sticky, or dry
- Beef should be bright red; pork, light pink

Internal Temperature

- Fresh meat – at or below 41 °F
- Frozen meat – delivered frozen solid

Signs of Spoilage (Reject Delivery)

- Brown, green, or purple discoloration
- Black, white, or green spots indicating mold
- Freezer burn

✓ Check Poultry

Quality, Appearance, Texture

- USDA Inspection stamp
- Soft, flabby flesh indicates inferior product

Internal Temperature

- Fresh poultry – at or below 41 °F
- Fresh poultry should be surrounded by crushed ice when delivered
- Frozen poultry – delivered frozen solid

Signs of Spoilage (Reject Delivery)

- Purplish or greenish discoloration
- Abnormal color
- Stickiness under wings and around joints
- Dark wing tips
- Freezer burn

RECEIVING CHECKLIST

Evaluate Dairy Products and Eggs During Receiving

✓ Check Milk

Quality, Appearance, Texture

- Pasteurized or ultra-pasteurized
- Smooth and fluid
- Tightly sealed cartons

Internal Temperature

- At or below 41 °F
- Should be delivered refrigerated

Signs of Spoilage (Reject Delivery)

- Putrid odor
- Curdled consistency
- Check the sell-by date stamped on cartons. Reject milk delivered after that date.

✓ Check Yogurt

Quality, Appearance, Texture

- Pasteurized or ultra-pasteurized
- Tightly sealed cartons
- No evidence of crystals that form when frozen

Internal Temperature

- At or below 41 °F
- Should be delivered refrigerated

Signs of Spoilage (Reject Delivery)

- Sour smell
- Mold

RECEIVING CHECKLIST

Evaluate Dairy Products and Eggs During Receiving (continued)

✓ Check Butter/Margarine

Quality, Appearance, Texture

- Smooth, firm texture
- Uniform color
- Clean packaging or containers

Internal Temperature

- 33 °F to 41 °F
- May be successfully frozen

Signs of Spoilage (Reject Delivery)

- Mold
- Rancid color

✓ Check Ice Cream

Quality, Appearance, Texture

- Tightly sealed cartons
- No ice crystals indicating thawing and refreezing
- Individual products are not misshapen due to thawing and refreezing

Internal Temperature

- Should be delivered at 6 °F to 10 °F

Signs of Spoilage or Poor Quality (Reject Delivery)

- Large ice crystals indicate loss of quality

RECEIVING CHECKLIST

Evaluate Dairy Products and Eggs During Receiving (continued)

✓ Check Other Dairy Products

Quality, Appearance, Texture

- Pasteurized
- Sweet smell
- Packaging is clean and intact

Internal Temperature

- At or below 41 °F
- Should be delivered refrigerated

Signs of Spoilage (Reject Delivery)

- Sour Smell
- Moldy Color
- Check the sell-by date. Reject dairy products delivered after that date.

✓ Check Eggs

Quality, Appearance, Texture

- USDA Inspection stamp
- Clean, dry shells without cracks

Internal Temperature

- Truck interior at or below 45 °F
- Do not check the internal temperature of the eggs themselves

Signs of Spoilage (Reject Delivery)

- Cracked, checked, or dirty shells

RECEIVING CHECKLIST

Evaluate Fresh Foods During Receiving

✓ Check Fresh Produce

Quality, Appearance, Texture

- Little or no dirt
- Reasonably unblemished
- No evidence of mold
- Firm texture

Internal Temperature

- Refrigerated produce should have an internal temperature of 33 °F to 41 °F
- Non-refrigerated produce (bananas, tomatoes, sweet potatoes, dry onions, potatoes) should have an internal temperature from 50 °F to 60 °F
- Fresh-cut produce should have a temperature of 33 °F to 41 °F. Insert the stem of the food thermometer between packages. Do not insert into a package.
- Cut melons should have an internal temperature of 41 °F or below

Signs of Spoilage (Reject Delivery)

- Signs of insect infestation
- Mold
- Mushiness, wateriness, or wilting
- Discoloration or blemishes
- Cuts

Evaluate Frozen Foods During Receiving

✓ Check Frozen Foods

Quality, Appearance, Texture

- Packaging intact and clean

Internal Temperature

- Frozen foods should be frozen solid
- Insert stem of food thermometer between the packages in the case; do not pierce the packaging

Signs of Spoilage (Reject Delivery)

- Signs of thawing (liquids at bottom of carton)
- Signs of thawing and refreezing (large ice crystals on packages, blocks of ice in boxes)

RECEIVING CHECKLIST

Evaluate Canned and Dry Foods During Receiving

✓ Check Canned Foods

Quality, Appearance, Texture

- Packaging intact

Signs of Spoilage (Reject Delivery)

- Swollen, leaking, rusty, or dented cans
- Flawed seals
- Reject any can without a label

✓ Check Dry Foods

Quality, Appearance, Texture

- Packaging intact
- Dry and undamaged

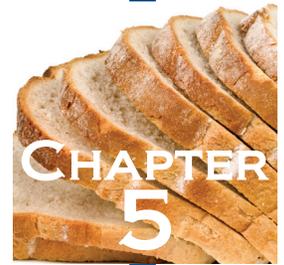
Signs of Spoilage (Reject Delivery)

- Damp or moldy container
- Insect infestation

Evaluate Specially Packaged Foods During Receiving

✓ Check Modified Atmosphere Packaged (MAP) Foods and Vacuum-Packed Foods

- Insert a food thermometer between two packages, being careful not to puncture the wrap. The temperature should be the temperature specified by the manufacturer.
- Examine color indicators on the package to see if the product was kept at a proper temperature. If the color indicators do not match, reject the shipment.



Step 3: Storing

Know How Storage Affects Food Safety

Food storage affects both quality and safety.

Food stored improperly will lose its quality, spoil more rapidly, and can cause a foodborne illness when harmful microorganisms are allowed to grow.

Follow Food Safety Guidelines for Storing

Dry storage—longer holding of less perishable items

Refrigerator—short-term storage of perishable items

Deep-chilling unit—specific foods for short periods

Freezer—long-term storage of perishable foods

Use Dry Storage Safely

The following foods are typically stored in dry storage:

- canned goods, baking supplies (salt, sugar), grain products (rice, cereals), and other dry items;
- some fruits (bananas, avocados, pears) that ripen best at room temperature;
- some vegetables (onions, potatoes, tomatoes) that store best in dry storage.

Like all areas of the facility, storerooms for dry storage must be kept clean and litter- and pest-free. Follow the suggestions below to maintain sanitary dry storage for food and supplies. Follow state and local public health regulations.

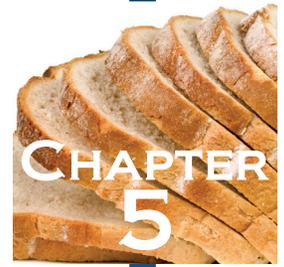
- Maintain the storage room temperature between 50 °F and 70 °F. Use a wall thermometer to check the temperature of the dry storage area.



- Keep the storerooms clean and dry.
- Sweep and scrub walls, ceiling, floors, shelves, light fixtures, and racks on a routine basis.
- Have and use a regular cleaning schedule for all surfaces and floors.
- Store all food and paper supplies 6 to 8 inches off the floor and at least 6 inches away from the wall (follow state and local public health regulations).
- Keep food in labeled containers approved for food storage. Containers should have tight-fitting lids.
- Label all food with name and delivery date.
- Take cans out of cardboard cases and write the delivery date on the can. If a code number from the case needs to be recorded on the can, write it on the top of the can or keep the needed portion of the cardboard case. Discard the box. Cardboard boxes attract roaches and other pests.
- Use the First In, First Out (FIFO) method of inventory. Store new products behind older products and use the older products first.
- Protect food from contamination with regular pest control.
- Store chemicals away from food and other food-related supplies.
- Check all storage areas frequently.
- Look for damaged or spoiled foods, broken or torn packages, and bulging or leaking cans.
- Remove any potentially spoiled foods, bulging cans, or infested packages and foods immediately and clean the area thoroughly. Discard or destroy contaminated food according to state, district, or school procedures.

Use Refrigerated Storage Safely

Foods stored in refrigerators include fresh meat, poultry, seafood, dairy products, most fresh fruit and vegetables, and leftovers. Follow state and local public health department regulations for the temperature



setting for refrigerators. The *Food Code* requires cold food temperatures to be maintained at 41 °F or below.

- Arrange food in refrigerators to allow for maximum air circulation. Refrigerators should contain open, slotted shelving to allow cold air to circulate around food. Do not line shelves with foil or paper or overload the refrigerator. Leave space between items to provide air circulation.
- For best practice, all refrigerated foods should be labeled with the name of the food item, date, time, and temperature of the product at the time of storage. Use this time and temperature to determine if food reaches proper holding temperature in the time allotted. See Chapter 2 for more information.
- Store food in clean, non-absorbent, covered containers that are approved for food storage. Be sure all containers are properly sealed.
- Cool hot foods by putting into shallow pans or small containers before refrigeration. Some commonly used safe cooling methods include dividing the food into smaller batches for cooling in the refrigerator, cooling in shallow pans in the refrigerator, using an ice-water bath, and stirring with cold paddles.
- Store dairy products separately from foods with strong odors like onions, cabbage, and seafood.
- Store fruits in a separate section of the refrigerator from vegetables. The ethylene gas that some fruits generate during ripening causes some vegetables to deteriorate more rapidly.
- To avoid cross-contamination, store raw or uncooked food away from and below prepared or ready-to-eat food, such as deli meat or cheese.
- Never allow fluids from raw poultry, fish, or meat to come into contact with other foods. Change the drip pan at the first sight of raw juices in the pan.



- Check the temperature of all refrigeration units regularly to make sure they stay at or below 41 °F or at state or district required temperature settings. Keeping potentially hazardous foods at the proper temperature is a key factor in preventing foodborne illness.
- Record the temperature of each refrigerator at the same time every day (see Appendix 4 for a sample storage temperature form). Keep the temperature form on file to document that foods have been stored at correct temperatures.
- Have at least two hanging thermometers located at different locations inside each refrigerator to confirm the reading of the mounted or built-in thermometers. Place one thermometer in the coldest part and one in the warmest part in the refrigerator.

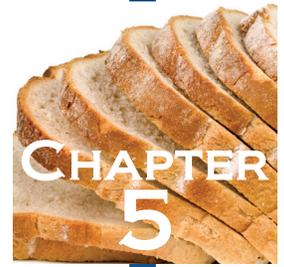
Use Deep Chilling Safely

- Storing foods at temperatures between 26 °F and 32 °F has been found to decrease bacterial growth. This method can be used to increase the shelf life of fresh foods such as poultry, meat, seafood, and other protein items without compromising their quality by freezing.
- Some foods will form ice crystals during deep chilling.
- Certain foods can be deep chilled in specially designed units or in a refrigerator set to a deep chilling temperature.

Use Frozen Storage Safely

Frozen meats, poultry, seafood, fruits and vegetables, and some dairy products, such as ice cream, should be stored in a freezer at 0 °F to –10 °F to keep them fresh and safe for an extended period of time.

As a rule, a freezer should be used primarily to store foods that are frozen when they are received. Freezing refrigerated food can lower the quality of some items.



- Arrange food in freezers to allow for maximum air circulation. Freezers should contain open, slotted shelving to allow cold air to circulate around food. Do not line shelves with foil or paper or overload the freezer. Leave space between items to provide air circulation.
- Store frozen foods in moisture-proof material or containers to minimize loss of flavor and to avoid discoloration, dehydration, and odor absorption.
- Monitor freezer temperatures regularly, using several thermometers to ensure adequacy and consistent temperatures. Record temperatures of each freezer on a storage temperature form. See Appendix 4.
- Avoid raising the temperature of the freezer by frequently opening and closing the freezer door or placing large amounts of hot foods in the freezer. A freezer cold curtain on the door can help maintain the required cold temperature.
- Never refreeze thawed food unless it has been thoroughly cooked.

Step 4: Preparing

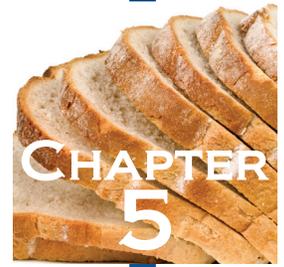
Know How Preparing Affects Food Safety

The preparation step of the foodservice process includes many opportunities for the safety of food to be compromised. Food handlers must be on alert to

- prevent contamination of food,
- avoid time in the temperature danger zone, and
- use safe food handling practices.



Keep hot foods hot. Keep cold foods cold.



Follow Food Safety Guidelines for Preparing

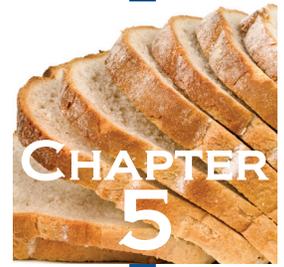
Thaw Food Safely

Freezing food keeps most bacteria from multiplying, but it does not kill them. Never thaw food at room temperature.

Some foods, such as frozen vegetables, pre-formed hamburger patties, and chicken nuggets can be cooked from the frozen state. It is important to note, however, that this method depends on the size of the item. Cooking from the frozen state is not recommended for large foods such as a whole turkey.

Four Safe Methods to Thaw Frozen Foods

1. Thaw frozen food in refrigeration at a temperature at or below 41 °F. Place the food in a pan on the lowest shelf so juices cannot drip on other foods. The drip pan should be changed when the first sign of juices appears.
2. Thaw frozen food under clean, drinkable, running water at a sufficient water velocity to float off loose particles in an overflow and at a temperature of 70 °F or less. Remember that a food cannot remain in the temperature danger zone for more than 4 hours. The 4 hours includes the thawing time under running water and the preparation time.
3. Thaw frozen food in a microwave oven only if it will be cooked immediately. This method is not considered best practice in school foodservice.
4. Thaw frozen food as part of the cooking process. This method is typically used for frozen hamburger patties, nuggets, pizzas, and some other convenience foods.



Complete Pre-Preparation (Mise en Place) Safely

This stage of food preparation includes

- assembling ingredients using the recipe,
- weighing or measuring ingredients, and
- assembling small equipment and utensils needed.

During this stage, there are several cautions for food handlers because

- pre-preparation usually takes place at room temperature, and
- this stage is one of the most common points of contamination and cross-contamination.

Follow Food Safety Guidelines for Pre-Preparation

- Wash hands correctly before beginning preparation.
- Prepare foods no further in advance than necessary.
- Prepare foods in small batches and place in cold storage immediately. This will prevent holding food too long in the temperature danger zone.
- Always hold prepared cold foods at or below 41 °F.
- Wash fresh fruits and vegetables with cold, running water to remove surface pesticide residues and other impurities, such as soil particles. Wash all produce regardless of whether it will be served whole, peeled, or cooked.
- Use a brush to scrub thick-skinned produce.
- Avoid cross-contamination.
- Keep raw products separate from ready-to-eat foods.
- After each contact with a food, wash hands, and wash, rinse, and sanitize cutting boards, knives, equipment, and all other food contact surfaces.
- Use batter, breading, or marinade for one product (recipe), and



then discard. Follow the recipe to use the product as planned.

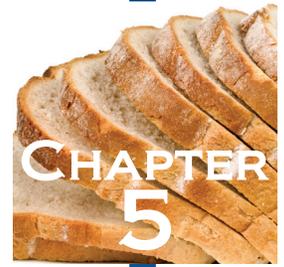
- When a can is opened, if contents are foamy or smell bad, do not use the contents and report this to the manager and the purchaser. Keep the can until the purchaser has been notified and has notified the vendor. If possible, save the can lid and cardboard box if they have numbers on them that will help track the product. Secure the can and mark “do not use.” Discard according to district and state procedures when notified.
- Be aware of those foods that are potentially hazardous and pay special attention to food handling practices during their preparation.

Mix Food Safely

The mixing stage of food preparation is when ingredients are combined. For many recipes, the ingredients are combined, pans are prepared, and the food is cooked immediately (see Step 5: Cooking); but some foods are panned and stored in the refrigerator for cooking later. Some recipes are for cold foods that will not be cooked. Each situation has special considerations for food safety, and that is why it is important to document temperature throughout food preparation.

Follow Food Safety Guidelines for Panned Foods to Be Cooked Later

- Wash hands and use single-use gloves properly.
- Keep food out of the temperature danger zone—move panned food to the refrigerator for holding as soon as possible. Best practice is to set a time limit of 20 minutes for preparing a batch of food so that ingredients are at room temperature only 20 minutes before cooking or storing in the refrigerator.



- Because food will be held before cooking or serving, be especially careful about cross-contamination.
- Cover food to prevent contamination during storage.
- Document the internal temperature of the food during this step.

Follow Food Safety Guidelines for Cold Foods That Will Not Be Cooked

Some examples of cold foods not cooked after preparation include chicken salad, tuna salad, potato salad with eggs, other protein-rich salads, and sandwiches prepared in advance.

Because cold foods such as these receive no further cooking, it is essential that all ingredients used in them are properly cleaned, prepared, and, where applicable, cooked. It is a good idea to cool meats and other ingredients and combine them while cooled.

- Wash hands and use single-use gloves properly.
- Properly clean, prepare, or cook ingredients for cold mixed foods that will receive no further cooking. Wash fresh fruits and vegetables with cold, running water. Use a brush to scrub thick-skinned produce.
- Cool cooked or canned meats and other ingredients and combine while cooled.
- Prepare foods in small batches and place in cold storage immediately.
- Hold prepared cold foods at or below 41 °F and document temperature. Prepare foods no further in advance than necessary.
- Beware of cross-contamination.
- After each contact with a potentially hazardous food, wash, rinse, and sanitize cutting boards, knives, and other food-contact surfaces.

Step 5: Cooking

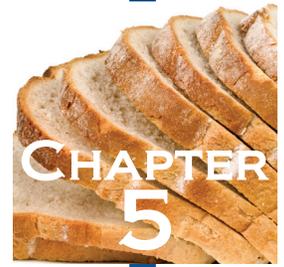
Know How Cooking Affects Food Safety

Even when foods are handled correctly up to this step in the food preparation process, bacteria and other contaminants may still be present. Cooking foods to the safe internal temperature will destroy any existing bacteria but may not kill toxins or bacterial spores.

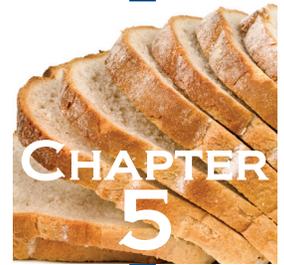


Follow Food Safety Guidelines for Cooking Foods

- Follow equipment manufacturer's directions and standardized recipes to avoid overloading baking pans.
- Stir foods cooked in deep pots frequently to ensure even heat distribution and thorough cooking.
- Avoid overloading fryers. Allow the oil temperature to return to the required level between batches.
- Regulate the size and thickness of each portion to make cooking time predictable and uniform. Cook like-size portions together.
- Never interrupt the cooking process. Partially cooking poultry or meat, for example, may produce conditions that encourage bacterial growth.
- Use a clean and calibrated thermometer to monitor the accuracy of heating equipment.
- Use a clean and calibrated thermometer to check that food reaches the required safe internal temperature during cooking. (Refer to Appendix 5: Temperature Rules! Cooking for Foodservice)
- Check food temperature in several places, especially in the thickest parts, to make sure the food is thoroughly cooked.



- To avoid getting a false reading, be careful not to touch the pan or bone with the food thermometer.
- Always cook food to the required safe internal temperature and appropriate time.
- Use a serving utensil or single-use glove to avoid cross-contamination.
- Taste foods correctly to avoid cross-contamination. Place a small amount of food from the food container into a small bowl. Step away from the food container and taste the food with a teaspoon. Remove the used bowl and teaspoon to the dish room. Never reuse a bowl or spoon already used for tasting. Wash hands before and after tasting.



Step 6: Holding and Serving

Know How Holding and Serving Affect Food Safety

Foodborne outbreaks have occurred because improper procedures were used after cooking was completed. To handle food safely, it is necessary to hold and serve foods at safe temperatures, either above or below the temperature danger zone. Specifically, this means

- always keep **hot** foods in hot holding equipment at or above 135 °F, and
- always keep **cold** foods at or below 41 °F in a refrigeration unit or surrounded by ice.

The best practice to ensure safety and good food quality is to prepare foods just-in-time for service. Just-in-time food preparation is also known as batch cooking or cooking to the line.

Follow Food Safety Guidelines for Holding and Serving

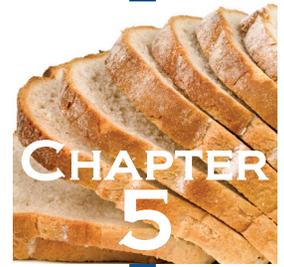
- Use hot holding equipment, such as steam tables and hot food carts during service but never for reheating. Hot foods should be cooked to the required temperature and placed in holding cabinets or on a steam table to be held at or above 135 °F.
- Keep cold foods at or below 41 °F in a refrigeration unit or surrounded by ice.
- Stir foods at reasonable intervals to ensure even heating or cooling.
- Check internal food temperatures with a food thermometer every 30 minutes. Sanitize the food thermometer after each use.
- During any point in the food production process when food could be in the temperature danger zone, the internal temperature must be documented. Follow state and local public health department recommendations to control time and temperature at each stage of food production.



- Cover hot holding equipment to retain heat and to guard against contamination.
- Monitor the temperature of hot holding equipment with each use.
- Avoid cross-contamination that can occur when an undercooked food is added to another food that is not cooked further. (For example: Freshly made scrambled eggs added to an existing pan of scrambled eggs on a steam table.)

Follow Food Safety Guidelines for Employees on the Service Line

- Follow rules for good personal hygiene.
- Always wash hands and arms up to the elbow with soap and warm water of at least 100 °F for at least 20 seconds before serving food.
- Use clean and sanitized long-handled ladles and spoons so bare hands do not touch food.
- Avoid touching the parts of plates, food trays, or flatware that will come into contact with food or the customer's mouth.
- Wear single-use gloves when serving food by hand. Follow guidelines for single-use gloves (see Chapter 2).
- When possible, use tongs to dispense rolls and bread, or wear single-use gloves.
- Clean and sanitize equipment and utensils thoroughly after each use.
- Use lids and sneeze guards to protect prepared food from contamination.
- **Avoid cross-contamination.**
 - Always wash hands between food preparation tasks.
 - Always clean and sanitize food preparation areas and equipment between food preparation tasks. For example, do not reuse a serving pan used to hold raw chicken to serve the same chicken after it has been cooked unless the pan has been thoroughly cleaned and sanitized.
- Throw away garnishes used on pans on the service line.



Follow Food Safety Guidelines for Sanitary Self-Service

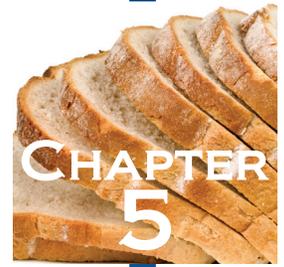
Monitor self-service lines. Customers, especially children, are generally not educated about food sanitation and can either unintentionally or intentionally contaminate food by

- using the same plate or tray twice;
- touching food with their hands;
- sneezing or coughing on food;
- picking up foods, such as rolls or carrot sticks, with their fingers;
- not using serving utensils;
- eating at the self-service line;
- dipping their fingers into a container of food to taste it;
- putting their head under sneeze guard to reach items in the back; and
- returning food items to avoid waste.

Post signs on self-service lines to encourage customers to be polite and avoid contaminating food. A sample sign is provided in Appendix 2:

Tips for Customers: Keep Your Food Safe.

- Observe customer behavior and remove any foods that may have been contaminated.
- Package food to prevent contamination; serve sealed packages of crackers, breadsticks, and condiments; pre-wrap sandwiches.
- Monitor and document the internal temperature of self-service items every 30 minutes as with other foods on the service lines.



Follow Food Safety Guidelines for Transporting and Receiving Food for Off-Site Feeding

Transporting prepared food from a central kitchen to remote sites must be monitored. Special care must be taken to ensure that food is safe when it leaves the central kitchen and is still safe when it is served.

Transport food using proper food carriers.

Use only food carriers approved by the National Sanitation Foundation International (NSF International) for transporting food. Follow state and local public health department recommendations.

- Sanitize food carriers daily.
- Make sure the insulating properties in carriers are adequate to maintain safe food temperature.
- Equip trucks with equipment designed to keep hot foods hot (at or above 135 °F) and cold foods cold (at or below 41 °F).
- Clean and sanitize the interior of delivery trucks on a routine basis.

Use proper food containers.

Food containers should be

- rigid and sectioned so foods do not mix,
- tightly closed to retain heat or cold,
- non-porous to avoid leakage,
- easy to clean or disposable, and
- approved to hold food.

Monitor temperatures.

- Transport an extra sample of hot and cold foods in order to measure the internal temperature of the sample foods on arrival at the remote site. Hot food should be delivered at or above 135 °F and cold food should be delivered at or below 41 °F.

- Keep the sample 48 hours or follow the school district's requirements in case of a foodborne outbreak.
- Store food immediately upon arrival in order to maintain safe internal temperatures.

Step 7: Cooling

Know How Cooling Affects Food Safety

In any foodservice operation, it is often necessary to prepare foods in advance or use leftover foods. This can easily lead to problems unless proper precautions are taken. In fact, problems at the cooling stage contribute to outbreaks of foodborne illness.



Follow Steps for Safe Cooling

- Protect the food from contamination during the cooling process. To avoid contamination, food that is being cooled in the refrigerator should be loosely covered. Although uncovered foods cool faster, be aware that they are at an increased risk for cross-contamination.
- Reduce food mass. Smaller amounts of food will cool more quickly than larger amounts, so cut large items into pieces or divide food among several containers or shallow pans.
- Use shallow, pre-chilled pans (no more than 4 inches deep).
- Stainless steel containers transfer heat better and cool faster than plastic.
- Cool rapidly. Quick-cool large amounts of food (larger than 1/2 gallon or 2 pounds).
 - Use an ice-water bath—water is a much better heat conductor than air. As a result, foods can cool much more quickly in an ice-water bath than they can in a refrigerator.



- Use a quick-chill unit (26 °F to 32 °F) rather than a refrigerator. These special refrigerators are sometimes used in large, central kitchens for chilling large amounts of food quickly. The typical walk-in or reach-in refrigerator is designed to keep cold foods cold rather than to chill hot foods. They can take too long to cool foods to safe temperatures.
 - Pre-chill foods in a freezer for about 30 minutes before refrigerating. Separate food items so air can flow freely around them. Do not stack shallow pans.
 - **Never** cool food at room temperature.
- Stir frequently. Stirring accelerates cooling and helps to ensure that cold air reaches all parts of the food. Some manufacturers make cold paddles just for cooling food; they can be filled with water and then be frozen. If a cold paddle is used to stir a food, it should be washed and sanitized after use.
 - Measure and document temperature during the cooling process. Chill cooked hot food from 135 °F to 70 °F within 2 hours and from 70 °F to 41 °F in an additional 4 hours for no more than a total cooling time of 6 hours. If the food has not reached 70 °F within 2 hours it must be reheated immediately to 165 °F for 15 seconds.
 - When the food has been properly cooled to 41 °F or lower, cover tightly and label with product name, date, and time of preparation.

Store cooked foods on the upper shelves of the refrigerator. Never store them beneath raw foods.

Step 8: Reheating

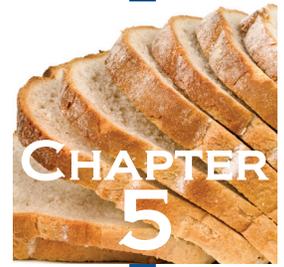
Know How Reheating Affects Food Safety

Reheating is used for previously cooked food, either pre-prepared or leftover. Like the original cooking process, reheating requires precautions to prevent contamination and to keep food out of the temperature danger zone. Cooling a contaminated food does not kill harmful microorganisms; it only slows growth. Failure to reheat a previously cooked food to the required temperature within the time limit can result in a foodborne outbreak.



Follow Guidelines for Reheating Food

- Reheat food only one time.
- Take the food through the temperature danger zone as quickly as possible.
- Monitor and record internal temperatures of foods.
- Reheat all previously cooked food to an internal temperature of 165 °F for 15 seconds.
- If a pre-cooked food is added to a recipe as an ingredient, the whole mixture must be reheated to 165 °F for 15 seconds. For example, if adding pre-cooked ground beef to canned spaghetti sauce, the mixture must reach 165 °F for 15 seconds.
- Reheat food to a minimum of 165 °F within 2 hours after taking the food out of the refrigerator.
- Never reheat food in hot-holding equipment.
- Never mix a leftover batch of food with a fresh batch of food.
- According to the *Food Code*, food held at 41 °F or less may be held for 7 days.
- While storing leftovers, be sure refrigerator temperature is low enough to maintain an internal temperature of foods at or below 41 °F.



Summary

Chapter 5: A Process for Preventing Foodborne Illness, describes the Eight Steps of the Foodservice Process with ways to prevent foodborne illness in every step.

Eight Steps of the Foodservice Process

- Step 1:** Purchasing
- Step 2:** Receiving
- Step 3:** Storing
- Step 4:** Preparing
- Step 5:** Cooking
- Step 6:** Holding and Serving
- Step 7:** Cooling
- Step 8:** Reheating

Handling food safely through the foodservice process is the highest priority in any kitchen. It is everyone's responsibility to

- maintain a clean, sanitary environment;
- control potential sources of food contamination; and
- be vigilant with time and temperature control.

Food can become contaminated with harmful microorganisms that can grow and cause a foodborne illness during every step of the foodservice process unless food safety guidelines are followed.

The Food Safety Checklist on the following pages can be used as a weekly self-inspection for each step of the foodservice process.

FOOD SAFETY CHECKLIST

Date:

Observer:

Directions: Use this checklist once a week to determine areas in your operation that require corrective action. Record corrective action taken and keep completed records in a notebook for future reference.

PERSONAL DRESS AND HYGIENE	Yes	No	Corrective Action
■ Employees wear proper uniform including proper shoes.	<input type="checkbox"/>	<input type="checkbox"/>	_____
■ Hair restraint is worn.	<input type="checkbox"/>	<input type="checkbox"/>	_____
■ Fingernails are short, unpolished, and clean (no artificial nails).	<input type="checkbox"/>	<input type="checkbox"/>	_____
■ Jewelry is limited to a plain ring, such as a wedding band.	<input type="checkbox"/>	<input type="checkbox"/>	_____
■ Hands are washed properly, frequently, and at appropriate times.	<input type="checkbox"/>	<input type="checkbox"/>	_____
■ Burns, wounds, sores or scabs, or splints and bandages on hands are completely covered while handling food.	<input type="checkbox"/>	<input type="checkbox"/>	_____
■ Eating, drinking, chewing gum, smoking or using tobacco are observed only in designated areas away from preparation, service, storage, and ware-washing areas.	<input type="checkbox"/>	<input type="checkbox"/>	_____
■ Employees use disposable tissues when coughing or sneezing and then immediately wash hands.	<input type="checkbox"/>	<input type="checkbox"/>	_____

FOOD PREPARATION	Yes	No	Corrective Action
■ Food preparation equipment and food contact surfaces are properly washed, rinsed, and sanitized after every use.	<input type="checkbox"/>	<input type="checkbox"/>	_____
■ Frozen food is thawed under refrigeration or in cold running water.	<input type="checkbox"/>	<input type="checkbox"/>	_____

FOOD SAFETY CHECKLIST

FOOD PREPARATION (continued)	Yes	No	Corrective Action
■ Preparation is planned so ingredients are kept out of the temperature danger zone to the extent possible.	<input type="checkbox"/>	<input type="checkbox"/>	_____
■ Food is tasted using the proper procedure.	<input type="checkbox"/>	<input type="checkbox"/>	_____
■ Procedures are in place to prevent cross-contamination.	<input type="checkbox"/>	<input type="checkbox"/>	_____
■ Food is handled with utensils, single-use gloves, or clean hands.	<input type="checkbox"/>	<input type="checkbox"/>	_____
■ Utensils are used to avoid touching parts of food that will be in direct contact with other food or a person's mouth.	<input type="checkbox"/>	<input type="checkbox"/>	_____
■ Reusable towels are used only for sanitizing equipment surfaces and not for drying hands, utensils, or floor.	<input type="checkbox"/>	<input type="checkbox"/>	_____
■ Food is cooked to the required safe internal temperature for the appropriate time. The temperature is tested with a calibrated food thermometer.	<input type="checkbox"/>	<input type="checkbox"/>	_____
■ The internal temperature of food being cooked is monitored and documented.	<input type="checkbox"/>	<input type="checkbox"/>	_____

HOT HOLDING	Yes	No	Corrective Action
■ Hot holding unit is clean.	<input type="checkbox"/>	<input type="checkbox"/>	_____
■ Food is heated to the required safe internal temperature before placed in hot holding.	<input type="checkbox"/>	<input type="checkbox"/>	_____
■ Temperature of hot food being held is at or above 135 °F and internal temperature is monitored and documented every 30 minutes.	<input type="checkbox"/>	<input type="checkbox"/>	_____
■ Food is protected from contamination.	<input type="checkbox"/>	<input type="checkbox"/>	_____

FOOD SAFETY CHECKLIST

COLD HOLDING	Yes	No	Corrective Action
■ Refrigerators are kept clean and organized.	<input type="checkbox"/>	<input type="checkbox"/>	_____
■ Temperature of cold food being held is at or below 41 °F and internal temperature is monitored every 30 minutes.	<input type="checkbox"/>	<input type="checkbox"/>	_____
■ Food is protected from contamination.	<input type="checkbox"/>	<input type="checkbox"/>	_____

REFRIGERATOR, FREEZER, AND MILK COOLER	Yes	No	Corrective Action
■ Thermometers are conspicuous and accurate.	<input type="checkbox"/>	<input type="checkbox"/>	_____
■ Temperature is appropriate for piece of equipment.	<input type="checkbox"/>	<input type="checkbox"/>	_____
■ Food is stored 6 inches off the floor in walk-in cooling equipment.	<input type="checkbox"/>	<input type="checkbox"/>	_____
■ Refrigerator and freezer units are clean and neat.	<input type="checkbox"/>	<input type="checkbox"/>	_____
■ Proper chilling procedures are used.	<input type="checkbox"/>	<input type="checkbox"/>	_____
■ All food is properly wrapped, labeled, and dated.	<input type="checkbox"/>	<input type="checkbox"/>	_____
■ The First In, First Out (FIFO) method of inventory is practiced.	<input type="checkbox"/>	<input type="checkbox"/>	_____
■ A temperature form is maintained to document storage temperatures.	<input type="checkbox"/>	<input type="checkbox"/>	_____

FOOD STORAGE AND DRY STORAGE	Yes	No	Corrective Action
■ Temperature of dry storage area is between 50 °F and 70 °F or your state or local health department requirement.	<input type="checkbox"/>	<input type="checkbox"/>	_____
■ All food and paper supplies are stored 6 to 8 inches off the floor.	<input type="checkbox"/>	<input type="checkbox"/>	_____
■ All food is labeled with name and delivery date.	<input type="checkbox"/>	<input type="checkbox"/>	_____

FOOD SAFETY CHECKLIST

FOOD STORAGE AND DRY STORAGE (continued)	Yes	No	Corrective Action
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- | | | | |
|---|--------------------------|--------------------------|-------|
| ■ The FIFO method of inventory management is used. | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| ■ There are no bulging or leaking canned goods or torn bags in storage. | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| ■ Food is protected from contamination. | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| ■ All surfaces and floors are clean. | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| ■ Chemicals are stored away from food and food-related supplies. | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| ■ There is a regular cleaning schedule for all surfaces and floors. | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

CLEANING AND SANITIZING	Yes	No	Corrective Action
--------------------------------	------------	-----------	--------------------------

- | | | | |
|--|--------------------------|--------------------------|-------|
| ■ A three-compartment sink is properly set up for ware washing. | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| ■ Suds are visible only in wash sink. | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| ■ Water is clean and free of grease and food particles. | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| ■ A chemical test kit or thermometer is used to check sanitizing rinse. | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| ■ Water temperatures are correct for wash and rinse. | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| ■ If heat sanitizing, the utensils are allowed to remain immersed in 171 °F water for 30 seconds. | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| ■ If using a chemical sanitizer, it is mixed correctly, and a sanitizer test strip is used to test chemical concentration. | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| ■ Smallware and utensils are allowed to air dry. | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| ■ Wiping cloths are stored in sanitizing solution while in use. | <input type="checkbox"/> | <input type="checkbox"/> | _____ |

FOOD SAFETY CHECKLIST

UTENSILS AND EQUIPMENT	Yes	No	Corrective Action
■ All small equipment and utensils, including cutting boards, are cleaned and sanitized between uses.	<input type="checkbox"/>	<input type="checkbox"/>	_____
■ Small equipment and utensils are washed, sanitized, and air-dried.	<input type="checkbox"/>	<input type="checkbox"/>	_____
■ Work surfaces are clean to sight.	<input type="checkbox"/>	<input type="checkbox"/>	_____
■ Work surfaces are cleaned and sanitized between uses.	<input type="checkbox"/>	<input type="checkbox"/>	_____
■ Thermometers are cleaned and sanitized after each use.	<input type="checkbox"/>	<input type="checkbox"/>	_____
■ Thermometers are calibrated on a routine basis.	<input type="checkbox"/>	<input type="checkbox"/>	_____
■ The can opener is clean to sight.	<input type="checkbox"/>	<input type="checkbox"/>	_____
■ Drawers and racks are clean.	<input type="checkbox"/>	<input type="checkbox"/>	_____
■ Small equipment is stored inverted, covered, or otherwise protected from dust or contamination.	<input type="checkbox"/>	<input type="checkbox"/>	_____

LARGE EQUIPMENT	Yes	No	Corrective Action
■ The food slicer is clean to sight.	<input type="checkbox"/>	<input type="checkbox"/>	_____
■ The food slicer is cleaned and sanitized after each use.	<input type="checkbox"/>	<input type="checkbox"/>	_____
■ All pieces of equipment are clean to sight, including equipment on serving lines, storage shelves, cabinets, ovens, ranges, fryers, and steam equipment.	<input type="checkbox"/>	<input type="checkbox"/>	_____
■ Exhaust hood and filters are clean.	<input type="checkbox"/>	<input type="checkbox"/>	_____

FOOD SAFETY CHECKLIST

GARBAGE STORAGE AND DISPOSAL	Yes	No	Corrective Action
■ Kitchen garbage cans are clean and covered.	<input type="checkbox"/>	<input type="checkbox"/>	_____
■ Garbage cans are emptied as necessary.	<input type="checkbox"/>	<input type="checkbox"/>	_____
■ Boxes and containers are removed from site.	<input type="checkbox"/>	<input type="checkbox"/>	_____
■ Loading dock and area around dumpster are clean.	<input type="checkbox"/>	<input type="checkbox"/>	_____
■ Dumpster is closed.	<input type="checkbox"/>	<input type="checkbox"/>	_____

PEST CONTROL	Yes	No	Corrective Action
■ Outside doors have screens and are equipped with self-closing devices.	<input type="checkbox"/>	<input type="checkbox"/>	_____
■ Screens are on open windows and doors and are in good repair.	<input type="checkbox"/>	<input type="checkbox"/>	_____
■ No evidence of pests is present.	<input type="checkbox"/>	<input type="checkbox"/>	_____
■ There is a regular schedule of pest control by a licensed pest control operator.	<input type="checkbox"/>	<input type="checkbox"/>	_____



FOOD SAFETY PROGRAMS IN SCHOOLS

In this chapter, find answers to the following questions:

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What is the Process Approach for managing food safety?	138
What are the requirements of a food safety program?	143
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FOOD SAFETY PROGRAMS IN SCHOOLS



Why are food safety programs needed in schools?

Serving safe food to children is a critical responsibility for all school foodservice professionals and a key component of a healthy school environment. Keeping food safe is also a vital part of healthy eating and a recommendation in the Dietary Guidelines for Americans. While there are relatively few foodborne illness outbreaks in schools, it is extremely important that school foodservice employees continue to follow good food safety practices to maintain that good record.



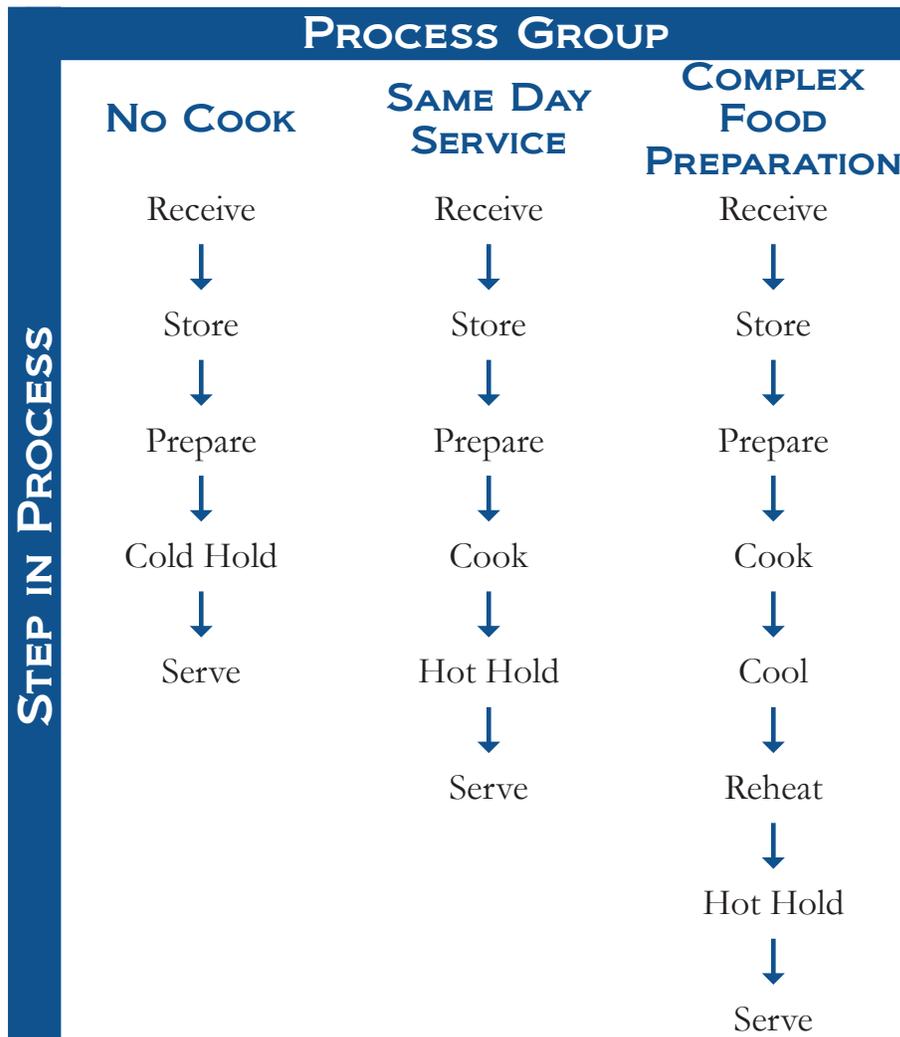
Schools are required to implement a food safety program. Section 111 of the Child Nutrition and WIC Reauthorization Act of 2004 (Public Law 108-265) amended section 9(h) of the Richard B. Russell National School Lunch Act requires school food authorities to implement a food safety program for the preparation and service of school meals. The law specifies that the food safety program be based on Hazard Analysis and Critical Control Point (HACCP) principles. The Food and Drug Administration has developed a simplified approach for retail foodservice operations, such as schools and restaurants, to manage food safety based on HACCP principles. It is known as the Process Approach.

What is the Process Approach for managing food safety?

The Process Approach is a method for grouping menu items into broad categories based on the flow of food product through the foodservice operation, and then analyzing the hazards and placing controls on each grouping to prevent the hazards.



Most food products can be grouped into one of three preparation processes depending on the number of times the food goes through the temperature danger zone (between 41 °F and 135 °F): no cook, same day service, and complex food preparation.



NOTE: There are some foods that are purchased and served that do not require any preparation or temperature control. A few examples of these foods include cereal, bread or rolls, or individually packaged condiments. Managing the safety of these foods is done by following standard operating procedures for hand washing, storing, and serving.



No Cook

Foods in the no cook process group are not cooked. In schools, there are typically many menu items that fall into this category such as salads, deli sandwiches, or fruit. When food is not cooked, standard operating procedures that include control measures are used to protect these foods.

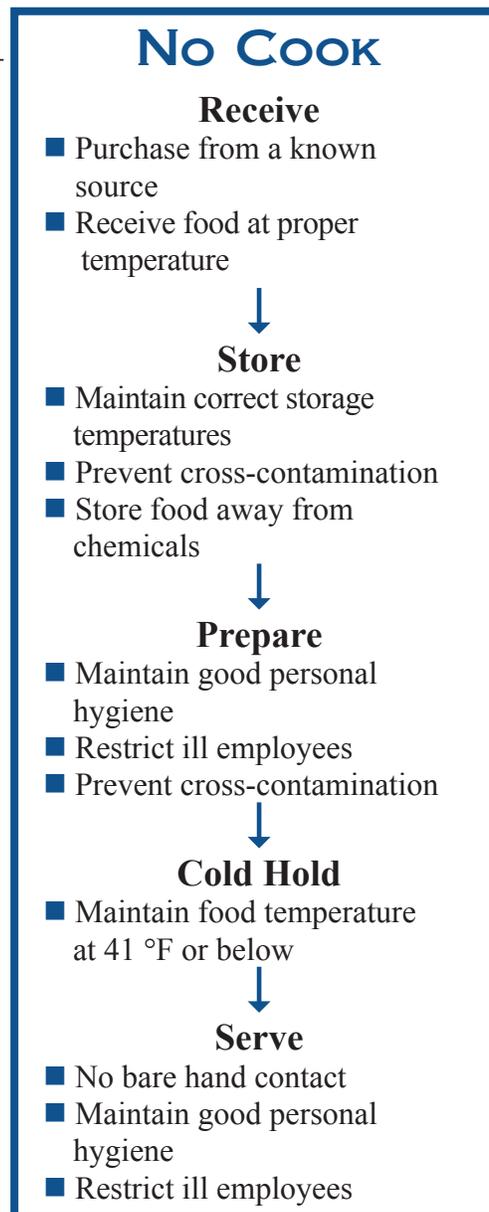
For foods in this process, there are five steps: receive, store, prepare, cold holding, and serve.

At the **receive** step, two control measures help to ensure food safety—purchase food from a known source and receive food at the proper temperature.

At the **store** step, control measures include maintaining correct storage temperatures, prevention of cross-contamination, and storage of food away from chemicals.

At the **prepare** step, control measures include maintaining good personal hygiene, restricting ill employees from working with food, and preventing cross-contamination.

At the **cold hold** step, the temperature of food should be maintained at 41 °F or below.





At the **serve** step, control measures include no bare hand contact, maintaining good personal hygiene, and restricting ill employees from working with food.

Record keeping is important for a food safety program to be successful. For the no cook process foods, temperatures should be taken and recorded at the receive, store, and cold holding steps.

Same Day Service

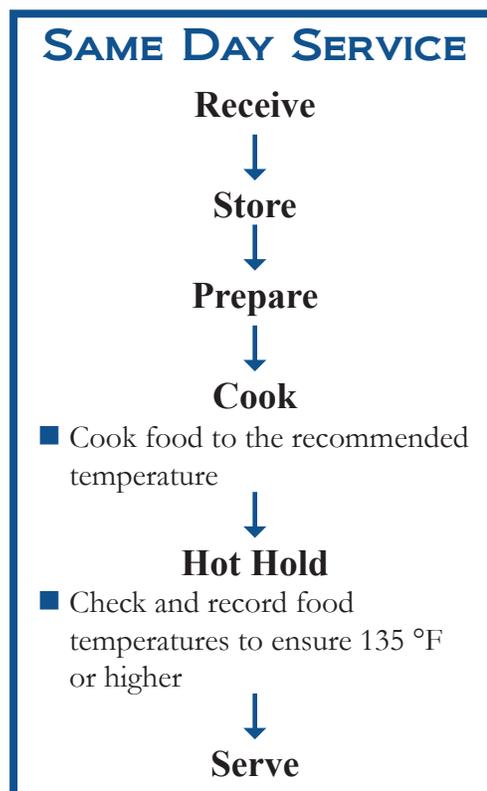
Foods in the same day service process are cooked and served on the same day. Many menu items served in schools fit into this category, such as baked chicken, tacos, spaghetti, mashed potatoes, cooked vegetables, and many other foods.

For foods in the same day service process, there are six steps: receive, store, prepare, cook, hot hold, and serve.

There are control measures at each step that must be followed to ensure food safety. The control measures for the same day service process and the no cook process are the same for the steps receive, store, prepare, and serve steps.

The two unique steps for the same day service process are **cook** and **hot hold**.

For the **cook step**, it is important to cook food to the recommended temperature. For example, raw chicken or turkey must be cooked to 165 °F for 15 seconds.





It is important to check the internal temperature of food to make sure the appropriate internal temperature was reached—and to record that temperature on a cooking log or production sheet.

Cooked foods are held hot (**hot hold step**) until time for service. It is important to check and record food temperatures during hot holding to make sure the food temperature does not fall below 135 °F.

Complex Food Preparation

Foods in the complex food preparation process are cooked one day and served on a later day. There are several menu items that may fit into the complex food preparation process, such as whole turkeys or turkey roasts, pork roasts, chili, spaghetti sauce, or marinara sauce. Menu items in this category vary by schools, depending on production system, how food is purchased, staffing, and many other factors. **These foods go through the temperature danger zone at least two times, creating more critical control points for these products.**

For foods in the complex food preparation process, there are eight steps: receive, store, prepare, cook, cool, reheat, hot hold, and serve.

Two additional steps are added to the complex food preparation process: cool and reheat.

In the **cool step**, time and temperature are critical. The *Food Code* guidelines state food has to cool from 135 °F to 70 °F within 2 hours and from 70 °F to 41 °F or lower within an additional 4 hours.

Temperatures of the cooling food should be taken before the 2-hour time limit so corrections can be made if the food is not cooling quickly enough (that might include using an ice paddle for liquid products, cutting up whole products into smaller pieces, or dividing food in large containers into more shallow ones).



After the first cooling goal (70 °F) has been met, temperatures should be taken during the following 4 hours to make sure that the next cooling goal (41 °F) will be met. If cooling does not meet these time and temperature guidelines, the food must be heated to above 135 °F and the cooling process started again—a process that can only be repeated one time. Each time a temperature is taken, it should be recorded on a cooling log so the exact times and temperatures are documented.

The **reheat step** is the next step that would occur. When ready to use, a food must be reheated to 165 °F or higher for 15 seconds (within 2 hours of when the reheating process began). The temperature of the reheated food must be taken and recorded to document that proper procedures were followed.

COMPLEX FOOD PREPARATION

Receive



Store



Prepare



Cook



Cool

- Food must cool from 135 °F to 70 °F within 2 hours and from 70 °F to 41 °F or lower within an additional 4 hours



Reheat

- Food must be reheated to 165 °F or higher for 15 seconds (within 2 hours of when reheating began)



Hot Hold



Serve

What are the requirements of a school food safety program?

Each school food authority is responsible for developing a comprehensive food safety program for their jurisdiction, including a plan for every school food preparation and service site. A school food safety program must include the following elements:



1. Written Standard Operating Procedures (SOPs)

A standard operating procedure provides specific step-by-step instructions for actions employees must take related to a specific food handling activity. For example, a school would have an SOP on hand washing, cleaning and sanitizing food contact surfaces, dish washing, receiving food, cooking food, and many other specific food handling tasks. These SOPs provide a strong foundation for a food safety program.

2. A written plan for applying HACCP principles including:

- documenting menu items in the appropriate process category,
- documenting of critical control points,
- monitoring,
- establishing and documenting corrective actions,
- record keeping, and
- reviewing and revising the overall food safety program periodically.

To download adaptable templates for standard operating procedures and for developing a school food safety program, visit the National Food Service Management Institute's website at www.nfsmi.org.

What are managers' and employees' responsibilities for a food safety program?

All employees in school foodservice have the responsibility to follow good food safety practices and follow the procedures established for the school's food safety program. While managers and employees have some different roles, each is extremely important for an effective program.



Managers

Managers have six basic responsibilities related to a food safety program.

1. Develop Policies and Procedures

If food safety policies and procedures have not been developed for your school, it is imperative that they be developed and implemented. Most often, there are food safety policies and procedures in place. These policies and procedures need to be reviewed periodically and updated to meet the current needs of the operation. There are many changes that may necessitate modifications to policies and procedures, such as

- menu revisions,
- changes in the way food is purchased, or
- new equipment.

In addition, managers in large school districts may need to modify policies and procedures to fit the uniqueness of individual schools because there is no “one size fits all.”

2. Develop the Food Safety Program

There may be situations where there is no comprehensive food safety program or the existing program no longer meets the needs of a school or district. Managers provide leadership to develop and modify the program. Also, as was mentioned with policies and procedures, changes occur that necessitate modifications to existing food safety programs. The entire food safety program needs to be reviewed annually to make sure it still meets the needs of the school.

3. Be a Role Model

It is important to model correct behaviors. A great example is hand washing. If a manager walks into the kitchen and doesn't wash her hands, she is sending out a negative message to employees.



On the other hand, if she makes it a habit to always wash her hands each time she enters the kitchen, employees will notice and appreciate the importance of hand washing.

4. Train Employees

Employees need to be trained on basic food safety and on their role in implementing a food safety program. Training needs to be ongoing to reinforce concepts with continuing employees and to introduce concepts to new employees. There will often be new developments related to food safety that need to be conveyed to employees.

5. Supervise Implementation

Supervision of employees is very important for practices to become ingrained in an operation. It is not enough to train employees because there is often a gap between knowledge and application of knowledge. For example, employees typically know that hand washing is important and why it should be done. Sometimes, however, they get in a hurry and do not wash their hands as often as they should.

Another typical example is documentation. In training, employees are told they must document cooking temperatures. But, when they get busy that may not happen even though they take temperatures. Supervisors must check the documentation forms to make sure temperatures are recorded. If there are gaps in recording temperatures, it is essential to follow up with the employees.



6. Verify SOP and Employee Documentation

The foodservice manager has the specific responsibility to review the records kept by employees and verify that documentation was done and appropriate corrective action taken. This process allows the manager to see any trends that may be occurring. For example, if dish machine temperatures frequently do not meet standards, the manager may need to call a service technician to repair the dish machine. Through monitoring and documentation, potential food safety problems can be identified and corrected.

Employees

Employees have two basic responsibilities related to food safety. While that may not sound like a lot of responsibility, these two tasks are critical to food safety.

1. Follow Standard

Operating Procedures (SOPs)

Each school will have many standard operating procedures related to food safety. While there is no specific format for an SOP, all will have the following information:

- Purpose
- Instructions
- Monitoring
- Corrective Action
- Verification and record keeping

HACCP-Based SOPs
Cleaning and Sanitizing Food Contact Surfaces (Sample SOP)
<p>PURPOSE: To prevent foodborne illness by ensuring that all food contact surfaces are properly cleaned and sanitized.</p>
<p>SCOPE: This procedure applies to foodservice employees involved in cleaning and sanitizing food contact surfaces.</p>
<p>KEY WORDS: Food Contact Surface, Cleaning, Sanitizing</p>
<p>INSTRUCTIONS:</p> <ol style="list-style-type: none"> 1. Train foodservice employees on using the procedures in this SOP. 2. Follow State or local health department requirements. 3. Follow manufacturer's instructions regarding the use and maintenance of equipment and use of chemicals for cleaning and sanitizing food contact surfaces. Refer to Storing and Using Poisonous or Toxic Chemicals SOP. 4. If State or local requirements are based on the <i>2001 FDA Food Code</i>, wash, rinse, and sanitize food contact surfaces of sinks, tables, equipment, utensils, thermometers, carts, and equipment: <ul style="list-style-type: none"> • Before each use • Between uses when preparing different types of raw animal foods, such as eggs, fish, meat, and poultry • Between uses when preparing ready-to-eat foods and raw animal foods, such as eggs, fish, meat, and poultry • Any time contamination occurs or is suspected 5. Wash, rinse, and sanitize food contact surfaces of sinks, tables, equipment, utensils, thermometers, carts, and equipment using the following procedure: <ul style="list-style-type: none"> • Wash surface with detergent solution. • Rinse surface with clean water. • Sanitize surface using a sanitizing solution mixed at a concentration specified on the manufacturer's label. • Place wet items in a manner to allow air drying.




The **purpose** tells why the SOP is important and what it is used for. The **instructions** include step-by-step procedures.

Monitoring requirements are explained. **Corrective actions** are given for use when food safety goals are not being met. Finally, the **verification and record keeping** section provides a place for recording monitored activities and any corrective actions taken. The foodservice manager then verifies that actions have been taken and dates and initials the verification.

2. Follow the Food Safety Program

Each foodservice employee will serve a different role in following the food safety program. For example, cooks are responsible for checking and documenting internal temperatures of food. Employees who serve food are responsible for checking the internal temperature of food on the service line. Employees need to understand their role and perform responsibilities in a thorough and timely manner.



Summary

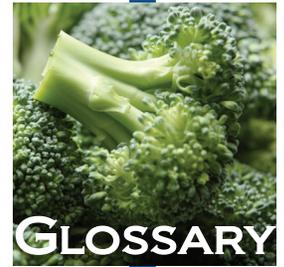
Chapter 6: Food Safety Programs in Schools emphasizes that the safe handling of food is the responsibility of every school foodservice employee. Employees must follow the planned food safety program for their school.

The Process Approach serves as the framework for the food safety program. Grouping food items into three processes—no cook, same day service, and complex food preparation—shows the flow of food, appropriate control measures, when temperatures need to be taken, and what documentation is required.

Managers and employees alike are critical to the implementation of an effective food safety program designed to minimize the risk of foodborne illness for the children served in school nutrition programs.

REFERENCES:

- National Restaurant Association Educational Foundation. (2005). *ServSafe essentials (5th ed)*. Chicago, IL: Author.
- U.S. Department of Agriculture, Food and Nutrition Service, & National Food Service Management Institute. (2006). *Developing a school food safety program: Participant's workbook*. University, MS: Author.
- U.S. Department of Agriculture Food Safety Inspection Service. Parasites and Foodborne Illness. (May 2001). Retrieved June 5, 2009, from http://www.fsis.usda.gov/FactSheets/Foodborne_Illness_&_Disease_Fact_Sheets/index.asp
- U.S. Department of Agriculture, Food and Nutrition Service, & National Food Service Management Institute. (2004). *Wash your hands: Educating the school community*. University, MS: Author.
- U.S. Department of Agriculture Food Safety Inspection Service. *Foodborne illness: What consumers need to know*. (April 3, 2006). Retrieved from http://www.fsis.usda.gov/FactSheets/Foodborne_Illness_What_Consumers_Need_to_Know/index.asp
- U.S. Department of Health and Human Services Public Health Services, Food and Drug Administration. (2005). FDA food code. Retrieved June 5, 2009, from <http://www.cfsan.fda.gov/~dms/fc05-toc.html>



GLOSSARY

Acidity

A substance with a pH below 7.0

Biological Hazard

Contamination of food or water from harmful microorganisms, including bacteria, viruses, parasites, and fungi

Chemical Hazard

Contamination of food or water from chemical substances such as pesticides, food additives, preservatives, cleaning supplies, and toxic metals that leach from cookware or equipment

Clean

No visible sign of soil

Cross-Contamination

The transfer of harmful microorganisms from a surface (hand- or food-contact) to food or from one food to another food

Facultative Microorganisms

Microorganisms that can grow with or without oxygen. Most bacteria that cause foodborne illness are in this group.

Food-Contact Surface

A surface of equipment or a utensil with which food normally comes into contact or a surface from which food may drain, drip, or splash into a food or onto a surface normally in contact with food

Foodborne Illness

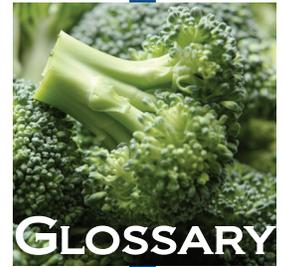
A disease carried to people by food or water

Foodborne Outbreak

An incidence in which two or more people experience the same illness after eating the same food. It must be confirmed by a laboratory analysis showing the source of the foodborne illness to be a specific food.

Hazard Analysis and Critical Control Point (HACCP)

A written procedure that describes a process to reduce the risk of foodborne illness



Hot-Holding Equipment

Foodservice equipment designed to hold hot foods at a temperature at or above 135 °F. Examples include steam tables, heated cabinets, and bains maries. Hot-holding equipment should never be used to heat or reheat foods.

Ice-Water Bath

A cooling method where food is placed in pans, and the pans are placed in ice water in a sink or another pan or pot

Pathogen

Disease-causing microorganisms, including bacteria

Personal Hygiene

Health habits that include clean hair, body, and teeth; clean clothes and shoes; correct hand washing; and maintaining good health

pH

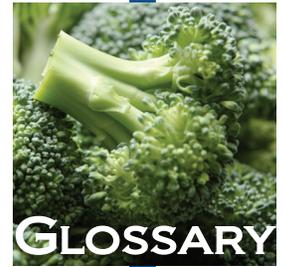
The expression of the degree of acidity. On a scale from 1 to 14, 7 is neutral, 1 is most acid, and 14 is most alkaline or least acid.

Physical Hazard

Contamination of food or water from foreign objects that accidentally get into food, such as bone fragments, dirt, nail polish, plastic fragments, or broken glass

Potentially Hazardous Food

A food that is natural or synthetic and requires temperature control because it is in a form capable of supporting: (1) the rapid and progressive growth of harmful microorganisms; (2) the growth of toxin production of *Clostridium botulinum*; or (3) in raw shell eggs, the growth of *Salmonella enteritidis*. Foods included are raw or cooked foods from animals; cooked plant foods; raw seed sprouts; cut melons; and garlic-in-oil mixtures that have not been treated so they do not support growth of harmful microorganisms. Examples are milk and milk products; meat—beef, pork, lamb; poultry; fish; shell eggs; shellfish and crustaceans; tofu or other soy-protein foods; sprouts and raw seeds; baked and boiled potatoes; cooked rice, beans, and other heat-treated products; cut melons; and garlic-and-oil mixtures.



Ready-To-Eat Food

Food that is in an edible form without washing, cooking, or additional preparation by the foodservice and is generally consumed in that form. Some examples include raw, washed, or cut fruits and vegetables; deli meats and hot dogs; and cheeses.

Sanitize

To use either a chemical or heat on a clean surface to reduce the number of microorganisms or other contaminants to a level that is not harmful

Single-Use Items

Items that are designed to be used and then disposed. Examples include paper towels and napkins, disposable gloves, plastic eating utensils, paper or Styrofoam plates and trays, aluminum foil, and plastic wrap.

Smallware

Dishes, trays, flatware, glasses, and small utensils

Temperature Danger Zone

The temperature danger zone is between 41°F and 135 °F and refers to the required, safe internal temperature of food. Whenever food is in the temperature danger zone too long, it can become unsafe. For best practice, a foodservice operation should document temperatures and maintain written procedures. Follow state and local public health department recommendations to control time and temperature at each stage of food production.

Toxin

A poisonous substance produced by a living organism such as bacteria



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RESOURCES FOR FOOD SAFETY INFORMATION



Following are some resources you will find helpful when developing a food safety program for your foodservice facility.

- Title:** 2005 *U.S. FDA Food Code*
Source: Food and Drug Administration
Description: The *Food Code* is a reference document for regulatory agencies responsible for overseeing food safety in retail outlets such as restaurants and grocery stores and institutions such as nursing homes and child care centers. The *Food Code* is updated every 2 years, and state, local, and some tribal jurisdictions may use the *Food Code* as a model for their sanitation codes. The most recent *Food Code* is available from the Web site below, which also includes a synopsis of changes from the 2005 *Food Code*.
Web Site: <http://www.cfsan.fda.gov/~dms/fc05-toc.html>
- Title:** *ServSafe Essentials* (5th ed., 2005)
Source: Chicago: National Restaurant Association Educational Foundation
Phone: 800-765-2122
Description: References and course books for the *ServSafe* training course.
Web Site: <http://www.servsafe.com/Foodsafety/overview/>
- Title:** Thermometer Education Campaign as *Thermy™ Art and Educational Materials*
Source: U.S. Department of Agriculture, Food Safety Education Office, Washington, D.C.
Phone: 301-344-4755
Description: Consumer art and educational materials featuring *Thermy™*, a messenger for food safety. The materials can be reproduced for use with consumer education. Note that because these materials were designed for the public, some temperatures may not be consistent with state and local public health department regulations for institutional foodservice. Always refer to state and local public health department regulations.
Web Site: http://www.fsis.usda.gov/Food_Safety_Education/Thermy/index.asp



4. **Title:** *Using Partnerships to Fight BAC!—A Workbook for Local Food Safety Educators*

Source: Partnership for Food Safety Education, New York, NY

FAX: 301-504-2092

USDA Meat and Poultry Hotline: 800-535-4555

Description: *A Workbook for Local Food Safety Educators* describes how to partner in a community to promote food safety. The workbook includes examples of community programs, reproducible worksheets, and other information to use at state and local partner meetings.

Web Site: www.fightbac.org

5. **Titles:** Food safety resources from the National Food Service Management Institute are:

- *Child Care Mini-Posters*
- *Child Care Tips Poster*
- *Developing a School Food Safety Program*
- *Food Safety and Sanitation*
- *Food Safety Fact Sheets*
- *Food Safety in the Child Care Food Program*
- *Food Safety Mini-Posters*
- *Food Safety Standard Operating Procedures (SOPs)*
- *Serving It Safe*
- *Wash Your Hands: Educating the School Community*

Source: National Food Service Management Institute, University, MS

Phone: 800-321-3054

FAX: 800-321-3061 or 662-915-5615

Description: NFSMI disseminates quality publications at an affordable cost in media appropriate to the needs of child nutrition program personnel. All published materials are available on the NFSMI Web site.

Web Site: www.nfsmi.org

Food Safety Web Sites

<http://schoolmeals.nal.usda.gov>

The Healthy School Meals Resource System (HSMRS) is a searchable Web site, providing information to persons working in USDA's Child Nutrition Programs. This Web site includes a Food Safety button that links to resources, current food safety information, and activities.



www.foodsafety.gov

This Web site is the Gateway to Government Food Safety Information. Links to the food safety pages of government Web sites are included. There are many links to other Web sites providing food safety information and resources.

Additional Resources for Food Safety Materials

The following federal agencies and private organizations offer food safety materials. Contact state and local agriculture and public health agencies for state-specific resources.

American Dietetic Association

120 South Riverside Plaza
Suite 2000

Chicago, IL 60606-6995

Phone: 800-877-1600

Web Site: www.eatright.org

American Society for Microbiology

1752 N Street, NW

Washington, DC 20036

Phone: 202-737-3600

Web Site: www.asm.org

American Egg Board

1460 Renaissance Drive

Park Ridge, IL 60068

Phone: 847-296-7043

Web Site: www.aeb.org

Centers for Disease Control and Prevention (CDC)

1600 Clifton Road

Atlanta, GA 30333

Phone: 404-639-3311

Web Site: www.cdc.gov

American Meat Institute

1150 Connecticut Avenue, NW
12th Floor

Washington, DC 20036

Phone: 703-841-2400

Web Site: www.meatami.com

Council of Hotel and Restaurant Trainers

P.O. Box 2835

Westfield, NJ 07091

Phone: 800-463-5918

Web Site: www.chart.org

American Public Health Association (APHA)

800 I Street, NW

Washington, DC 20001

Phone: 202-777-2742

Web Site: www.apha.org

Food Allergy and Anaphylaxis Network

11781 Lee Jackson Highway

Suite 160

Fairfax, VA 22030-3309

Phone: 800-929-4040

Web Site: www.foodallergy.org



**Food and Drug Administration
Center for Food Safety and
Applied Nutrition (CFSAN)**

5100 Paint Branch Parkway
College Park, MD 20740-3835
Phone: 888-723-3366
Web Site: www.cfsan.fda.gov

**Food and Drug Administration
Office of Regulatory Affairs**

Phone: 301-827-3101
Web Site: [www.fda.gov/ora/
inspect_ref/iom](http://www.fda.gov/ora/inspect_ref/iom)

**Food and Drug Administration
Seafood Information
and Resources**

Web Site: [http://vm.cfsan.fda.
gov/seafood1.html](http://vm.cfsan.fda.gov/seafood1.html)

Food Marketing Institute

2345 Crystal Drive
Suite 800
Arlington, VA 22202
Phone: 202-452-8444
Web Site: www.fmi.org

**Gateway to Government Food
Safety Information**

Web Site: www.FoodSafety.gov

**Institute of Food
Technologists (IFT)**

525 West Van Buren
Suite 1000
Chicago, IL 60607
Phone: 312-782-8424
Web Site: www.ift.org

**International Dairy Foods
Association (IDFA)**

1250 H Street, NW
Suite 900
Washington, DC 20005
Phone: 202-737-4332
Web Site: www.idfa.org

**National Cattlemen's
Beef Association**

9110 E. Nichols Avenue
Suite 300
Centennial, CO 80112
Phone: 303-694-0305
Web Site: www.beef.org

**National Center for Infectious
Diseases**

Web Sites:
CDC Diseases and Conditions:
[http://www.cdc.gov/Diseases-
esConditions/](http://www.cdc.gov/DiseasesConditions/)

NCPDIC:
<http://www.cdc.gov/ncpcid/>
NCIRD:
[http://www.cdc.gov/ncird/index.
html](http://www.cdc.gov/ncird/index.html)

NCZVED:
<http://www.cdc.gov/nczved/>

NCHHSTP:
<http://www.cdc.gov/nchhstp/>

**National Environmental
Health Association (NEHA)**

720 South Colorado Boulevard
Suite 1000-N
Denver, CO 80246-1926
Phone: 303-756-9090
Web Site: <http://www.neha.org>



National Fisheries Institute, Inc.

7918 Jones Branch Drive
Suite 700

McLean, VA 22102

Phone: 703-524-8880

Web Site: www.aboutseafood.com

National Frozen and Refrigerated Food Association (NFFA)

4755 Linglestown Road
Suite 300

P.O. Box 6069

Harrisburg, PA 17112

Phone: 717-657-8601

Web Site: www.nffa.org

National Pest Management Association

10460 North Street

Fairfax, VA 22030

Phone: 703-352-6762

Web Site: www.pestworld.org

National Restaurant Association

1200 17th Street, NW
Washington, DC 20036

Phone: 202-331-5900

Web Site: www.restaurant.org

National Restaurant Association Educational Foundation

175 West Jackson Boulevard
Suite 1500

Chicago, IL 60604-2814

Phone: 800-765-2122

Web Site: www.nraef.org/ifsc
(International Food Safety Council)

National Turkey Federation

1225 New York Avenue, NW
Suite 400

Washington, DC 20005

Phone: 202-898-0100

Web Site: www.turkeyfed.org

North American Association of Food Equipment Manufacturers (NAFEM)

161 North Clark Street
Suite 2020

Chicago, IL 60601

Phone: 312-821-0201

Web Site: www.nafem.org

NSF International (National Sanitation Foundation International)

P.O. Box 130140

789 North Dixboro Road

Ann Arbor, MI 48113-0140

Phone: 734-769-8010

Web Site: www.nsf.org

Occupational Safety and Health Administration (OSHA)

200 Constitution Avenue, NW
Washington, DC 20210

Phone: 800-321-6742

Web Site: www.osha.gov

Partnership for Food Safety Education: FightBac!

Web Site: www.fightbac.org

Produce Marketing Association

1500 Casho Mill Road
P.O. Box 6036

Newark, DE 19711

Phone: 302-738-7100

Web Site: www.pma.com



School Nutrition Association

700 South Washington Street
Suite 300
Alexandria, VA 22314

Phone: 703-739-3900 or 800-877-8822

Web Site: www.asfsa.org

United Fresh Product Association

1901 Pennsylvania Avenue, NW
Suite 1100
Washington, DC 20006

Phone: 703-299-6282

Web Site: www.unitedfresh.org

United States Department of Agriculture (USDA)

1400 Independence Avenue, SW
Washington, DC 20250

Web Site: www.usda.gov

United States Department of Agriculture Food and Nutrition Information Center (FNIC)

National Agricultural Library
10301 Baltimore Avenue, Room 105
Beltsville, MD 20705

Phone: 301-504-5719

Web Site: <http://fnic.nal.usda.gov>
(USDA/FDA Foodborne Illness Education Information Center)

United States Department of Agriculture Food and Nutrition Service (FNS)

Child Nutrition Division
3101 Park Center Drive, Room 914
Alexandria, VA 22302

Phone: 703-305-2286

Web Site: www.fns.usda.gov/cnd

Web Site:

<http://schoolmeals.nal.usda.gov>

Healthy School Meals Resource System is a searchable Web site providing information to persons working in USDA's Child Nutrition Programs. The site includes a Food Safety button that links to current food safety resources, information, and activities.

United States Department of Agriculture Food Safety and Inspection Service (FSIS)

1400 Independence Avenue, SW
Washington, DC 20250-3700

Phone: 800-233-3935

Web Site: www.fsis.usda.gov

United States Food and Drug Administration (FDA)

10903 New Hampshire Avenue
Silver Spring, MD 20903

Phone: 888-463-6332

Web Site: www.fda.gov

United States Food Drug Administration

The Bad Bug Book

Web Site: www.cfsan.fda.gov/~mow/intro.html

United States Department of Health and Human Services

200 Independence Avenue, SW
Washington, DC 20201

Phone: 877-696-6775

Web Site: www.hhs.gov

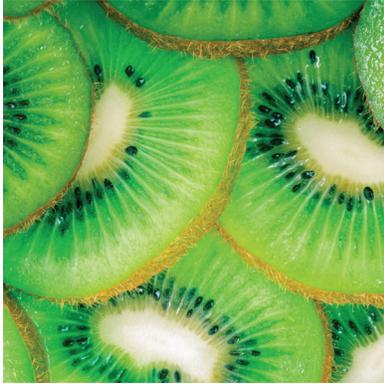
TIPS FOR CUSTOMERS: KEEP YOUR FOOD SAFE

To the foodservice manager:

Print the following page to make a display sign to post near self-service areas of the cafeteria. Laminate the sign before posting.

TIPS FOR CUSTOMERS: KEEP YOUR FOOD SAFE

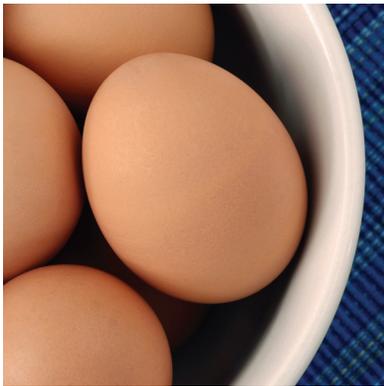
Follow the tips below to help keep your food safe.



1. Never reuse the same plate or tray.

2. Do not touch food with your hands.

3. Step away from the service line and cover your mouth and nose if you have to sneeze or cough.



4. Use the serving utensils that are provided for each menu item.

5. Do not eat near the service line.



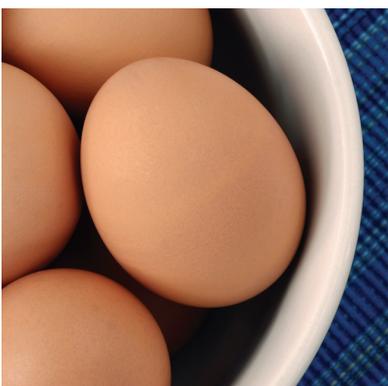
6. Never dip your fingers into a container of food to taste it.

7. Never put your head under the sneeze guard to reach items in the back.



8. If you choose not to eat a food you have placed on your tray or plate, please discard it in the appropriate place.

TEMPERATURE RULES— COOKING FOR FOODSERVICE



**USDA Meat and
Poultry Hotline
1-888-674-6854**

**FDA Food
Information Line
1-888-723-3366**

For alternative times and temperatures, see the 2005 *Food Code* at <http://www.cfsan.fda.gov>.

Food Safety and Inspection Service
U.S. Department of Agriculture
www.fsis.usda.gov

USDA is an equal opportunity employer and provider.

Minimum Temperatures and Holding Times

Hold at specified temperature or above for 15 seconds unless otherwise stated.

Hold all hot food at 135 °F or above after cooking.

165 °F (15 seconds)

- Poultry—chicken, turkey—whole, parts, or ground
- Soups, stews, stuffing, casseroles, mixed dishes
- Stuffed meat, poultry, fish and pasta
- Leftovers (to reheat)
- Any potentially hazardous food cooked in a microwave oven (hold covered 2 minutes after removal)
- Convenience products that include a potentially hazardous food, such as hamburger patties, chicken nuggets, burritos, and pizza

155 °F (15 seconds)

- Ground or flaked meats including hamburger, meatloaf, ground pork, flaked fish (patties or sticks), sausages, gyros
- Fresh shell eggs—cooked and held for service (such as scrambled)

145 °F (15 seconds)

- Beef, corned beef, pork, ham—roasts (hold 4 minutes)
- Beef, lamb, veal, pork—steaks, bacon, or chops
- Fish, shellfish
- Fresh shell eggs—broken, cooked and served immediately

135 °F (15 seconds)

- Ham, other roasts—processed, fully cooked (to reheat)
- Fruits and vegetables to be served hot
- Ready-to-eat food taken from a commercially processed, hermetically sealed container or from an intact package (for example: hot dogs, chicken nuggets)

Wild game is not allowed for use in child nutrition programs.