

## Cooking

Cooking food to the correct temperature is critical for keeping it safe. Each type of food has a minimum internal temperature that it must reach. Once food reaches its minimum internal temperature, make sure that it stays at that temperature for a specific amount of time. Figure 2.30 shows the correct way to check temperature.

Table 2.4 identifies the minimum internal temperatures and times for specific types of food.

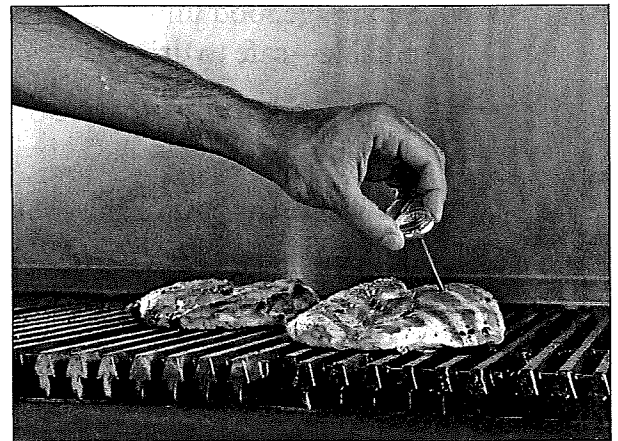
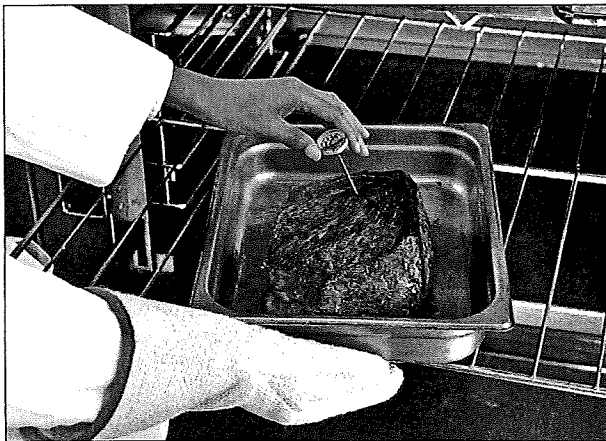
Operations that primarily serve high-risk populations, such as nursing homes and day-care centers, cannot serve certain items—for example, raw seed sprouts, raw or undercooked eggs (such as over-easy eggs), raw or undercooked meat (such as rare hamburgers), or seafood.

[fast fact]

### Did You Know...?

Since 1995, 13 foodborne-illness outbreaks worldwide have been linked to sprouts. These outbreaks sickened 956 people and resulted in one death.

Source: [www.healthnews.com](http://www.healthnews.com)



**Figure 2.30:** To check food temperature correctly: 1) Pick a thermometer with a probe that is the right size for the food. 2) Check the temperature in the thickest part of the food. Take at least two readings in different locations.

**Table 2.4: Cooking Requirements for Specific Types of Food**

Minimum Internal Temperature	Type of Food
165°F for 15 seconds	Poultry—including whole or ground chicken, turkey, or duck Stuffing made with TCS ingredients Stuffed meat, seafood, poultry, or pasta Dishes that include previously cooked TCS ingredients (raw ingredients should be cooked to their minimum internal temperatures)
155°F for 15 seconds	Ground meat—including beef, pork, and other meat Injected meat—including brined ham and flavor-injected roasts Ground seafood—including chopped or minced seafood Eggs that will be hot-held for service
145°F for 15 seconds	Seafood—including fish, shellfish, and crustaceans Steaks/chops of pork, beef, veal, and lamb Eggs that will be served immediately
145°F for 4 minutes	Roasts of pork, beef, veal, and lamb
135°F	Commercially processed, ready-to-eat-food that will be hot-held for service (cheese sticks, deep-fried vegetables)
135°F	Fruit, vegetables, grains (rice, pasta, etc.), and legumes (such as beans, refried beans) that will be hot-held for service

**[nutrition]****Start the Water Boiling Before You Harvest the Corn!**

Careless food-handling can actually decrease the nutrient content of food. Nutrient profiles can be affected by staleness or improper storage. Farm-fresh corn on the cob is one example. The sooner it is cooked and eaten, the higher the sugar content. As the corn ages in transport and storage, sugar converts to starch.

This alters not only the flavor, but also the way a body metabolizes the corn after it is eaten. Sweet-tasting, simple CHO (carbohydrate) molecules are rather quickly cleaved and enter the bloodstream as glucose, raising blood sugar. They are then transported into the cells via insulin. Not-so-sweet starch is a complex CHO, which cleaves more slowly and distributes the glucose to the blood and cells over a longer time frame. The increase in blood sugar is not as dramatic.

Both simple and complex carbohydrates definitely play a role in healthy eating, and you need some of both. Too many simple CHOs are bad, of course. But that doesn't mean you want to eat bland, starchy corn instead of fresh, sweet corn. Get simple CHOs through yummy high-fiber corn, rather than through something with fewer additional nutritional benefits.

## ***Holding, Cooling, and Reheating***

If foodhandlers aren't serving cooked food immediately, they must keep it out of the temperature danger zone. This means cooling the food quickly, reheating it correctly, and/or holding it correctly.

### **Holding**

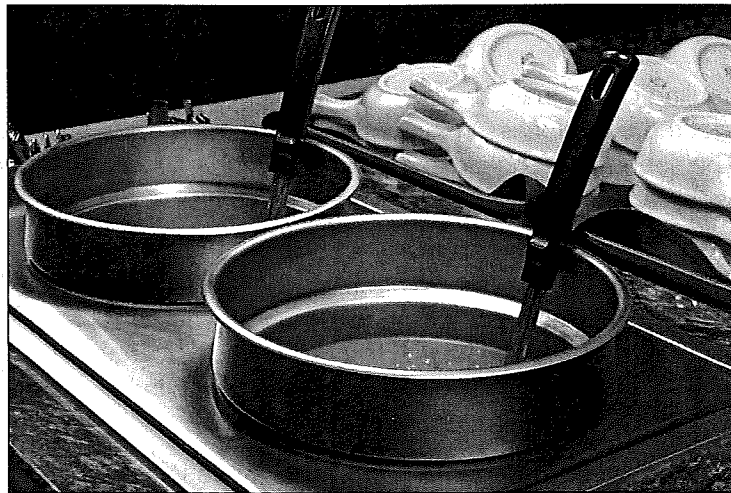
To hold TCS food safely, hold hot food at 135°F or higher and hold cold food at 41°F or lower. Be sure to check temperatures at least every four hours. Throw out any food that's in the temperature danger zone. Figure 2.31 shows the proper way to hold hot food.

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#### **Essential Skills**

##### *Holding Foods*

- Hold hot food at 135°F or higher.
- Hold cold food at 41°F or lower.
- Check temperatures at least every four hours. Throw out any food that's in the temperature danger zone.
- Do not use hot-holding equipment to reheat food if it is not designed to do so.



**Figure 2.31:** Hold hot food at 135°F or higher.

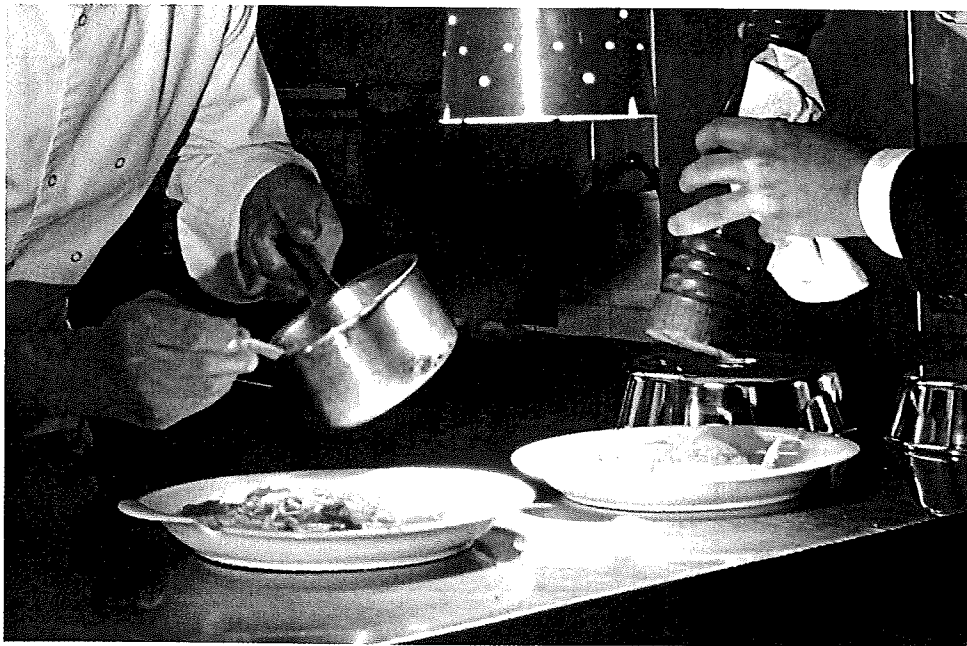
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### Infrared Technology

**Infrared** is a frequency of radiation waves of the electromagnetic spectrum, and **radiation** is simply the transfer of energy without physical contact. Infrared is just beyond the wavelength of the visible color red. This means that the waves are always all around you, whether you can detect them or not. Infrared waves play a role in culinary technology. One example is the culinary laser thermometer that uses infrared technology to quickly measure the surface temperature of hot pans.

The transfer of heat from something hot to something cold is really the flow of energy from a source of high energy to a lower energy material. When ice melts, waves of energy bombard the surface of the ice and cause the water molecules to move faster, which makes them liquid again. Temperature is really just molecular speed. When hot food is quickly cooled for storage, the hot food is actually transferring energy in the form of heat away from the product to something else (like a cooling paddle). You don't add cold, you remove heat. Thanks to radiation, materials do not have to be touching to transfer heat.

Figure 2.32 shows dishes under an infrared light, waiting to be served.

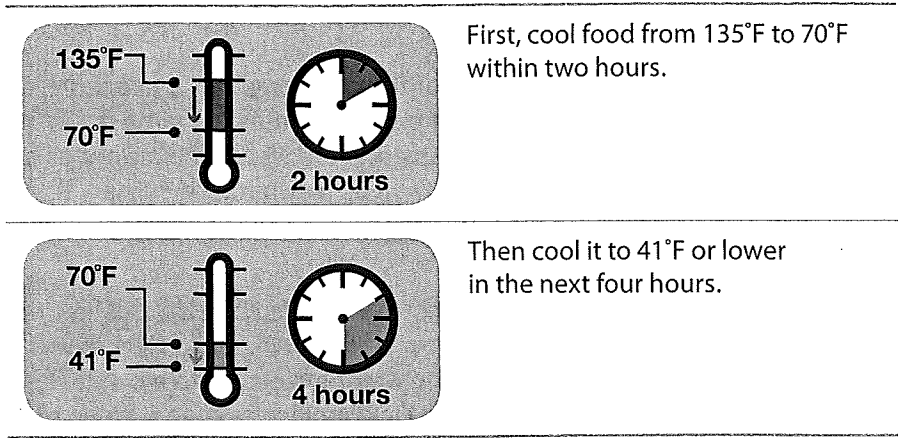


**Figure 2.32:** The chef is holding food under an infrared light until it is served.

## Cooling

Remember, pathogens grow well in the temperature danger zone. And they grow much faster at temperatures between 125°F and 70°F.

Cool TCS food from 135°F to 41°F or lower within six hours. First, cool food from 135°F to 70°F within two hours. Then cool it to 41°F or lower in the next four hours. Figure 2.33 explains how to properly cool TCS foods.






First, cool food from 135°F to 70°F within two hours.

Then cool it to 41°F or lower in the next four hours.

**Figure 2.33:** Cool TCS foods from 135°F to 41°F or lower within six hours.

If food hasn't reached 70°F within two hours, it must be either thrown out or reheated and then cooled again. Table 2.5 outlines how to cool food quickly and safely.

<b>Table 2.5: Cooling Food Quickly and Safely</b>	
	Reduce the size of food into smaller amounts by either cutting large food items into smaller pieces or dividing large containers of food into smaller containers or shallow containers.
	Place small containers into a prep sink or a large pot filled with ice water. This is called an ice-water bath. Stir the food frequently to cool it faster and more evenly.
	Use ice paddles to stir food. Ice paddles are plastic paddles that can be filled with ice or with water and then frozen. Food stirred with these paddles cools quickly.

### Reheating

If foodhandlers plan to reheat leftover or previously prepared TCS food so that it can be held for service, they must heat the food to an internal temperature of 165°F. The food needs to go from storage temperature to 165°F within two hours and then stay at that temperature for 15 seconds. If it doesn't reach this temperature, throw the food out.

If the food is going to be reheated for immediate service, just reheat it to an appropriate serving temperature.

**[fast fact]****Did You Know...?**

Doggy bags are containers of food that are left over from a meal that the customer has chosen to take home. Most of the time, the food is taken away while it is in the temperature danger zone, where bacteria that causes foodborne illnesses grows well. To minimize risk of foodborne illness, restaurant staff should transfer the food (leftovers) into a new, unused, food-grade container, and they should remind the customer to store the food according to food safety guidelines.

## *Serving*

The biggest threat to food that is ready to be served is contamination. Kitchen and service employees must know how to serve food in ways that keep it safe.

The kitchen staff must follow the guidelines below:

- Handle ready-to-eat food with tongs, deli sheets, or gloves.
- Use separate utensils for each food item. Clean and sanitize them after each serving task.
- Store serving utensils in the food with the handle extended above the rim of the container, to prevent anyone accidentally touching the food while they try to retrieve the utensil, which might contaminate the food. Alternatively, place utensils on a clean and sanitized food-contact surface.

The service staff needs to be just as careful as the kitchen staff. They can contaminate food by handling the food-contact areas of glasses, utensils, and dishes. Figure 2.34 shows guidelines for service staff when serving food.

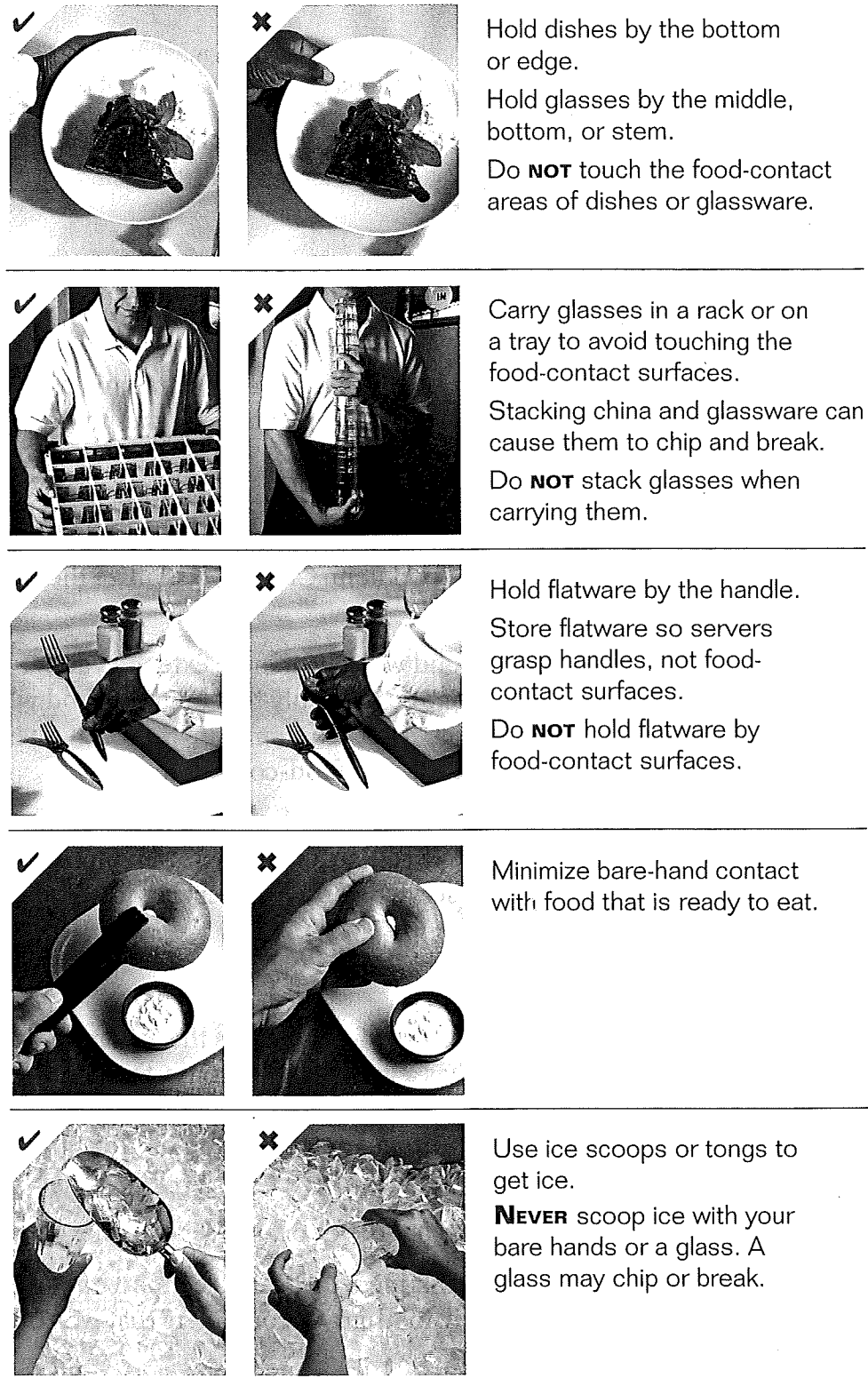
## **Off-Site Foodservice**

Any delay between preparation and service increases the threat to food safety. Food that will be served off-site has a greater risk of time-temperature abuse and contamination. Figure 2.35 shows an example of an insulated food container that keeps food at the proper temperature during holding, transporting, and catering.

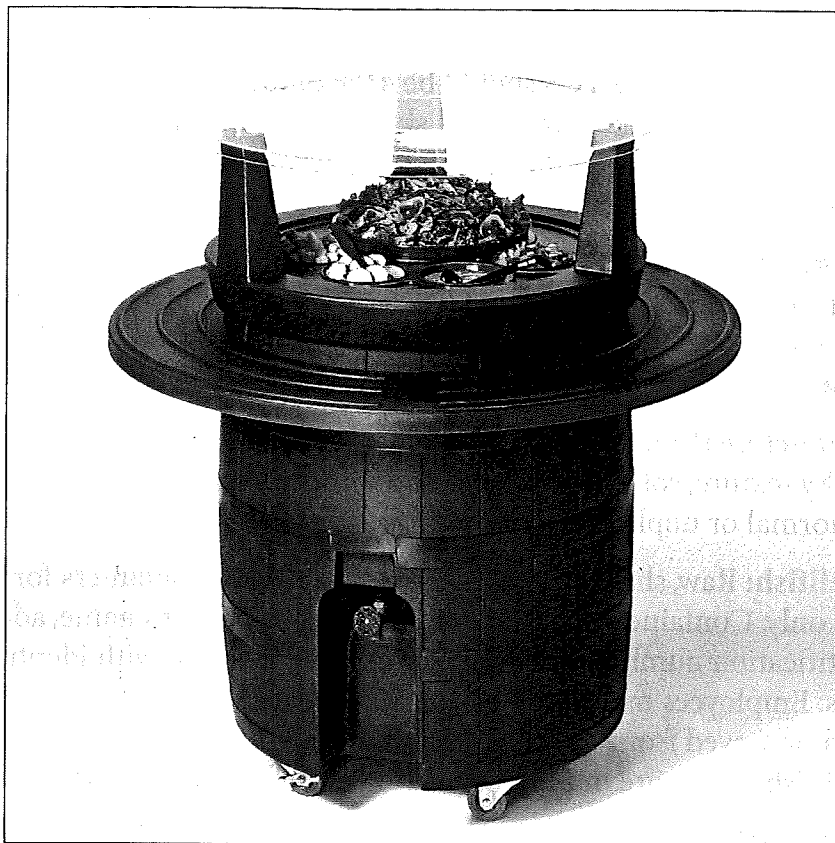
There are specific procedures to keep food for off-site service safe:

- Pack food in insulated food containers that can keep food out of the temperature danger zone. Use only food-grade containers that won't mix, leak, or spill food.
- Check internal food temperatures regularly.
- Clean the inside of delivery vehicles regularly.





**Figure 2.34:** Service staff should use these guidelines when serving food.



**Figure 2.35:** Food should be held and transported at the proper temperature using insulated equipment.

## Summary

In this section, you learned the following:

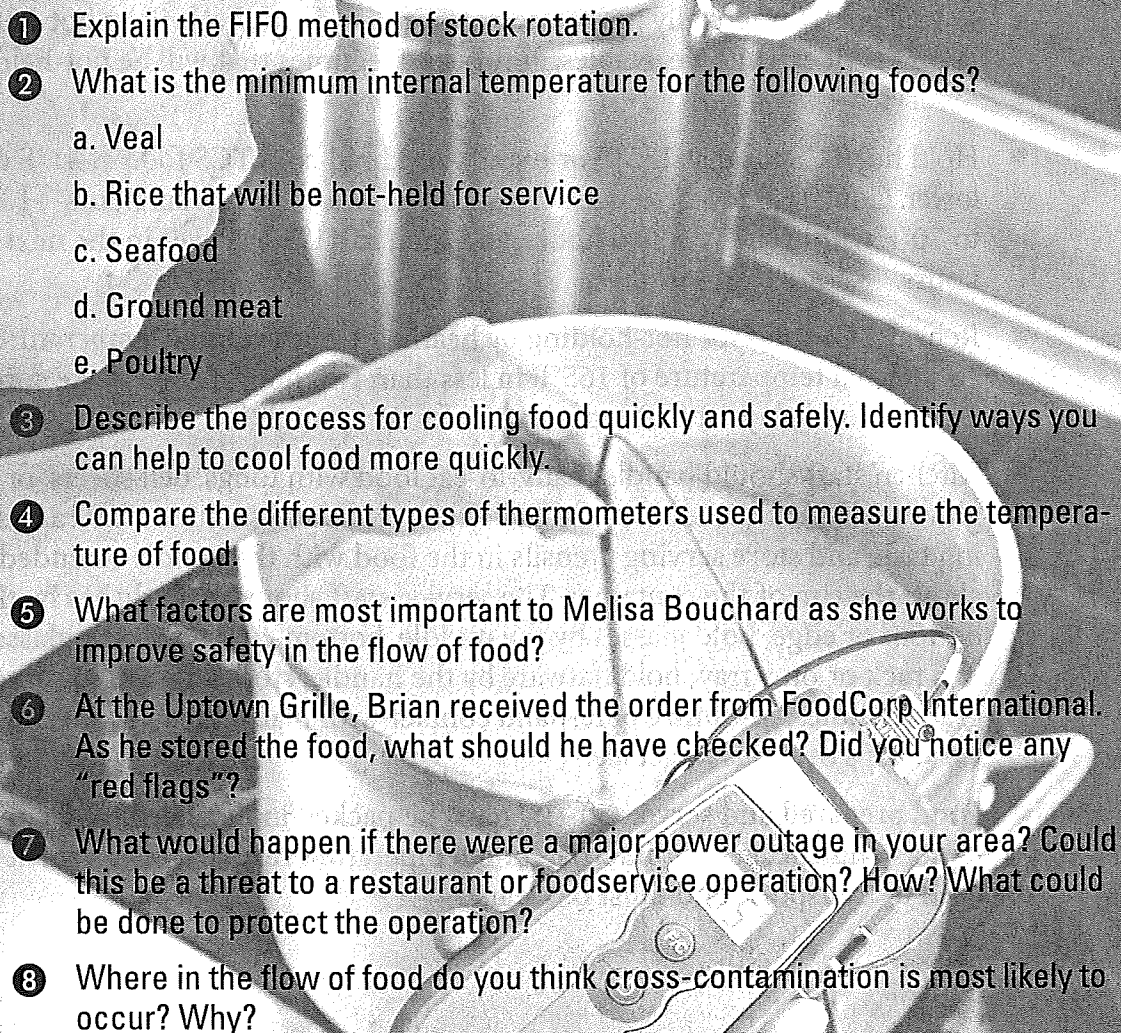
- Cross-contamination can be prevented by making sure workstations, cutting boards, and utensils are clean and sanitized; not allowing ready-to-eat food to touch surfaces that have come in contact with raw meat, seafood, or poultry; preparing different kinds of foods at different times; and cleaning and sanitizing work surfaces and utensils between each product.
- To prevent time-temperature abuse, minimize the amount of time that food spends in the temperature danger zone.
- Three types of thermometers commonly used in operations are bimetallic stemmed thermometers, thermocouples, and thermistors. In addition, infrared thermometers use infrared technology to produce accurate external temperature readings of food and equipment surfaces.
- An approved food source (supplier) is one that has been inspected and meets all applicable local, state, and federal laws.



- The criteria for accepting or rejecting food during receiving are as follows:
  - **Temperature:** Cold TCS should be 41°F or lower, hot TCS should be 135°F or higher, and frozen food should be frozen. Reject any frozen food that has ice crystals on the product or packaging or if any fluids or frozen liquids appear in the bottom of its case.
  - **Packaging:** For both food and nonfood items, packaging should be intact and clean. Reject any item that has a package with tears, holes, punctures, leaks, dampness, water stains, signs of pest damage, or an expired use-by date.
  - **Product quality:** Reject any food that has an abnormal color, slimy or sticky texture, soft flesh that leaves an imprint when you touch it, or abnormal or unpleasant odor.
  - **Shellfish:** Raw, shucked shellfish are packaged in containers for one-time use only. Containers must be labeled with the packer's name, address, and certification number. Live shellfish must be received with identification tags. Employees must write on the tags the date that the last shellfish was sold or served from the container, and keep the tags as records. Reject shellfish if they are muddy, have broken shells, or are dead.
  - **Eggs:** Shell eggs must be clean and unbroken. Reject shell eggs received at an air temperature higher than 45°F.
  - **Milk and dairy products:** These products must be received at 41°F or lower unless otherwise specified. They must be pasteurized and meet FDA Grade A standards.
- All TCS foods must be stored at 41°F or lower or at 135°F or higher. Label all ready-to-eat TCS food prepped in-house that will be held for more than 24 hours. These foods can be stored in-house for a maximum of seven days at 41°F or lower. Rotate food to use the oldest inventory first, and wrap or cover food. Refrigerate raw meat, poultry, and seafood separately from ready-to-eat food. Store raw meat, poultry, and seafood in coolers in the following top-to-bottom order: seafood on top, then whole cuts of beef and pork, then ground meat and ground fish, and at the bottom, whole and ground poultry.
- The following are minimum internal temperature requirements for cooking TCS foods:
  - **165°F for 15 seconds:** Poultry, stuffing made with TCS ingredients, stuffed meat/seafood/poultry/pasta, dishes that include previously cooked TCS ingredients
  - **155°F for 15 seconds:** Ground meat, injected meat, ground seafood, eggs that will be hot-held for service

- **145°F for 15 seconds:** Seafood, including fish, shellfish, and crustaceans; steaks/chops of pork, veal, and lamb; eggs that will be served immediately
- **145°F for 4 minutes:** Roasts of pork, beef, veal, and lamb
- **135°F:** Commercially processed ready-to-eat food that will be hot-held for service; fruits, vegetables, grains, and legumes that will be hot-held for service
- Hold hot TCS food at 135°F or higher, and hold cold TCS food at 41°F or lower. Cool TCS food from 135°F to 41°F or lower within six hours—135°F to 70°F within the first two hours, and then to 41°F or lower in the next four hours.
- Reheat TCS food for hot-holding by heating it from storage temperature to an internal temperature of 165°F in less than two hours. Then make sure that the food stays at that temperature for 15 seconds.
- Kitchen staff should handle ready-to-eat food with tongs, deli sheets, or gloves; use separate utensils for each item; clean and sanitize after each serving task; and store serving utensils in the food with the handle extended above the rim of the container. The service staff should hold dishes by the bottom or edge; hold glasses by the middle, bottom, or stem; carry glasses in a rack or on a tray; hold flatware by the handle; store flatware so servers grasp handles; minimize bare-hand contact with ready-to-eat food; and use ice scoops or tongs to get ice.
- Food prepared and served off-site must be packed in insulated food containers and checked for internal food temperature regularly. The vehicle used to transport food must be clean.

## Section 2.3 Review Questions

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- 1 Explain the FIFO method of stock rotation.
  - 2 What is the minimum internal temperature for the following foods?
    - a. Veal
    - b. Rice that will be hot-held for service
    - c. Seafood
    - d. Ground meat
    - e. Poultry
  - 3 Describe the process for cooling food quickly and safely. Identify ways you can help to cool food more quickly.
  - 4 Compare the different types of thermometers used to measure the temperature of food.
  - 5 What factors are most important to Melisa Bouchard as she works to improve safety in the flow of food?
  - 6 At the Uptown Grille, Brian received the order from FoodCorp International. As he stored the food, what should he have checked? Did you notice any “red flags”?
  - 7 What would happen if there were a major power outage in your area? Could this be a threat to a restaurant or foodservice operation? How? What could be done to protect the operation?
  - 8 Where in the flow of food do you think cross-contamination is most likely to occur? Why?

## Section 2.3 Activities

### 1. Study Skills/Group Activity: Safeguarding the Flow of Food

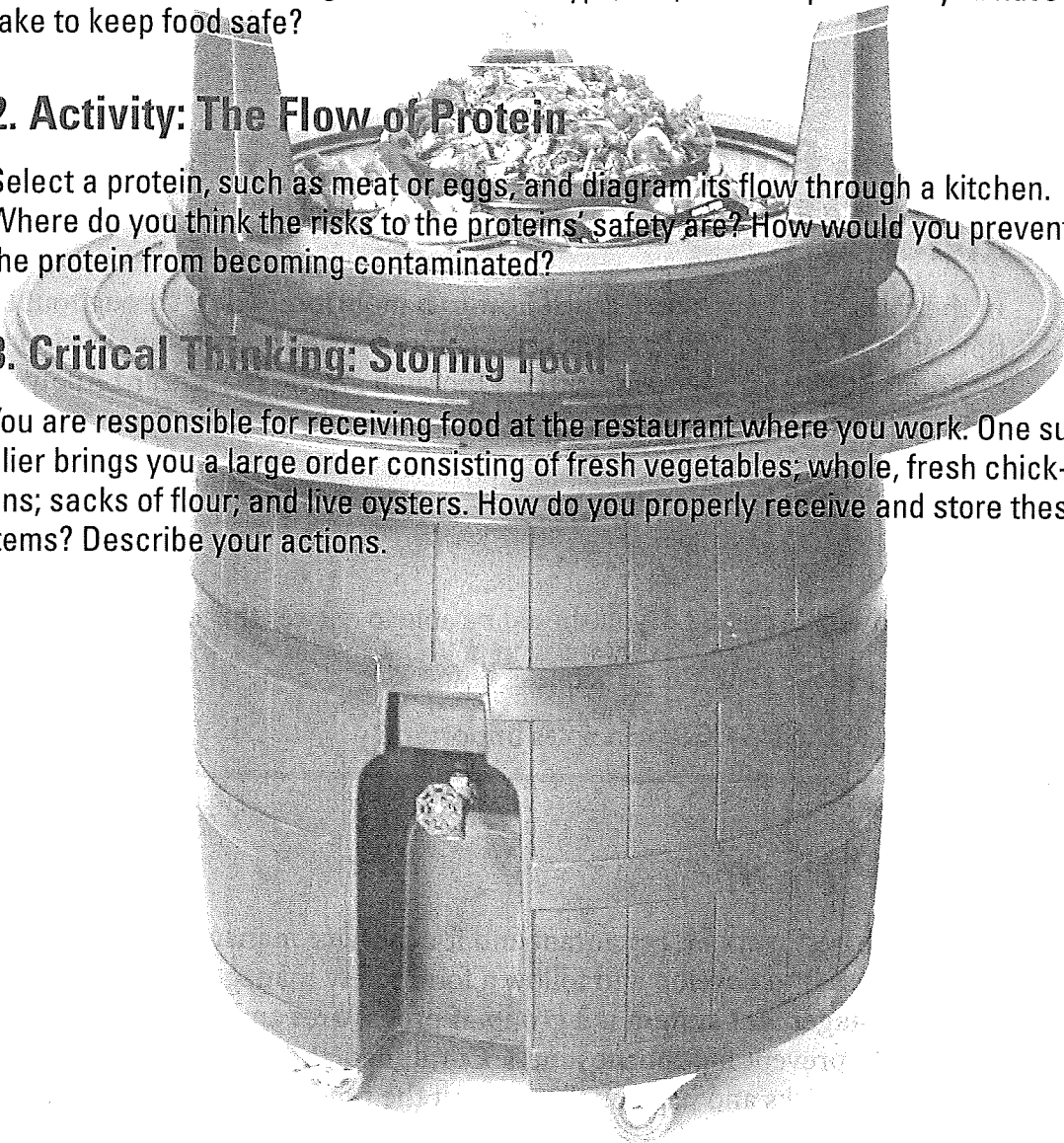
As a group, brainstorm three types of off-site foodservice—for example, catering an event at a banquet hall versus catering a beachside clambake versus catering a summer luncheon in a garden. For each type/site, what steps would you have to take to keep food safe?

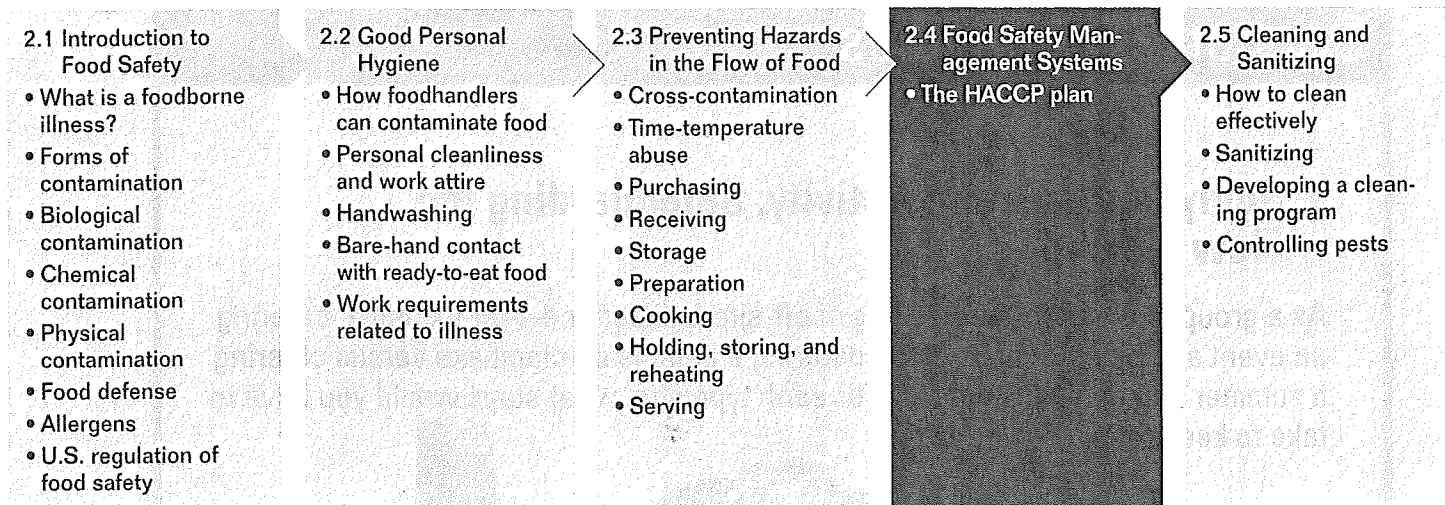
### 2. Activity: The Flow of Protein

Select a protein, such as meat or eggs, and diagram its flow through a kitchen. Where do you think the risks to the protein's safety are? How would you prevent the protein from becoming contaminated?

### 3. Critical Thinking: Storing Food

You are responsible for receiving food at the restaurant where you work. One supplier brings you a large order consisting of fresh vegetables; whole, fresh chickens; sacks of flour; and live oysters. How do you properly receive and store these items? Describe your actions.





## SECTION 2.4 FOOD SAFETY MANAGEMENT SYSTEMS

In the earlier sections, you learned how to handle food safely throughout the flow of food. The next step in preventing foodborne illness is the development of a food safety management system. One such system is a Hazard Analysis Critical Control Point system, or HACCP.

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### Study Questions

After studying Section 2.4, you should be able to answer the following questions:

- What are the HACCP principles?
  - Why are the HACCP principles important?
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### *The HACCP Plan*

One of the best ways for restaurant and foodservice managers to prevent foodborne illness is to develop and follow a food safety management system. A **food safety management system** is a group of procedures and practices that work together to prevent foodborne illness. Combined, these procedures and practices control risks and hazards throughout the flow of food in an operation.

A **Hazard Analysis Critical Control Point**, or **HACCP** (HASS-ip), system is an example of a food safety management system. HACCP identifies major hazards at specific points within a food's flow through the operation. The idea is that if managers can figure out where a biological, chemical, or physical hazard might happen, then they can prevent, eliminate, or reduce it.