

# 1.2

## The Flow of Food

### READING PREVIEW

#### Key Concepts

- Describing the flow of food
- Receiving foods safely
- Storing foods safely
- Cooking foods safely
- Serving foods safely

#### Vocabulary

- dry goods
- First In, First Out (FIFO) system
- flow of food
- holding
- one-stage cooling method
- perishable goods
- time-temperature-abused food
- two-stage cooling method

## The Flow of Food

Foodservice establishments of all sorts, whether they are fine dining restaurants, delis, or cafeterias, have a responsibility to their customers to serve safe foods. Cooks and chefs play a critical role in making sure the food the customer eats is as safe and wholesome as it can be.

Food can become contaminated between the time it arrives at the kitchen and the time it is served to customers. The **flow of food** is the route food takes from the time a kitchen receives it to the time it is served to the customer. Learning about the flow of food through a restaurant helps you learn not only when foods may become contaminated, but also how to reduce or eliminate the risk of contamination.



READING CHECKPOINT

*What is the flow of food?*

## Receiving Foods

The foods that are purchased by a restaurant must come from a reputable source. The restaurant is responsible for being certain that the companies or individuals from whom it buys food meet all the necessary requirements for supplying and delivering safe foods. The source is responsible for providing the food in good condition.

The first step in the flow of food is receiving. When you receive food, there's a handoff of responsibility. You are now taking responsibility for the food your restaurant receives. You must always inspect any food you receive for damage. Different types of food have different potential problems.

**Perishable goods**, for example, are foods that must be properly wrapped and kept cold until they arrive at your restaurant. There are two types of



Source: Culinary Institute of America



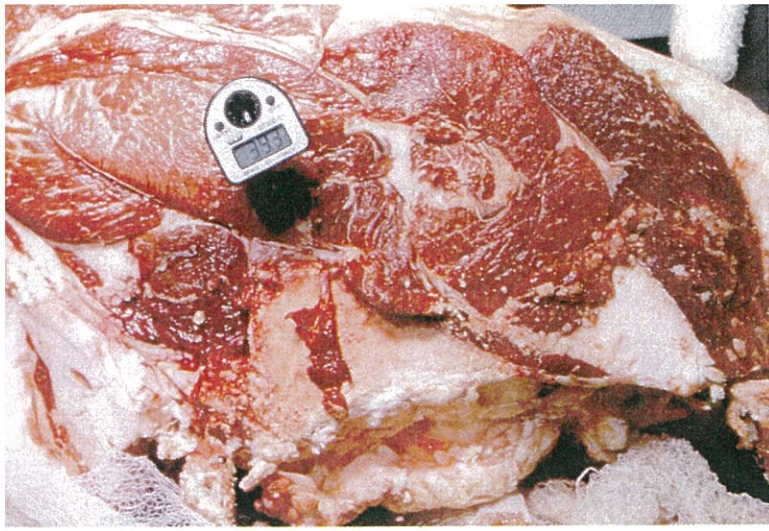


FIGURE 1-11

### Inspecting Food

Check the condition of all foods when they arrive.

**APPLYING CONCEPTS** *Why is it important to check the condition of food as it arrives?*

Source: Culinary Institute of America

perishable goods—those stored in the refrigerator and those stored in the freezer. Examples of perishable goods requiring refrigerator storage are meats and milk. You are responsible for checking deliveries to be sure perishable goods are at safe temperatures when you receive them.

Perishable goods that require storage in the freezer should be completely frozen when you get them. The packaging should not have any rips or tears. If you see large ice crystals or drips, the food has started to thaw while it was on its way to you.

Foods such as flour, tea, sugar, rice, and pasta are known as **dry goods**. These foods should arrive at your restaurant well wrapped. Any packaging should be free from tears or rips. Canned goods should never have bulges, dents, signs of rust, or leaks.

You should reject any food that does not have clean, intact packaging or that is not at the appropriate temperature.

Nonfood items, including cleaning supplies, paper goods, and linens, must also be inspected when they are received. They should be in clean, intact packaging with no rips, tears, or leaks.



#### READING CHECKPOINT

*What is the first step in the flow of food?*

## Storing Foods

Once you are certain food you just received is safe, make sure it is stored correctly. This is the second step in the flow of food. You need to avoid cross-contamination and spoilage, while storing foods efficiently. Store freshly delivered food behind food you already have on hand so the oldest food gets used first. Rotating the inventory in this way assures that there is less waste. This stock rotation technique is referred to as a **First In, First Out (FIFO) system**. It should be used for both perishable and nonperishable goods. Many food establishments write the date they received a food on the packaging, using an indelible marker.

All perishable goods requiring refrigeration must be transferred immediately to the refrigerator. If possible, store raw ingredients and prepared food separately. If raw ingredients and prepared food must be stored together, always store the raw food below any cooked or ready-to-eat foods to avoid cross-contamination. Foods that may drip or leak should be placed in clean, sanitized containers. Check the temperature of the refrigerator frequently with an appliance thermometer. Refrigerators should be kept between 36°F and 40°F. However, the ideal storage temperature for specific food items may require lower or higher temperatures than normally available in a refrigerator.

## FOCUS ON Safety

### The Ideal

The ideal storage temperature is the temperature that both is safe and ensures that the food item is at its optimal quality. It may be necessary to store food on ice in the refrigerator, for example, to achieve the ideal storage temperature.



Frozen food must immediately be transferred to the freezer. Never place hot food directly into the freezer. It will raise the freezer's temperature and could cause other frozen foods to thaw. Freezers should be kept between  $-10^{\circ}\text{F}$  and  $0^{\circ}\text{F}$ .

Put dry goods away in a dry, clean, cool storage area well away from cleaning supplies or chemicals. If you need to transfer food from its original container, be sure the containers you use are clean and sanitized and have tight-fitting lids. Dry goods should be at least 6 inches off the floor and 6 inches away from the wall. Dry storage areas should be kept between  $50^{\circ}\text{F}$  and  $70^{\circ}\text{F}$ .

Store cleaning supplies and chemicals in the appropriate area, between  $50^{\circ}\text{F}$  and  $70^{\circ}\text{F}$ . They should be kept in a separate area of the storage room or, ideally, in a separate room or storage closet. Be sure that these items are clearly identifiable so that they cannot be mistaken for a food product. Linens and paper goods should also be stored separately to keep them from being contaminated or soiled during storage.



**READING CHECKPOINT**

What is meant by FIFO and why is it important to proper food storage?

## Ideal Storage Temperatures

Food Item	Ideal Storage Temperatures
Meat and poultry	$32^{\circ}\text{F}$ to $36^{\circ}\text{F}$
Fish and shellfish	$30^{\circ}\text{F}$ to $34^{\circ}\text{F}$
Eggs	$33^{\circ}\text{F}$ to $38^{\circ}\text{F}$
Dairy products	$36^{\circ}\text{F}$ to $41^{\circ}\text{F}$
Produce (refrigerated)	$32^{\circ}\text{F}$ to $50^{\circ}\text{F}$

## Cooking Foods Safely

When you cook foods, it is important to protect them from cross-contamination. Clean and sanitary work habits and proper food storage procedures are important parts of keeping foods safe from cross-contamination.

**Preparing Foods Safely** Store perishable foods in the refrigerator until you are ready to prepare them. Work with only what you need for about an hour. Don't let food sit on the counter. Return any unused portion to the refrigerator.

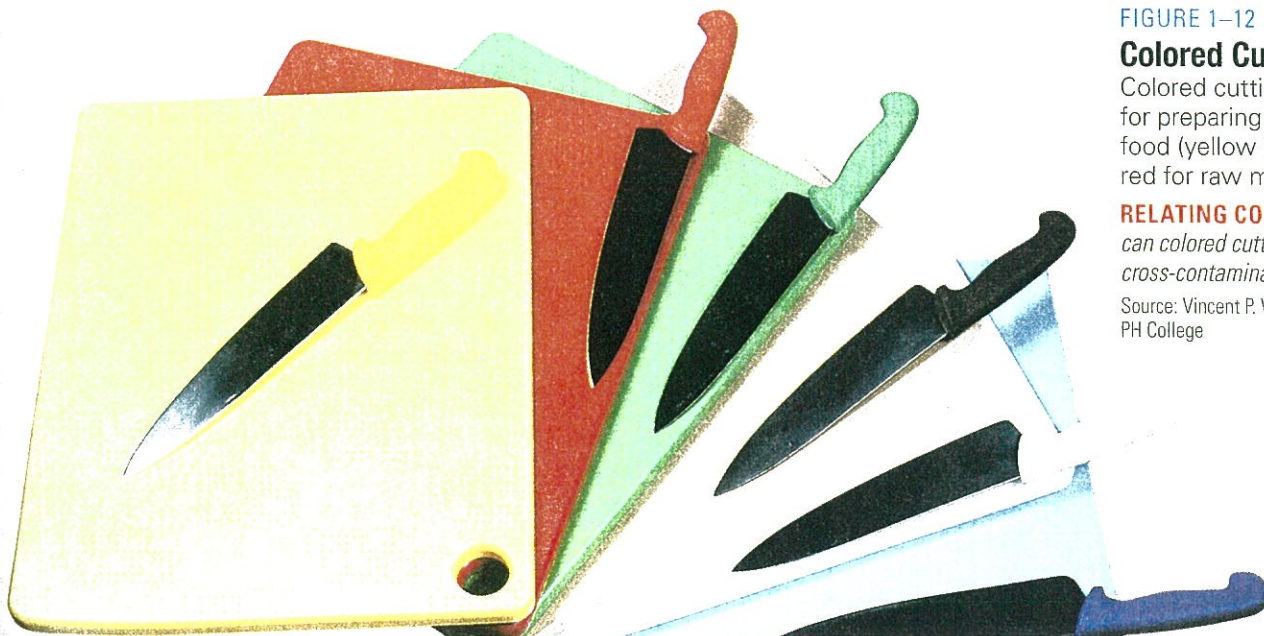


FIGURE 1-12

### Colored Cutting Boards

Colored cutting boards are used for preparing specific types of food (yellow is used for poultry, red for raw meat, and so on).

**RELATING CONCEPTS** How can colored cutting boards reduce cross-contamination?

Source: Vincent P. Walter/Pearson Education/PH College





## Chef's Tip

### Thermometers

Clean and sanitize thermometers after every use.

FIGURE 1-13

### Checking the Temperature of Cooked Food

A thermometer indicates when the food comes to a safe temperature.

**DRAWING CONCLUSIONS** *The thermometer reads 145.7°F. Is this rotisserie chicken safe to serve?*

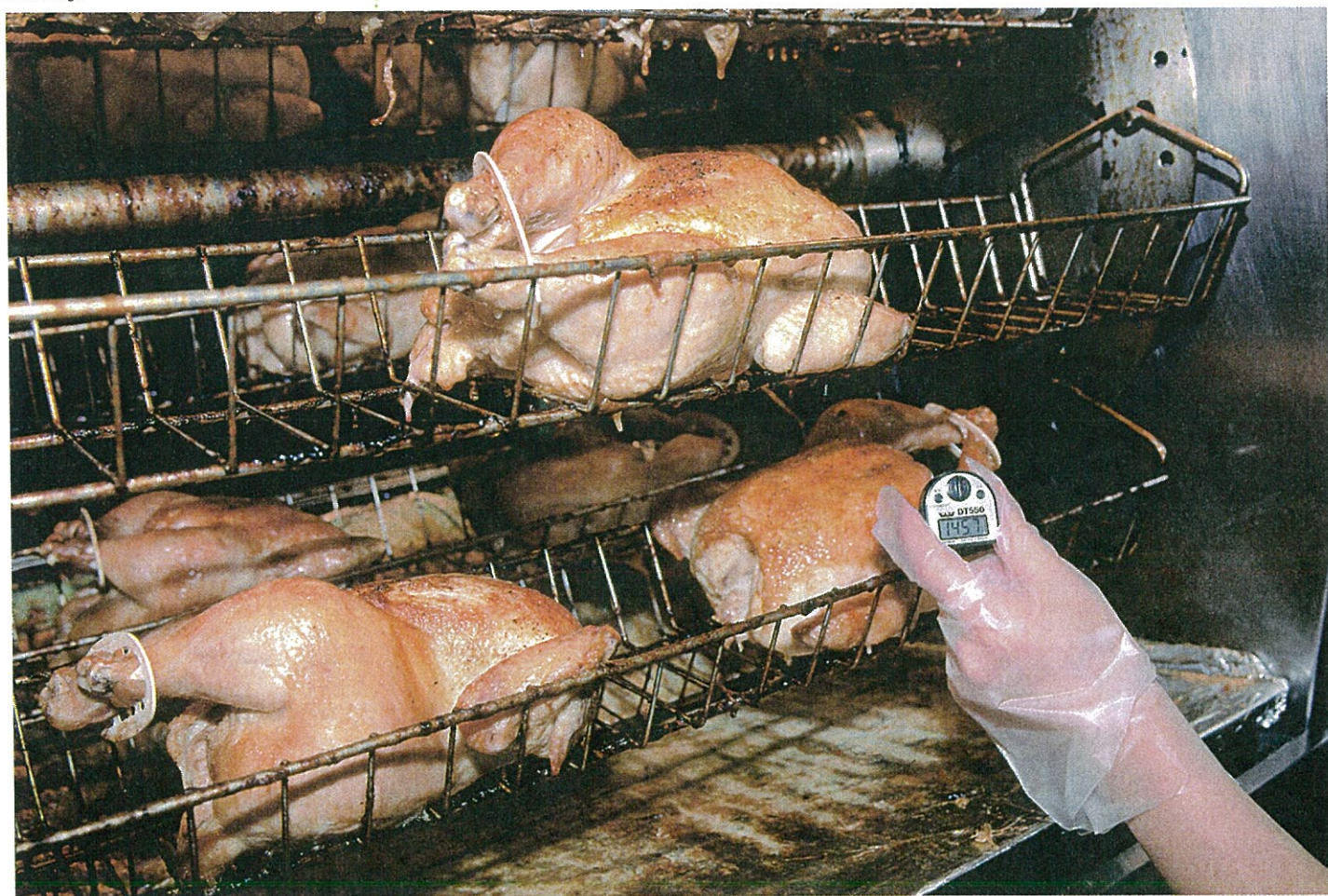
Source: Vincent P. Walter/Pearson Education/PH College

One of the biggest concerns when you are preparing food is cross-contamination. Be sure your hands and tools and any surface the food may touch are clean and sanitized. Prepare different types of food on separate cutting boards or in different areas.

Keep a container of sanitizing solution nearby. (It's important to use the correct proportion of sanitizer and water.) Also keep plenty of single-use towels on hand. Dip a single-use towel into the sanitizing solution and wring it out before you use it to wipe down cleaned cutting boards or knives. Spray the solution on tools that are difficult to wipe. You should also keep your hand tools (spoons, ladles, and whisks, for example) in a container of sanitizing solution between uses. Replace the solution when it gets dirty. Dirt in the sanitizing solution keeps it from working properly.

**Monitoring Food Temperature** You should expect raw foods, especially meats, fish, and poultry, to contain harmful microorganisms. Hazardous foods need to come to temperatures high enough to kill these pathogens.

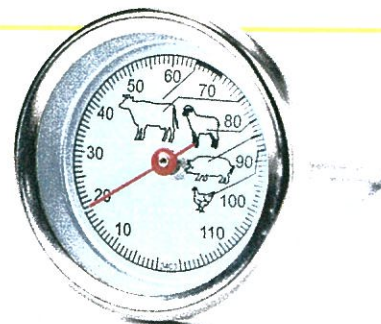
Once you begin to cook, it is important to bring food to safe temperatures as quickly as possible. Since most foods are served at temperatures that fall within the temperature danger zone (between 41°F and 135°F), you need to minimize how long foods stay in that range.





## Recommended Temperatures

Food Type	Recommended Internal Temperature	Minimum Time at Recommended Temperature before Serving
Beef roasts (rare)	130°F	112 minutes
	140°F	12 minutes
Roasts (medium beef, pork), lamb, veal	145°F	4 minutes
Fish, pork, and beef (other than roasts)	145°F	15 seconds
Ground meats (beef, pork, and game), ham steak	155°F	15 seconds
Poultry, stuffed meats	165°F	15 seconds



Source: Alexander Hoffmann/Shutterstock

Bring food up to a safe temperature and then hold the food at that temperature for an appropriate amount of time before it is served. The exact temperature varies according to the type of food you are preparing. Make sure your thermometers are accurate when checking temperatures.

Fully cook meats before adding them to other dishes. Casseroles and other foods that contain a combination of raw ingredients such as meat and poultry must be cooked to the final temperature of the food requiring the highest internal temperature. Don't mix leftover food with newly prepared food.

The distribution of heat in a microwave oven is often uneven. To distribute heat more evenly, stir and rotate the food frequently.

**Cooling Foods Safely** One of the leading causes of food-borne illness is improperly cooled foods. Cooked foods you plan to store for later use need to be cooled down to below 41°F as quickly as possible. There are two methods for cooling foods. Always depend on a thermometer reading to determine that the appropriate degree of coolness has been reached.

- **The One-Stage Cooling Method.** Using the **one-stage cooling method**, food should be cooled to below 41°F within four hours.
- **The Two-Stage Cooling Method.** The **two-stage cooling method** was approved by the Food and Drug Administration in its 1999 Model Food Code. In the first stage of this method, foods must be cooled down to 70°F within two hours. In the second stage, foods must cool down below 41°F within an additional four hours. The total amount of time elapsed during cooling the food is six hours.

Refrigerators are designed to keep foods cold, not to cool hot foods. They cool too slowly and food is at the temperature danger zone for too



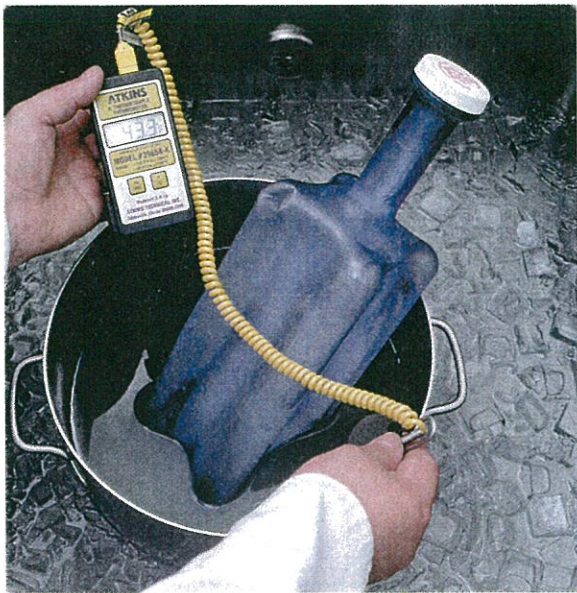


FIGURE 1-14

### Special Equipment for Cooling Cooked Foods

Using a chill wand to cool stock (left) and a blast chiller to cool pork (right).

**SOLVING PROBLEMS** *What cooling methods would you use if this equipment were not available?*

Sources: (left) Culinary Institute of America; (right) Vincent P. Walter/Pearson Education/PH College

long a period. For example, it can take 72 hours or more for the center of a 5-gallon stockpot of steamed rice to cool down to below 41°F when taken directly from the stove and placed in a refrigerator. You need to cool food much more rapidly to ensure that it is safe.

**Thawing Foods Safely** Never thaw food by simply leaving it out at room temperature. Frozen food may be safely thawed in several ways:

- **In the Refrigerator.** The best—though slowest—method of thawing food is to allow the food to thaw under refrigeration. Place still-wrapped food in a shallow container on a bottom shelf of the refrigerator to prevent any drips from contaminating other items stored nearby or below. The time it takes to thaw a food in the refrigerator varies depending on the thickness and texture of the food.
- **Under Running Water.** Place covered or wrapped food in a container under running water of approximately 70°F or below. Use a stream of water strong enough to wash loose particles off the food, but do not allow the water to splash on other foods or surfaces. Clean and sanitize the sink before and after thawing foods under running water.
- **In the Microwave.** You can use a microwave oven to thaw some foods. This method is recommended primarily for individual portions that will be cooked immediately after thawing.

Once thawed, food should be used as soon as possible. For optimal quality and flavor, thawed food should not be refrozen.

## FOCUS ON Safety

### Single Portions

Single portions of frozen food may be cooked from the frozen state, as long as the cooked item is at a safe temperature when served (examples: hamburger patties, french fries).



**READING CHECKPOINT**

*What is the two-stage cooling method?*



## Tips for Cooling Food Safely

### LIQUID FOOD

- Pour liquid into a stainless-steel container before you begin cooling it.
- Place the container holding the liquid in an ice water bath. The bath should reach the same level as the liquid inside the container.
- Stir the liquid frequently.
- Set bricks or a rack under the container to allow the cold water to circulate.
- Use an overflow pipe to allow the water to run continuously as the food cools.
- Add ice directly to condensed food (this both cools it and dilutes the food).
- Use a chill wand.

### SOLID OR SEMISOLID FOOD

- Place the food in a stainless-steel container before you begin cooling it.
- Cut the food into smaller portions (true especially for meat).
- Spread the food in a single layer in a shallow container.
- Leave the food unwrapped until after it cools.
- Stir the food, if possible.
- Put the container of hot food in an ice water bath.
- Use a blast chiller.
- Wrap all cooled food before refrigerating.



Source: Culinary Institute of America

## Serving Foods Safely

Keeping food safe from the time you receive it and throughout the time you cook it is a good way to control most of the hazards that can cause illness or injury. Serving foods safely is the final step in making sure everything you serve your guests is not only delicious and attractive, but also safe.

**Holding** Some food is served as soon as it is cooked. Other food is prepared ahead of time and then kept hot in steam tables or cold in the refrigerator until you are ready to serve it. This is referred to as **holding** food. Holding food at the right temperature is an important part of keeping the flow of food safe.

Set the temperature controls on all food-holding equipment to the correct temperatures for food safety. Hold hot foods above 135°F (or higher, if the requirement is different for your state or county). Hold cold foods below 41°F.

Use a sanitized instant-read thermometer to check the temperature of the food you are holding. Discard food that has been in the danger zone longer than two hours. This type of food is referred to as **time-temperature-abused food**.

**Reheating** Improperly reheated food is a frequent culprit in food-borne illness. When food is prepared ahead and then reheated, it should move

### Chef's Tip

#### Reheating Foods

A stew or soup will reheat more rapidly if you put a thin layer in a wide, shallow pan than if you put it in a tall, deep pot.



## Before the Refrigerator

Before the refrigerator, people had to find other ways to store and preserve their food. In some cases, people used ice that was cut from ponds in the winter and stored in sawdust for use in the summer. But people also preserved food in many other ways.

Foods were often pickled—stored in salty water or vinegar with a mix of herbs and spices. Cucumbers, onions, green beans, tomatoes, cauliflower, broccoli, and many other vegetables were pickled so they could be enjoyed long after they were harvested. These pickled vegetables are still an important component of the Italian appetizer antipasto (ahn-tee-PAHS-toe). In other cuisines, nuts, fish, meat, and even eggs are sometimes pickled.

Green cabbage was pickled in a different way. In Germany, it was shredded, salted heavily, and then kept in a cool, dry place. The salt caused the cabbage to ferment and become sauerkraut. In Korea, cabbage is the major ingredient in kimchi (KIM-chee). In this spicy condiment, the cabbage is seasoned with garlic, chiles, onions, ginger, and other spices. It is stored in sealed jars in

underground cellars or sheds for a month while it ferments.

Cod fish were salted heavily as a way of preserving them. This caused the cod to lose all its moisture, becoming as hard as a board. In this state it could be preserved almost indefinitely. To use the cod, which was called bacalao (bah-kah-LAH-oh) in Spanish and South American cuisines, it was necessary to soak it in water for a day, replacing the water three or four times as it dissolved the salt.

### Research

Research any of the types of preserved food described here. Describe how the food was preserved and how it is used in the cuisine. Provide a recipe that uses the preserved food.



Source: David Murray/Dorling Kindersley Secondary Permissions/Dorling Kindersley

through the danger zone as rapidly as possible and be reheated to at least 165°F for at least 15 seconds within a two-hour time period.

A steam table will maintain reheated foods at safe holding temperatures (135°F or higher, depending on your local code) but will not bring foods out of the danger zone quickly enough. Bring food to the proper temperature over a source of direct heat such as a burner, flattop, grill, or oven. You may also use a microwave oven to reheat small batches of food or individual portions.

The greater the surface area of the food and the shallower the layer, the more rapidly the food will heat. Use a clean and sanitized instant-read thermometer to check temperature. Clean and sanitize the thermometer after you use it.



READING CHECKPOINT

What is the temperature for holding hot foods? Cold foods?





FIGURE 1-15

### Holding Food Safely

Check the temperature of chilled foods during service.

**APPLYING CONCEPTS** *Why is it important to check the temperature of this potato salad?*

Source: Vincent P. Walter/Pearson Education/PH College

## 1.2 ASSESSMENT

### Reviewing Concepts

1. What is meant by the *flow of food*?
2. What is the first step in the flow of food?
3. What is meant by *FIFO* and why is it important to proper food storage?
4. Cooked foods you plan to store for later use need to be cooled below what temperature?
5. What is the temperature for holding hot foods? Cold foods?

### Critical Thinking

6. **Comparing/Contrasting** What is the difference between the one-stage cooling method and the two-stage cooling method?
7. **Relating Concepts** Some restaurant owners serve time-temperature-abused food, arguing that it is wasteful to discard food if it has been held for only an additional half hour. How would you respond?
8. **Inferring** Why is it a good idea to “expect raw foods, especially meat, fish, and poultry, to contain harmful microorganisms?”

### Test Kitchen

Use two cans of commercially prepared soups. Empty each can in a separate pot and heat quickly to 165°F for at least 15 seconds. Empty each pot in identical stainless-steel storage containers. Place both containers into a separate ice water bath. Stir the soup in one container constantly, but don't stir the other. Record the temperature of the soups every five minutes. Evaluate the results over an hour's time.

## SCIENCE

### Thermometers

Prepare a report comparing five thermometers (including instant-read digital thermometers). Focus on their stated accuracy, features, and ease of use. Indicate whether some are better suited for some types of cooking situations than others. Include your final recommendation.