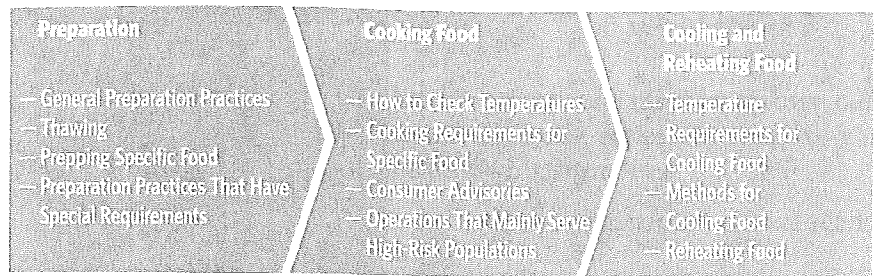


chapter 6

The Flow of Food: Preparation



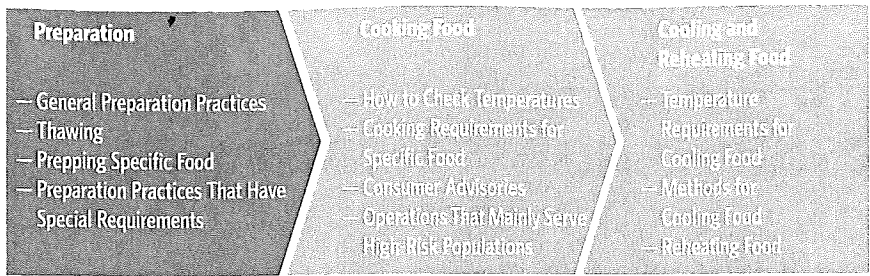
Undercooked Meatballs Result in Fatal Outbreak

A 73-year-old woman died and 51 people were hospitalized after eating undercooked turkey meatballs at a buffet in the southeastern United States. The victims all got sick with *Salmonella* spp. An investigation revealed that the chef had browned the meatballs but failed to finish baking them. This left the centers of the meatballs undercooked.

You Can Prevent This

The illness in the story above could have been avoided if the chef had made sure that the meatballs were cooked to the correct internal temperature. In this chapter, you will learn about the specific cooking temperatures that can keep food safe. You will also learn other guidelines for keeping food safe during preparation.

- Preventing cross-contamination and time-temperature abuse
- Thawing food correctly
- Cooking food to a minimum internal temperature
- Cooling and reheating food to the correct temperature in the correct amount of time



Preparation

Cross-contamination and time-temperature abuse can happen easily when you are preparing food. But, you can prevent pathogens from spreading and growing by making good food-prep choices.

General Preparation Practices

No matter what type of food you are prepping, you should begin by following these guidelines.

Equipment Make sure workstations, cutting boards, and utensils are clean and sanitized.

Quantity Only remove as much food from the cooler as you can prep in a short period of time. This keeps ingredients from sitting out for long periods of time. In the photo at left, the food handler has taken out too much tuna salad.

Storage Return prepped food to the cooler, or cook it as quickly as possible.

Additives If you use food or color additives when prepping food, follow these guidelines.

- Only use additives that have been approved by your local regulatory authority. **NEVER** use more than is allowed by law. **NEVER** use additives to alter the appearance of the food.
- Do **NOT** sell produce that was treated with sulfites before it was received in the operation. **NEVER** add sulfites to produce that will be eaten raw.

Presentation Food must be offered to customers in a way that does not mislead or misinform them. Customers must be able to judge the true appearance, color, and quality of food. Do **NOT** use the following to misrepresent the appearance of food.

- Food additives or color additives
- Colored overwraps
- Lights

Food that has not been honestly presented must be thrown out.



Corrective actions Food that has become unsafe must be thrown out unless it can be safely reconditioned. All food—especially ready-to-eat food—must be thrown out in the following situations.

- When it is handled by staff who have been restricted or excluded from the operation due to illness
- When it is contaminated by hands or bodily fluids from the nose or mouth
- When it has exceeded the time and temperature requirements designed to keep food safe

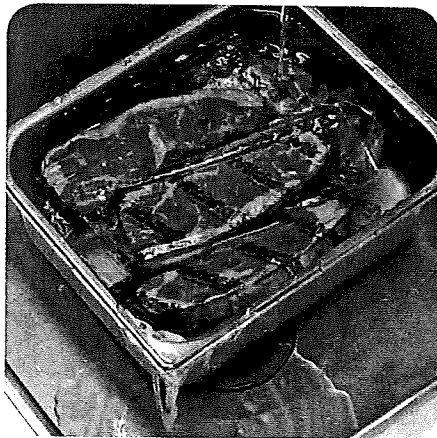
Sometimes food can be restored to a safe condition. This is called reconditioning. For example, a hot food that has not been held at the correct temperature may be reheated if it has not been in the temperature danger zone for more than two hours. This can return food to a safe condition.

Thawing

When frozen food is thawed and exposed to the temperature danger zone, pathogens in the food will begin to grow. To reduce this growth, **NEVER** thaw food at room temperature. Thaw TCS food in the following ways.

Refrigeration Thaw food in a cooler, keeping its temperature at 41°F (5°C) or lower.

Running water Submerge food under running, drinkable water at 70°F (21°C) or lower. The flow of the water must be strong enough to wash loose food bits into the drain. Always use a clean and sanitized food-prep sink when thawing food this way. **NEVER** let the temperature of the food go above 41°F (5°C) for longer than four hours. This includes the time it takes to thaw the food plus the time it takes to prep or cool it. The photo at left shows the correct way to thaw food under running water.



Microwave Thaw food in a microwave oven if it will be cooked immediately after thawing. The food must be cooked in conventional cooking equipment, such as an oven, once it's thawed.

Cooking Thaw food as part of the cooking process.

Prepping Specific Food

Special care must be taken when handling ice and when preparing produce, eggs, and salads that contain TCS food.

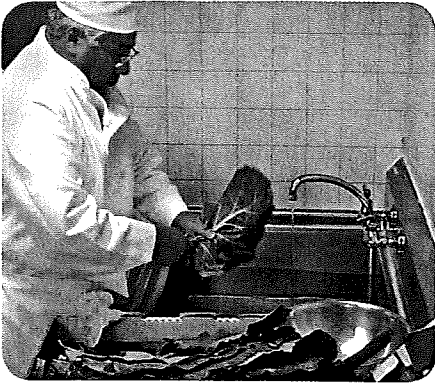
Produce

When prepping produce, follow these guidelines.

Cross-contamination Make sure fruit and vegetables do **NOT** touch surfaces exposed to raw meat, seafood, or poultry.

Washing Wash produce thoroughly under running water. This is especially important before cutting, cooking, or combining it with other ingredients.

- The water should be a little warmer than the produce.
- Pay special attention to leafy greens such as lettuce and spinach, as the food handler in the photo at left is doing. Remove the outer leaves, and pull the lettuce or spinach completely apart and rinse thoroughly.
- Certain chemicals may be used to wash fruits and vegetables. Also, produce can be treated by washing it in water containing ozone. This treatment helps control pathogens.



Check your local regulatory requirements.

Soaking or storing When soaking or storing produce in standing water or an ice-water slurry, do **NOT** mix different items or multiple batches of the same item.

Fresh-cut produce Refrigerate and hold sliced melons, cut tomatoes, and cut leafy greens at 41°F (5°C) or lower. Many operations hold other fresh-cut produce at this temperature as well.

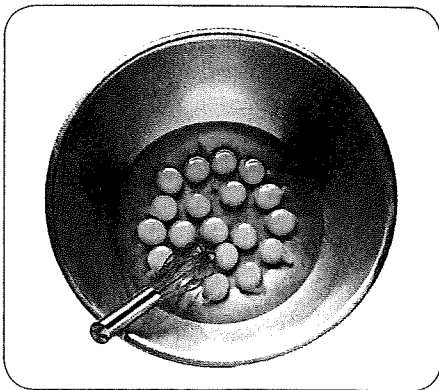
Raw seed sprouts If your operation primarily serves high-risk populations, do **NOT** serve raw seed sprouts.

Eggs and Egg Mixtures

When prepping eggs and egg mixtures, follow these guidelines.

Pooled eggs Handle pooled eggs (if allowed by your local regulatory authority) carefully. Pooled eggs are eggs that are cracked open and combined in a container, as shown in the photo at left. Cook them promptly after mixing, or store them at 41°F (5°C) or lower. Clean and sanitize the containers used to hold them before making a new batch.

Pasteurized eggs Consider using pasteurized shell eggs or egg products when prepping egg dishes that need little or no cooking. Examples include Caesar salad dressing, hollandaise sauce, tiramisu, and mousse.



! Pathogen Alert



High-risk populations If you mainly serve high-risk populations, such as those in hospitals and nursing homes, use pasteurized eggs or egg products when serving dishes that are raw or undercooked. Shell eggs that are pooled must also be pasteurized. You may use unpasteurized shell eggs if the dish will be cooked all the way through, such as an omelet or a cake.

Salads Containing TCS Food

Chicken, tuna, egg, pasta, and potato salads have all been involved in foodborne-illness outbreaks. These salads are not usually cooked after preparation. This means you do not have a chance to reduce pathogens, such as *Staphylococcus aureus*, that may have gotten into the salad. Therefore, you must take a few extra steps. Follow these guidelines.

Using leftovers TCS food such as pasta, chicken, and potatoes can be used only if it has been cooked, held, and cooled correctly.

Storing leftovers Throw out leftover food held at 41°F (5°C) or lower after seven days. Check the use-by date before using stored food items.

Ice

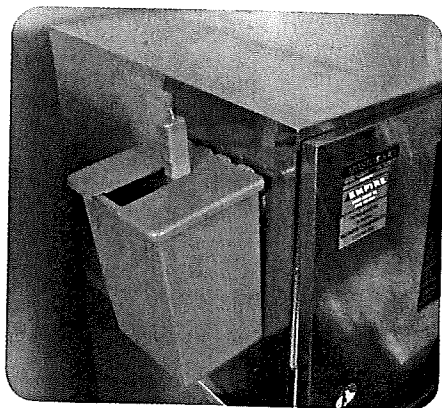
Follow these guidelines to avoid contaminating ice in your operation.

Consumption Make ice from water that is safe to drink.

Cooling food NEVER use ice as an ingredient if it was used to keep food cold. For example, if ice is used to cool food on a salad bar, it cannot then be used in drinks.

Containers and scoops Use clean and sanitized containers and ice scoops to transfer ice from an ice machine to other containers.

- Store ice scoops outside of the ice machine in a clean, protected location, as shown in the photo at left.
- NEVER hold or carry ice in containers that have held raw meat, seafood, or poultry; or chemicals.
- NEVER touch ice with hands or use a glass to scoop ice.



Preparation Practices That Have Special Requirements

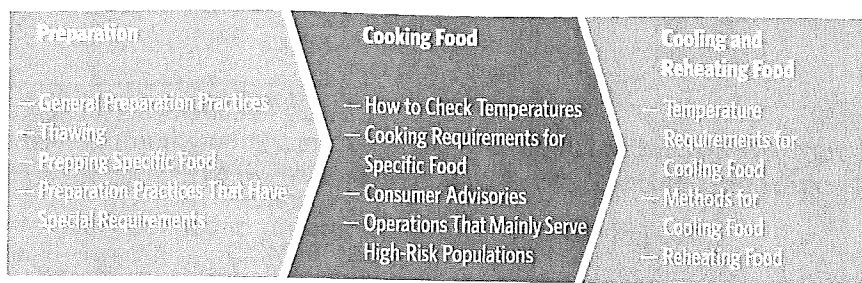
You will need a variance when prepping food in certain ways. A variance is a document issued by your regulatory authority that allows a regulatory requirement to be waived or changed.

When applying for a variance, your regulatory authority may require you to submit a HACCP plan. The plan must account for any food safety risks related to the way you plan to prep the food item.

You will need a variance if your operation plans to prep food in any of the following ways.



- Packaging fresh juice on-site for sale at a later time, unless the juice has a warning label.
- Smoking food as a way to preserve it (but not to enhance flavor), as shown in the photo at left.
- Using food additives or adding components such as vinegar to preserve or alter the food so that it no longer needs time and temperature control for safety.
- Curing food.
- Custom-processing animals for personal use. For example, a hunter brings a deer to a restaurant for dressing and takes the meat home for later use.
- Packaging food using a reduced-oxygen packaging (ROP) method. This includes MAP, vacuum-packed, and *sous vide* food. *Clostridium botulinum* and *Listeria monocytogenes* are risks to food packaged in these ways.
- Sprouting seeds or beans.
- Offering live shellfish from a display tank.



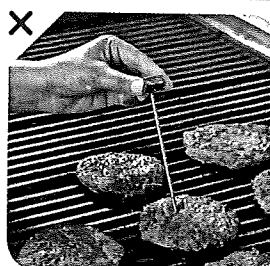
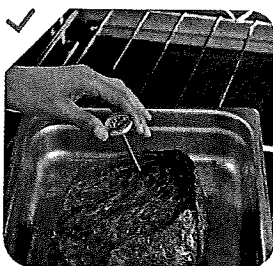
Cooking Food

The only way to reduce pathogens in food to safe levels is to cook it to its minimum internal temperature. This temperature is different for each food. Once reached, you must hold the food at this temperature for a specific amount of time. If customers request a lower temperature, you need to inform them of the potential risk of foodborne illness. Also be aware of special menu restrictions if you serve high-risk populations.

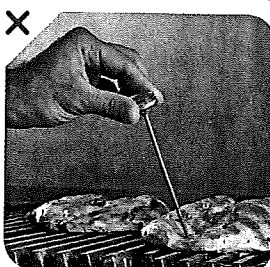
While cooking reduces pathogens in food, it does not destroy spores or toxins they may have produced. You still must handle food correctly before you cook it.

How to Check Temperatures

To make sure the food you are cooking has reached the correct temperature, you must know how to take the temperature correctly. Follow these guidelines.



Pick a thermometer with a probe that is the correct size for the food.



Check the temperature in the thickest part of the food.

Take at least two readings in different locations.

Cooking Requirements for Specific Food

Monitor the temperature of cooked food to make sure it has reached the correct temperature. Minimum temperatures have been developed for TCS food. These temperatures are listed on the next page. However, your operation or area might require different temperatures.

Check your local regulatory requirements.

| Cooking Requirements for Specific Types of Food | | | | | | | | | | | | | | | | | | | |
|---|--|--------------|-------------|--------------|------------|--------------|------------|--------------|------------|--------------|------------|--------------|------------|--------------|------------|--------------|-----------|--------------|-----------|
| Minimum Internal Temperature | Type of Food | | | | | | | | | | | | | | | | | | |
| 165°F (74°C) for 15 seconds | <ul style="list-style-type: none"> • Poultry—including whole or ground chicken, turkey, or duck • Stuffing made with fish, meat, or poultry • 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 (68°C) for 15 seconds | <ul style="list-style-type: none"> • Ground meat—including beef, pork, and other meat • Injected meat—including brined ham and flavor-injected roasts • Mechanically tenderized meat • Ratites—including ostrich and emu • Ground seafood—including chopped or minced seafood • Shell eggs that will be hot-held for service | | | | | | | | | | | | | | | | | | |
| 145°F (63°C) for 15 seconds | <ul style="list-style-type: none"> • Seafood—including fish, shellfish, and crustaceans • Steaks/chops of pork, beef, veal, and lamb • Commercially raised game • Shell eggs that will be served immediately | | | | | | | | | | | | | | | | | | |
| 145°F (63°C) for 4 minutes | <ul style="list-style-type: none"> • Roasts of pork, beef, veal, and lamb • Roasts may be cooked to these alternate cooking times and temperatures depending on the type of roast and oven used: <table border="0" style="margin-left: 20px;"> <tr> <td>130°F (54°C)</td> <td>112 minutes</td> </tr> <tr> <td>131°F (55°C)</td> <td>89 minutes</td> </tr> <tr> <td>133°F (56°C)</td> <td>56 minutes</td> </tr> <tr> <td>135°F (57°C)</td> <td>36 minutes</td> </tr> <tr> <td>136°F (58°C)</td> <td>28 minutes</td> </tr> <tr> <td>138°F (59°C)</td> <td>18 minutes</td> </tr> <tr> <td>140°F (60°C)</td> <td>12 minutes</td> </tr> <tr> <td>142°F (61°C)</td> <td>8 minutes</td> </tr> <tr> <td>144°F (62°C)</td> <td>5 minutes</td> </tr> </table> | 130°F (54°C) | 112 minutes | 131°F (55°C) | 89 minutes | 133°F (56°C) | 56 minutes | 135°F (57°C) | 36 minutes | 136°F (58°C) | 28 minutes | 138°F (59°C) | 18 minutes | 140°F (60°C) | 12 minutes | 142°F (61°C) | 8 minutes | 144°F (62°C) | 5 minutes |
| 130°F (54°C) | 112 minutes | | | | | | | | | | | | | | | | | | |
| 131°F (55°C) | 89 minutes | | | | | | | | | | | | | | | | | | |
| 133°F (56°C) | 56 minutes | | | | | | | | | | | | | | | | | | |
| 135°F (57°C) | 36 minutes | | | | | | | | | | | | | | | | | | |
| 136°F (58°C) | 28 minutes | | | | | | | | | | | | | | | | | | |
| 138°F (59°C) | 18 minutes | | | | | | | | | | | | | | | | | | |
| 140°F (60°C) | 12 minutes | | | | | | | | | | | | | | | | | | |
| 142°F (61°C) | 8 minutes | | | | | | | | | | | | | | | | | | |
| 144°F (62°C) | 5 minutes | | | | | | | | | | | | | | | | | | |
| 135°F (57°C) | <ul style="list-style-type: none"> • Fruit, vegetables, grains (rice, pasta), and legumes (beans, refried beans) that will be hot-held for service | | | | | | | | | | | | | | | | | | |

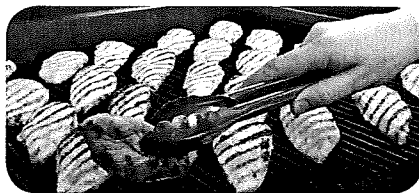
Cooking TCS Food in the Microwave Oven

Meat, seafood, poultry, and eggs that you cook in a microwave oven must be cooked to 165°F (74°C). In addition, follow these guidelines.

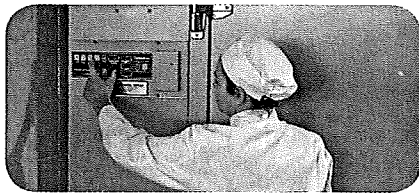
- Cover the food to prevent its surface from drying out.
- Rotate or stir it halfway through the cooking process so that the heat reaches the food more evenly.
- Let the covered food stand for at least two minutes after cooking to let the food temperature even out.
- Check the temperature in at least two places to make sure that the food is cooked through.

Partial Cooking During Preparation

Some operations partially cook food during prep and then finish cooking it just before service. You must follow the steps below if you plan to partially cook meat, seafood, poultry, or eggs; or dishes containing these items.



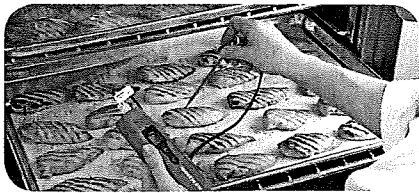
- 1 Do not cook the food for longer than 60 minutes during initial cooking.



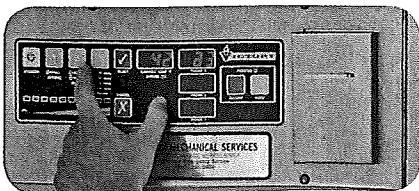
- 2 Cool the food immediately after initial cooking.



- 3 Freeze or refrigerate the food after cooling it. If refrigerating the food, make sure it is held at 41°F (5°C) or lower.



- 4 Heat the food to at least 165°F (74°C) for 15 seconds before selling or serving it.



- 5 Cool the food if it will not be served immediately or held for service.

Your local regulatory authority may require you to have written procedures that explain how the food cooked by this process will be prepped and stored. These procedures must be approved by the regulatory authority and describe the following.

- How the requirements will be monitored and documented
- Which corrective actions will be taken if requirements are not met
- How these food items will be marked after initial cooking to indicate that they need further cooking
- How these food items will be separated from ready-to-eat food during storage, once initial cooking is complete

Consumer Advisories

You must cook TCS food to the minimum internal temperatures listed in this chapter unless a customer requests otherwise. This might happen often in your operation, particularly if you serve meat, eggs, or seafood.

Disclosure If your menu includes TCS items that are raw or undercooked, you must note it on the menu next to these items. This can be done by placing an asterisk next to the item that points customers to a footnote at the bottom of the menu. The footnote must include a statement that indicates the item is raw or undercooked, or contains raw or undercooked ingredients. The menu in the photo at left shows an example of disclosure.

Reminder You must advise customers who order food that is raw or undercooked of the increased risk of foodborne illness. You can do this by posting a notice in your menu. You can also provide this information using brochures, table tents, signs, or other written methods.

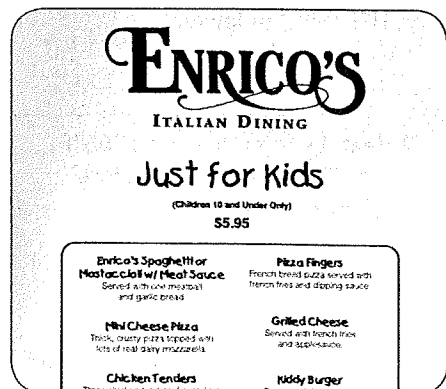
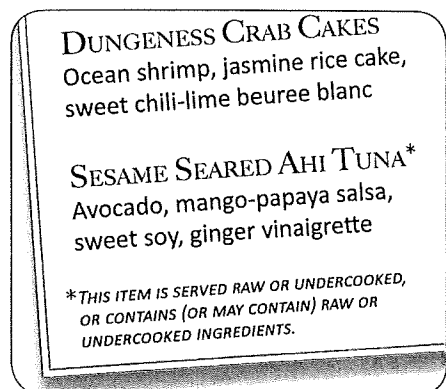
Check your local regulatory requirements.

Children's Menus

The Food and Drug Administration (FDA) advises against offering raw or undercooked meat, poultry, seafood, or eggs on a children's menu. This is especially true for undercooked ground beef, which may be contaminated with enterohemorrhagic and shiga toxin-producing *E. coli* O157:H7.

Operations That Mainly Serve High-Risk Populations

Operations that mainly serve a high-risk population, such as nursing homes or day-care centers, cannot serve certain items. NEVER serve raw seed sprouts or raw or undercooked eggs, meat, or seafood. Examples include over-easy eggs, raw oysters on the half shell, and rare hamburgers.



| Preparation | Cooking Food | Cooling and Reheating Food |
|---|--|---|
| <ul style="list-style-type: none"> — General Preparation Practices — Thawing — Preparing Specific Food — Preparation Practices That Have Special Requirements | <ul style="list-style-type: none"> — How to Check Temperatures — Cooking Requirements for Specific Food — Consumer Advisories — Operations That Mainly Serve High-Risk Populations | <ul style="list-style-type: none"> — Temperature Requirements for Cooling Food — Methods for Cooling Food — Reheating Food |

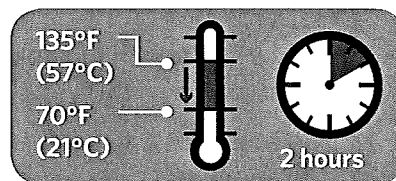
Cooling and Reheating Food

When you don't serve cooked food immediately, you must get it out of the temperature danger zone as quickly as possible. That means cooling it quickly. You also need to reheat it correctly, especially if you are going to hold it.

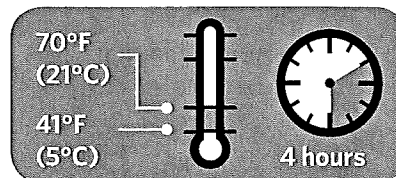
Temperature Requirements for Cooling Food

As you know, pathogens grow well in the temperature danger zone. However, they grow much faster at temperatures between 125°F and 70°F (52°C and 21°C). Food must pass through this temperature range quickly to reduce this growth.

Cool TCS food from 135°F (57°C) to 41°F (5°C) or lower within six hours.



First, cool food from 135°F to 70°F (57°C to 21°C) within two hours.

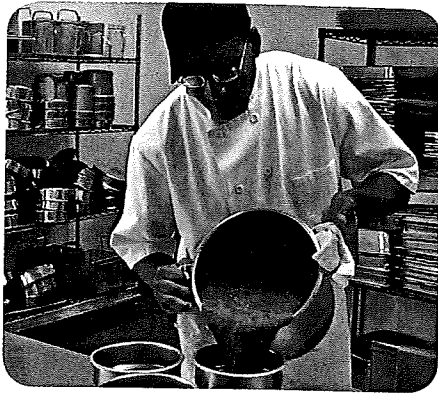


Then cool it from 70°F to 41°F (21°C to 5°C) or lower in the next four hours.

If food has not reached 70°F (21°C) within two hours, it must be reheated and then cooled again.

If you can cool the food from 135°F to 70°F (57°C to 21°C) in less than two hours, you can use the remaining time to cool it to 41°F (5°C) or lower. However, the total cooling time cannot be longer than six hours. For example, if you cool food from 135°F to 70°F (57°C to 21°C) in one hour, you have the remaining five hours to get the food to 41°F (5°C) or lower.

Check your local regulatory requirements.



Methods for Cooling Food

The following factors affect how quickly food will cool.

Thickness or density of the food The denser the food, the more slowly it will cool.

Size of the food Large food items cool more slowly than smaller items. To let food cool faster, you should reduce its size. Cut large food items into smaller pieces. Divide large containers of food into smaller containers or shallow pans, as shown in the photo at left.

Storage container Stainless steel transfers heat away from food faster than plastic. Shallow pans let the heat from food disperse faster than deep pans.

NEVER cool large amounts of hot food in a cooler. Most coolers are not designed to cool large amounts of hot food quickly. Also, placing hot food in a cooler may not move the food through the temperature danger zone quickly enough. Here are some effective methods for cooling food quickly and safely.



Ice-water bath After dividing food into smaller containers, place them in a clean prep sink or large pot filled with ice water. The food handler in the photo at left is cooling a container of meat sauce this way.

Stir the food frequently to cool it faster and more evenly.

Blast chiller Blast chillers blast cold air across food at high speeds to remove heat. They are typically used to cool large amounts of food.

Ice paddle Plastic paddles are available that can be filled with ice or with water and then frozen. Food stirred with these paddles will cool quickly, as shown in the photo at left.

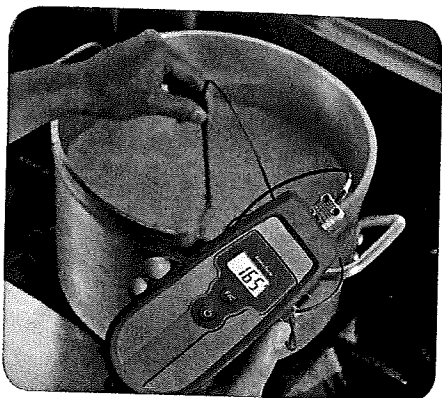


Food cools even faster when placed in an ice-water bath and stirred with an ice paddle.

Ice or cold water as ingredient When cooling soups or stews, the recipe is made with less water than required. Cold water or ice is then added after cooking to cool the food and provide the remaining water.

Storing Food for Further Cooling

Loosely cover food containers before storing them. Food can be left uncovered if stored in a way that prevents contaminants from getting into it. Storing uncovered containers above other food, especially raw seafood, meat, and poultry, will help prevent cross-contamination.



Reheating Food

How you reheat food depends on how you intend to use the food. Follow these guidelines when reheating food.

Food reheated for immediate service You can reheat food that will be served immediately, such as beef for a beef sandwich, to any temperature. However, you must make sure the food was cooked and cooled correctly.

Food reheated for hot-holding You must heat TCS food for hot-holding to an internal temperature of 165°F (74°C) for 15 seconds. Make sure the food reaches this temperature within two hours from start to finish. The food handler in the photo at left is reheating clam chowder for hot-holding. These guidelines apply to all reheating methods, such as ovens or microwave ovens.

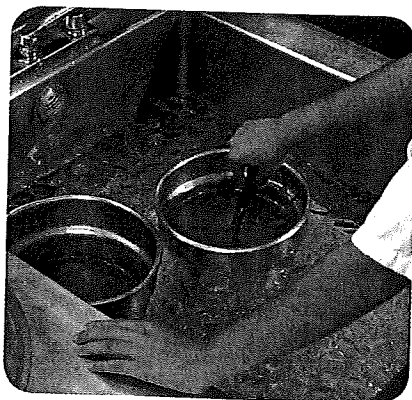
Reheat commercially processed and packaged ready-to-eat food to an internal temperature of at least 135°F (57°C). This includes items such as cheese sticks and deep-fried vegetables.

Apply Your Knowledge

Cooling Food

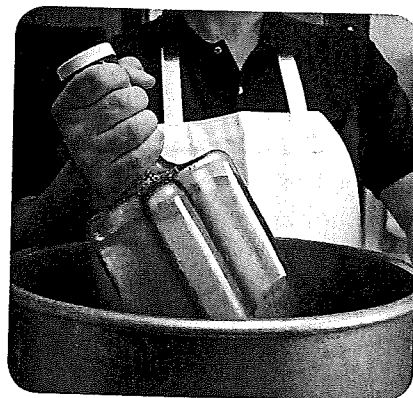
Write an **X** next to each food that has been cooled correctly.

① _____



Meat sauce was cooled from 135°F to 70°F (57°C to 21°C) in 1 hour and then from 70°F to 41°F (21°C to 5°C) in 4 hours.

② _____



Chili was cooled from 135°F to 70°F (57°C to 21°C) in 2 hours and then from 70°F to 41°F (21°C to 5°C) in 4 hours.

For answers, please turn to page 6.24.

Chapter Summary

- To protect food during preparation, you must handle it safely. The keys are time and temperature control and preventing cross-contamination.
- Freezing does not kill pathogens. Pathogens in the food will grow if exposed to the temperature danger zone during thawing. Thaw frozen food in the cooler, under running water, in a microwave oven, or as part of the cooking process. Never thaw food at room temperature.
- Prevent cross-contamination and time-temperature abuse when preparing food. Prep food in small batches and keep workstations and utensils clean and sanitized. Prepped food that is not going to be cooked immediately should be put back in the cooler.
- Cooking food can reduce pathogens in food to safe levels. You must cook food to minimum internal temperatures for a specific amount of time. These temperatures vary from food to food. Cooking does not kill the spores or toxins that some pathogens produce.
- You must advise customers who order food that is raw or undercooked of the increased risk of foodborne illness. You can do this in different ways. If your menu includes TCS items that are raw or undercooked, you must note it on the menu next to these items. The FDA advises against offering raw and undercooked food on children's menus.
- TCS food must be cooled from 135°F to 70°F (57°C to 21°C) within two hours. Then it must be cooled from 70°F to 41°F (21°C to 5°C) or lower in the next four hours.
- Before food is cooled, you should reduce its size. Cut large food items into smaller pieces. Divide large containers of food into smaller ones. Use an ice-water bath, stir food with ice paddles, or use a blast or tumble chiller to cool food safely.
- Reheated TCS food that will be hot-held must be heated to an internal temperature of 165°F (74°C) for 15 seconds. Make sure the food reaches this temperature within two hours.