

# CHAPTER 9

## Food Production and Sanitation

### LEARNING OBJECTIVES

*After reading and studying this chapter, you should be able to:*

- Discuss America's culinary heritage.
- Explain the main elements in receiving and storing perishable and nonperishable items.
- Describe the key points in food production.
- Discuss the various types of food poisoning and how to avoid them.
- Develop and maintain a food protection system.



## Our Culinary Heritage

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Before we delve into food production, let's first get a taste of our *culinary heritage* because it brought us to where we are today and brings hope of a bright tomorrow.

For many, the background information of the kind given in this chapter provides depth and feeling. American cooking is formed on a matrix of national cuisines, the confluence of foods and food preparation methods from numerous national and racial groups. The early American colonists brought from England the love of beef and lamb. Once they arrived in the New World, the colonials quickly adapted to Indian corn; in fact, it became a staple food for a number of years. Later successive streams of immigrants—Irish, Scots, Germans, and Scandinavians—added their own foods and methods of preparation. Potatoes, originally from the Inca empire in South America, became a staple brought to this country via Europe.

As wheat and other grains became plentiful, bread formed a part of every meal. Many Americans grew up on meat and potatoes, bread, and milk. Meat and bread as sandwiches, milk in milkshakes, and potatoes in french fries dominate today's fast-food restaurant menu.

Roast beef and steak are the basics of the beef and steakhouse restaurants. The Midwest and South have their favorite barbecued beef and pork emporia. The meat, potatoes, and bread syndrome is the despair of fancy food writers yet highly nutritious and obviously satisfying to the Great American Public.

Later came the Italians with their cheeses and pasta dishes. Italian restaurants have spread across the country, and pizzerias can be found in almost every community.

When Chinese laborers were brought in to help build the railroads and work in the West, they brought their own cookery techniques and food combinations.

Coffee shops have their sources in Vienna and in the seventeenth-century coffeehouses of England and France.

The family restaurant might trace its beginnings to the “ordinary,” the boardinghouse style of food service found in the taverns of Britain and early America.

For the more complicated, subtle dining experience, we look to the French.

Mexicans, and before them the Spanish, provided the backdrop for today's Mexican restaurant. More recently, specialized foods from the Orient—India, Thailand, Korea, and Japan—have appeared in specialty restaurants.

Whenever there are Jewish communities, there are the Jewish ethnic foods and deli restaurants.

But the menus of the Great American Restaurant, the common-denominator restaurants, present foods that originated from around the world prepared by methods that are an amalgam of various cookery styles, sharpened by food science, home economics, and the food section of the daily newspaper. All cuisines are worthy of study, but this book is about restaurants. We focus on only a few, less understood yet influential cuisines.

## **Native American Influence**

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Native Americans have had a lasting, yet sometimes overlooked, influence on American cuisine today. Foods like cornbread, turkey, cranberry, blueberry, hominy, grits, and mush are known to have been adopted into the cuisine of the United States from Native American groups.<sup>1</sup>

Early American Indians residing in the Eastern Woodlands (now the eastern United States and Canada) planted crops of corn, beans, and squash. These crops are today commonly referred to as the “three sisters.” Native Americans residing in the South formed the foundation of today’s Southern cuisine. They made use of corn crops by grinding it into meals or by liming it with an alkaline salt to make hominy (i.e. masa). Potatoes were often used in similar ways to corn.

Native Americans diets included several fruits and vegetables. Pumpkin, various types of beans, squash, peppers, blackberries, raspberries, and tomatoes were all introduced to settlers through Native Americans. Diets were also supplemented through hunting game. Meat staples included venison, rabbit, squirrels, and raccoons.

## **African American Influence**

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*Soul food* is a term used for an ethnic cuisine, food traditionally prepared and eaten by African Americans of the Southern United States.<sup>2</sup> While the term *soul food* only dates back to the 1960s, the selection of food can be trace back to Africa. In the early 1600s, the first Africans were brought to America to work as slaves. Many Africans brought fruits and vegetables with them to eat on their journey. The seeds of these fruits and vegetables would have a lasting influence on American cuisine. They include seeds from foods such as watermelon, okra, black-eyed peas, and eggplant.

At this point in time there were no refrigerators. Meat was smoked in a smokehouse to prevent spoilage. When it was time to prepare the meat for eating it was barbecued, roasted, boiled, or combined with other ingredients to make stews. To prepare birds they would use methods such as frying, baking, roasting, or simmering (to make broths, stews, and/or gravy). Vegetables were generally boiled or fried. Meals were cooked in open fires using black kettles or were barbecued in open pits.<sup>3</sup> Notable influential African American dishes include cornbread, greens, gumbo with okra, red beans and rice, southern-style black-eyed peas, sweet potato pie, and fruit cobbler.<sup>4</sup>

## **Italian Influence**

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Say “Italian food” and we think of spaghetti and pizza, but Italy has a rich culinary tradition and offers a variety of foods. Historically, Italians cultivated fine cuisine long before the French. In the ancient period, wealthy Romans spent lavish amounts of time and money on food and drink.

The Italian and French influences have much in common, for it was from Italy that much of the French fascination with food came originally. In the sixteenth century, when Florence led the Renaissance, a little girl of 14, Catherine de' Medici, went to France in 1533 to become the bride of Henri, Duke of Orleans, the second son of King Francis I of France. With her came a couple of her cooks, chefs who were particularly well informed about the preparation of sweets; Catherine was particularly fond of gelati, a water ice.

The Medici fortune had been built in part on the spice trade, largely salt, pepper, saffron, ginger, nutmeg, and cloves. Catherine brought some of the Italian art of cookery with her along with an interest in olive oil, oranges, sugar, artichokes, broccoli, beans, and the tiny new peas, which the French later called *petits pois*. Rice had been brought in from the Orient, and Catherine ate it regularly as a child in the form of risotto.

Crusaders had brought spinach to France. Even today the word *Florentine* in a dish means that it probably contains spinach in some form. Truffles came along from Italy, as did a taste for songbirds, a liking for sweetbreads, and the wine custard known as zabaglione in Italian, which in France became sabayon. Keynotes of Florentine cooking were sauces and simplicity. The aromatic herb basil was an Italian import.

In the eighteenth century, an Italian by the name of Procopio opened an ice cream parlor in Paris serving liqueurs, pastries, cakes, and delicate water ices.<sup>5</sup>

## French Influence

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The lexicon of cookery reflects the contribution of the French to the culinary scene: dishes developed by the French and terms referring to styles of food preparation, presentation, and service. We blanch, fricassee, and poach, all terms of French origin. Foods are prepared with almonds (“almandine”) and on a skewer (“en brochette”), terms that are commonly used. When it comes to classic culinary terms, the vast majority are straight from the kitchens of France.

Most foodservice experts rank French cookery near or at the top of various national cuisines. Menus of luxury restaurants in U.S. hotels and restaurants reflect the French concern for subtlety of flavor through sauces, the use of butter and cream, the emphasis on quality of food, and appetizing combinations of food. Perhaps more than other national groups, the French have long been concerned with the nuances and complexities of food. Much of the ingenuity of the French chef appears in various classical dishes that have been adopted by the Western culinary world.

Common French sauces found in luxury restaurants include hollandaise (emulsified egg yolks and butter with lemon juice or white wine and pepper), béarnaise (similar to hollandaise plus tarragon, shallots, and chervil), and meunière (hot butter and lemon juice). Veal Cordon Bleu (veal, ham, and cheese) is a common veal dish. Tournedos Rossini (filet of beef plus a slice of pâté de foie gras) and bouillabaisse (a stewlike soup containing several fish and shellfish) are typically French.

The French have heavily influenced the style of foods and even their shape in dinner restaurants: potatoes duchesse (mashed and mixed with egg yolk, salt, and pepper); potatoes Anna (cylindrically sliced and cooked in layers of clarified butter); potatoes Parisienne (cut into small balls); and potatoes château (barrel-shaped and roasted). Quiche has been popularized in some chain restaurants. Quiche Lorraine, a thin-crust pastry flan stuffed with bacon, chopped ham, egg yolk, milk, or cream is widely served.

### FRENCH CHEFS DOMINATE CULINARY HISTORY

Of all of the hundreds of thousands of cooks in history, only a few are recorded. Nearly all of them are French. In 1671 Vatel, maitre d'hotel to the Prince de Conde, gained dubious distinction by committing suicide when the fish failed to arrive for an important banquet. The prince had invited King Louis XIV and an entourage of several hundred for a spring hunting weekend at Chantilly Castle. When the fish failed to arrive, Vatel stabbed himself three times. Madame de Sevigne, an inveterate letter writer of the time and a member of the king's group, commented, "His death spoiled the party."

François Pierre de La Varenne became well-known because of his cookbook, *Le Cuisinier François* (1651). La Varenne disapproved of heavy masking sauces for meat, preferring au jus mixed with lemon or vinegar and thickened when necessary with a roux or egg yolks. It was he who invented sauce duxelles, the popular mince of mushrooms, shallots, and onions seasoned and simmered in butter and oil until almost black. Unfortunately for La Varenne, the mixture was named after his master the Marquis de'Uxelles.

The name Carême signifies classic cuisine. Antoine Carême, not one to hide his light under a chef's hat, stated that his goal was to "present sumptuously the culinary marvels with which I enriched the tables of kings." He did, in fact, work for royalty, including for a short time the Prince Regent of England, where for one banquet in 1817, Carême prepared 116 dishes. Carême was much impressed with set pieces, the centers of attention of the classical style of dining. These pieces sometimes took on architectural quality in the form of fish aspics, poultry galantines, and baskets of fruit, creations in spun sugar. A Carême dessert we all remember is Charlotte Russe, a concoction of lady fingers, Bavarian pudding, and whipped cream. Carême died in 1833 before reaching the age of 50, burned out, a colleague said, "by the flame of his genius and the fuel of his ovens."

Felix Urbain-DuBois, chef of the King of Prussia, is chiefly remembered for his book *La Cuisine Classique*.

In modern times, the chef whose name every gastronome knows is Georges Auguste Escoffier, whose happy association with César Ritz and the fact that he was a capable organizer and author have emblazoned his name in gastronomic history. Of great social importance for Escoffier was his friend and sponsor, Edward Albert, Prince of Wales and later King Edward VII.

Perhaps the most inventive of chefs, Escoffier enjoyed beautiful women and the invention of dishes to which he attached their names. A few of these are still popular: Riz à l'Imperatrice (named for the empress Eugénie); Peaches Alexandra

(for the wife of the Prince of Wales); Peaches Melba (for his friend Dame Melba, the famous Australian opera star).

Part of the reason we eat frog's legs today may be traced to Escoffier and the Prince of Wales. Asked by the prince to prepare an intimate theater supper, Escoffier put together a dish which he called *Les Cuisses de Nymphes à la Aurore* (the thighs of nymphs at dawn). The next morning Marlborough House, the royal residence, called to ask the recipe, only to learn that the party had eaten frog's legs in a paprika-shaded wine sauce to resemble the dawn. The sprigs of tarragon suggested seaweed.

The English, never known for culinary adventurousness, had never eaten frog, but since the prince liked them, the snobs of London were soon calling for them. (It took longer for America to come around to frog's legs. As late as World War I, the American doughboys in France called the French the derisive term *Frogs*.)

Escoffier's book, *Le Guide Culinaire*, or as it appeared in this country, *The Escoffier Cookbook*, written in 1903, became the bible for thousands of cooks for many years. It is still referred to with some reverence.

During the 1960s and 1970s, the most popular food commentator in the United States was "The French Chef," Julia Child (neither a chef nor French), who detailed the art of French cooking over dozens of television stations and in her cookbooks. The French are still very much with us.

French chefs have been in demand in the homes of the rich and in expensive restaurants, especially since the French Revolution of 1789, when many of their employers were killed. Some chefs went into business for themselves in Paris, a few immigrated to the United States; many served in the stately homes and clubs of England. Name restaurants in the West world often employ French chefs and others apprenticed on the Continent, since most have been intensively trained, often starting at the age of 14.

The word *restaurant* itself is of French origin, derived from the soup recommended by physicians of the time as a *restorant* (restorative). Paris is credited with having the first restaurant opened by a Monsieur Boulanger in 1765. Supposedly this inscription in Latin appeared over the door: "*Venite ad me omnes qui stomachs laboralis et ego restaurabo vos*" ("Come to me all those whose stomachs cry out in anguish and I shall restore you").

The French and Chinese are known for their attention to gastronomy and the willingness to devote time and talent to its elaboration. The various sections of the French kitchen suggest the high degree of specialization that can be found in a large French restaurant. Such a specialized kitchen with its own hors d'oeuvres maker, ice cream maker, fish cook, meat cook, vegetable cook, and cheese specialist is, of course, rare.

## FRENCH SAUCES AND SEASONINGS

The French influence in seasonings is widespread, especially the use of bay leaf, parsley, thyme, and chervil. In the past we tended to think of French cookery in terms of butter, cream, *pâté de foie gras* (fat goose liver paste), delicate fish dishes in pastry cases, wines, and an array of cakes and pastries.

Sauces, particularly those thickened with roux (equal quantities of fat and flour), were the hallmarks of the French cook. The professional chef knew at least 100 sauces, usually learned over a period of years as an apprentice.

To better understand the contribution of the French to the culinary scene, look at the attention to detail that has gone into the subject of sauce cookery. French cuisine includes literally hundreds of sauces but basically there are five “mother,” or leading, sauces, each with a number of variations. These basic sauces are shown in Figure 9.1.

Sauces can be remembered by color: white, blond, brown, red, and yellow. In the white sauces, the liquid is milk or cream. Fish, chicken, or veal stock is used in the blond sauces. Reduced meat stock is the vehicle for the brown sauces. Egg yolks provide most of the liquid for the yellow sauces. The thickening agent is likely to be roux (pronounced roo) for the white, blond, and brown sauces.

Most widely used of all the warm sauces is white sauce. In the original French version, béchamel, it was made with veal stock. Variations of the white sauce include Mornay (the most widely used) and Sauce Newburg, which has paprika, shallot, sherry wine, and butter added. Another of the mother sauces, the velouté sauces (meaning velvety smooth sauces), are made from thickened veal, chicken, or fish stock.

Of course, the French are not the only inventors of sauces. We have many of our own, an example being the à la king sauce, which is a white sauce to which chicken or other meat, sliced pimientos, and green peppers (and sometimes mushrooms) are added. American home cooking features gravy, the drippings from meat thickened with flour or cornstarch.

The French are much more sophisticated when it comes to brown sauces, as seen in Figure 9.2. The French brown sauce starts with stock prepared from beef bones, chopped vegetables, and a bag of herbs. Preparing espagnole sauce from scratch is time-consuming and with labor costs rising can become quite expensive.

The American cook often starts with a sauce or soup base. Hollandaise, another French offering, is widely used and béarnaise sauce, a derivation of hollandaise, is often seen on sophisticated menus.

Ketchup, probably the most widely used sauce of all, is not usually thought of as sauce. But sauce it is, albeit served at room temperature, and it is very similar to the basic tomato sauce.

Name	Ingredients
Béchamel	Milk (simmered with a clove and studded onion) + White Roux
Velouté (chicken, fish, or veal)	White Stock + White Roux
Brown or Espagnole	Brown Stock + Brown Roux
Tomato	Tomato + Stock + Roux (optional)
Hollandaise	Butter + Egg Yolks

**FIGURE 9.1:** Leading, basic, or “mother” sauces

<b>Demi-Glace or Fond Lie/ Jus Lié</b>	Espagnole + Brown stock (reduced)
<b>Bordelaise</b>	Espagnole + Cornstarch and seasoning Reduction of red wine, shallots, herbs, seasoning, and garnished with bone marrow
<b>Chasseur (French for Hunter)</b>	Mushrooms, tomato, and white wine
<b>Diabla (Deviled)</b>	Reduce white wine, chopped shallots, and crushed pepper. Add demi-glace, simmer. Add cayenne to taste.
<b>Madeira</b>	Reduce demi-glace and add Madeira wine
<b>Marchand De Vine (Wine Merchant)</b>	Reduction of red wine and shallots
<b>Mushroom</b>	Sauté sliced mushrooms, minced shallots in butter, add demi-glace, simmer, add sherry, and a drop of lemon juice.
<b>Perigeaux</b>	Garnish Madeira sauce with finely diced truffle.
<b>Robert</b>	Sautéed onions in butter with a white wine reduction to which demi-glace is added, plus dry mustard and a pinch of sugar dissolved in a little lemon juice.

**FIGURE 9.2:** Classic Small Brown Sauces — A Partial List

*Adapted from Wayne Gisslen, Professional Cooking, Seventh Edition (Hoboken, N.J.: John Wiley & Sons, Inc., 2011), p. 189.*

Though paying homage to tradition, the French kitchen is also flexible. The traditional warm sauces, heavy with saturated fats and flavor, are still with us, but younger French chefs have invented ways of avoiding calories while retaining flavor. Fresh foods, lower fat, and the avoidance of roux-thickened sauces are being featured. Voilà: Nouvelle Cuisine (New Cuisine) and Cuisine Minceur (pronounced man sir, the “cuisine of thinness”).

Instead of roux-thickened sauces, pureed fruits and vegetables are used and liquids are reduced by cooking to appropriate thickness. As in the diet restaurants of the United States, nouvelle cuisine emphasizes veal, fish, fruit, and salads. It reduces the use of table sugar and places more emphasis on sugars found naturally in fruits and vegetables. An example of a tomato sauce without a thickening agent: puree a fresh tomato in a blender and use the result, nothing else, as a sauce.

Traditional French cookery, especially that of haute cuisine (the complex, expensive cookery), was concerned with working over foods: long cooking times, the making of forcemeats, shaping and turning vegetables, and combining foods in familiar ways. Nouvelle cuisine espouses unusual marriages of fruits and vegetables, shorter cooking times, and often an emphasis



A seafood salad appetizer  
*Courtesy of Sysco*

on *au naturel* foods, cooked not at all. Hors d'oeuvres for a reception might feature crudités: raw carrots, cauliflower, celery, and the like.

About the same time that nouvelle cuisine was being introduced—the early 1980s—Alice Waters opened Chez Panisse, in Berkeley, California. One of the things that made Chez Panisse special was that it offered fresh local ingredients. It did not offer an à la carte menu but simply a table d'hôte menu featuring whatever was fresh that day.

Later in the 1990s and early 2000s saw the popularization of *fusion cuisine*—a blending of the techniques and ingredients of two different cuisines, such as Japanese and French, Mediterranean and Chinese, or Thai and Italian.

Today because of fusion cuisine and other influences, a new American cuisine has evolved using methods and ingredients from other cultures. Regional American cuisine has also become more prominent. Another recent trend is the Spanish small-plate concept that evolved from tapas, where people can eat four or five appetizers, which gives them the chance to enjoy more variety. A number of renowned chefs offer guests inspired cuisine that is local and international, fresh and organic.

## Receiving

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Smart restaurateurs arrange with suppliers for all deliveries to be delivered at times convenient to the restaurant—usually between 8 and 11 A.M. and 2 and 4 P.M.. For those restaurants only open for dinner, receiving hours of 8 A.M. to 3 P.M. allows for items delivered to be prepared for that evening's dinner.

It is critically important that a copy of the order be available for the receiver (to ensure that no item was forgotten) and to check that the quality and quantity was accurate per the order. Even more important is to have a member of management check and sign for all deliveries. All items should be checked for quantity—size, weight, and number—and quality. Some restaurants also verify price before signing.

Few restaurateurs have the time to check all items, so they check the higher-cost items, knowing that their system will show if there is a shortage of an item. One successful restaurateur's system showed that there was a 400-pound shortage of potatoes in one month. When the general manager started to weigh every bag of potatoes, the scale showed short deliveries. The supplier agreed and found that the grower was not weighing the potatoes. The restaurant received a credit for the short deliveries. This situation underlines the necessity of occasionally spot checking every item on the delivery sheet.

Restaurants that have purchase order specifications (often made up with the help of the supplier) find it easier to check the condition and quality of orders. Some useful industry tips for receiving are:

- Keep the receiving area clean and tidy.
- Check for product freshness: Use your eyes, nose, and, yes, mouth if necessary.

- Maintain an accurate weighing scale for easy checking of the weight of items. Remember to take the packaging off and weigh the raw product.
- Check all the items you want to; don't be hurried by the delivery person.
- Check the temperature of items to be sure that frozen items are still frozen and items that should be chilled are chilled. If the temperature is 50°F and it should be 43°F, have the item replaced.
- Once the delivery is received, it must be dated, labeled, and stored in the proper place.

## Storage

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Part of the food production system is to store food and other supplies so that they fit into the overall system. This means storage arranged for easy receiving, easy issuing, and easy inventory control. In the dry-goods storeroom, canned, packed, and bulk dry foods are stored according to usage. The most-used foods are stored closest to the door, the least-used foods in the less accessible corners and shelves.

Once a system of storage has been arranged and the items are stored according to usage, a form can be made up listing the items in the sequence in which they are stored. The spreadsheet is then used in taking a physical inventory.

As foods are received, they are stored at the backs of shelves, the older items moved forward to be used first. This rotational system helps ensure that items are not allowed to become too old.

The rotation of goods has no relation to any system of costing foods or other merchandise. In costing an inventory, the last-in, first-out (LIFO) system costs the item at the price paid for the merchandise purchased last. The first-in, first-out (FIFO) system uses the price actually paid for the item. During a period of inflation, the two costs could be quite different. Whichever method is selected, it must be used consistently. Changing methods requires the approval of the IRS.

Convenience foods usually come in a form that makes it possible for them to be stored in a minimal amount of space. Other items are received in a form that should be processed immediately to reduce the amount of storage needed. Lettuce is a good example. Crated lettuce can be uncrated, trimmed, cored, and placed core side up under ice in less space.

Many operators buy only salad greens that have already been washed and cut. Both time and space are saved, but the quality may be lower than if the greens were prepared on the premises. To ensure freshness, a frequent turnover is essential.

In order to maximize the shelf life of a product, it is important to store all items at the correct temperature. A guide to storage temperatures follows.



A hamburger and potato chips, an American favorite  
*Courtesy of PhotoDisc, Inc.*

Dry storage	50–75°F
Produce	37–40°F
Meat & Poultry	33–38°F
Dairy	33–38°F
Seafood	33–38°F
Frozen foods	0–15°F

Managers should be present at delivery times and see that everything is properly stored.

Depending on the size and operation of the restaurant, the storage area and walk-ins may be open to the prep cooks; in most restaurants they are of necessity. In order to safeguard against theft, most smart restaurateurs treat their kitchen staff right by paying them a good salary, feeding them, and providing a good working environment. They also take inventory twice a month and calculate their food-cost percentage.

To help facilitate the ordering and inventory taking, a perpetual inventory method can be used. In this system, a record of the inventory level of an item and a column for withdrawals and total remaining is kept on a clipboard.

## Food Production

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Planning, organizing, and producing food of a consistently high quality is no easy task. The *kitchen manager*, *chef*, or cook begins the production process by determining the expected number of guests for the next few days. The same period for the previous year can give a good indication of the expected volume and breakdown of the number of sales of each menu item. The product mix (a list of what was sold yesterday) will give an indication of what needs to be prepped (prepared) in order to bring the item back up to its par level—and par levels for Monday, Tuesday, and Wednesday will be different from later in the week.

The kitchen manager/chef then gives the food order to the general manager. In some cases a kitchen manager/chef is authorized to order directly him- or herself.

Every morning the chef or kitchen manager determines the amount of each menu item to prepare. The *par levels* of those menu items in the refrigerators are checked, and a *production sheet* is completed for each station in the kitchen. (See Figure 9.3.) Most of the prep (preparation) is done in the early morning and afternoon. The prep sheets (production sheets) give the quantity of each menu item to be prepared. Use of prep sheets increases efficiency and productivity by eliminating guesswork. Taking advantage of slower times in which to prepare food allows the line cooks to do the final preparation just prior to and during the meal service. Kitchen managers make up their own production sheet based on the menu. The production sheet can be split into sections by station or equipment: mixer, stove, oven, pantry, and so on.

The *cooking line* is the most important part of the kitchen layout. It might consist of a broiler station, window station, fry station, salad station, sauté station,

**FRI-SAT PREP/WEIGHT WATCHERS**

DAY PREP				DATE:						
PG	DAY PREP	SHIFTS	PAR	INV	PREP	FREEZER PREP	SHIFTS	PAR	INV	PREP
82	TOMATO WEDGES 1X=1/6TH. PAN	2	1X			61 ONION PEELS 6 OZ 1X=CASE	90	2CS		
82	SLICED TOMS 1X=LAYER 1/3 RD.PAN	2	1X			61 SWEET POT FRIES 6 OZ 1X=1CS	90	2CS		
82	DICED TOMS 1X=1/6TH. PAN	2	8X			61 BONELESS WINGS 1EA=6 OZ BAG	90	4CS		
21	PICO 1X=1/6TH. PAN	3	11X			61 BUTTERMILK SHRIMP (1X=1CS 10EA)	90	2CS		
15	GUAC 1X=1/6TH. PAN	2	3X			61 BATTERED FISH 1X=1CS/4EA PIECES	90	1CS		
81	CUCUMBER 1X=1/6TH. PAN	2	2X			61 BROWNIES 1X=1EA	4	15		
136	TRI-COLORED STRIPS MIXES/WELL	2	2X			61 BLONDE 12CT 1X=1EA	4	15		
137	WHITE CORN CHIPS/LIGHTLY SALTED	2	5X			61 APPLE CHIMI 1X=1EA	4	15		
120	BACON BITS COOKED 1X=5#	2	5#			61 APPLE PIE 1X=1EA	4	15		
80	DICED EGGS 2 OZ	2	20			207 KEY LIME PIE	6	12		
							PORTIONING			
32	SALAD 3.5 OZ. PORTION	3	50			70 POT PIE 1X=12/10 OZ PORTIONS	8	12		
32	SALAD 7 OZ. PORTION	3	50			63 BAKED BEANS 1X=18/4 OZ	6	40		
35	ROMAINE 4 OZ. PORTION	4	30			60 ALFREDO SAUCE	6	25		
35	ROMAINE 8 OZ. PORTION	4	40			205 KEY LIME PIE SAUCE (1X=10/3 OZ)	6	1X		
31	ORIENTAL 4 OZ. PORTION	4	30			114 ANGLAISE SAUCE (1X=10/3 OZ)	6	2X		
31	ORIENTAL 8 OZ. PORTION	4	30			115 MAPLE SAUCE 1X=12/4 OZ	4	10		
31	ORIENTAL 2 OZ. PORTION	4	25			110 APPLE-BUTTER SAUCE 1X=15/2 OZ	4	45		
13	COLE SLAW 1X=1/6TH. PAN	4	6X			206 MARGARITA LIME BUTTER (1X=26/#20)	6	1X		
80	WING CELERY 1X=1/2 LEX	4	2X			64 BEEF MIX 1X=1BG/8-9 OZ PORTIONS	4	5X		
	WW. SALAD MIX 7 OZ. PORTIONS	3	20			64 BEEF MIX 1X=1BG/2 OZ PORTIONS	4	24		
	WW. ROMAINE LEAVES WHOLE	4	20			46 HABANARA SAUCE 1X=10/4 OZ	10	15		
99	WW. SHRIMP SALAD SETS	4	8			ALMONDS 1X=1EA/1 OZ	14	60		
101	WW. VEGGIE QUESA MIX 1X=14/5 OZ	4	5X			ALMONDS 1X=1EA/2 OZ	14	60		
90	WW. BLK/CORN SALSA 1X=12/#20 DISH	3	8X			BLACK BEANS 1X=18/1/4 CUP	4	1X		
33	SPINACH SALAD (PORT=2.5OZ EA)	4	15			HONEY BBO PORTION 1X=24/3 OZ	6	30		
33	SPINACH SALAD (PORT=5OZ EA)	4	15			ORANGE GLAZE 1X=1EA/3 OZ	6	50		
71	RED PEPPER/RED ONION (2OZ/1OZ)	4	30			TERI SAUCE (3 OZ PORT)	10	30		
107	COBB SALAD SET (1/4 CUP EACH) (6OZ)	4	10			CHIPOLTE CHICKEN 1X=1BG-21/4 OZ	6	2X		
	HOT PREP	SHIFTS	PAR	INV	PREP	CHIPOLTE CHICKEN 1X=1BG-28/3 OZ	6	2X		
126	HERB GARLIC MASH POTATOES (1X=3P)	2	1X			155 GARLIC BREAD 1X=1 LEX	3	5LEX		
127	FETTUCINI 10#=#24/10 OZ	2	1X			CHX ROLL UP SETS 4OZ CHK/8OZ CHEESE	6	30		
133	MEXI RICE 1X=18/6 OZ	4	4X			65 CLUB GRILL SETS 1X=1EA(3 OZHAM/TURKEY)	4	15		
132	ALMOND RICE 1X=19/6 OZ	4	8X			68 FAJITA FLOUR TORTS 1X=4 EA	4	30		
103	WW WHITE RICE 1X=43/3 OZ	4	45			66 BABY BACK RIBS-FULL/BAGGED/DATED	2	20		
45	COUNTRY GRAVY 1X=11/6 OZ	4	1X			66 BABY BACK RIBS-HALF/BAGGED/DATED	6	10		
139	WINGS 10 PORTION=5DRUMS/5 WINGS	4	40			153 BURGERS PREP- 1X=1CS/5 PER BAG	10	2CS		
130	POT PIE LIDS 12/TR/SUGAR WATER	4	20			PORTION RIBS 10 OZ WRAPPED/DATED	6	ALL		
131	RIBLET'S CASES COOKED	6	3CS			96 WW TERRI SHRIMP SKEWERS 1X=2EA	2	25X		
91	WW GRILLED LEMON HALVES 1X=1EA	4	50							
	COUNTRY POTATOES 1X=1EA	4	5			24 SEASONED SHRIMP 1X=13/7 PCS.	4	5X		
18	4 CHEESE PANINI SETS	4	5			158 PLAIN SKEWERS(1X=2 SKEWERS BAG)	4	20X		
19	PANINI SPREAD (1X=12-30#)	6	5X			DICED CELERY (1/4 CUP PORT)	2	20		
27	CRANBERRY TURKEY SET	4	10			BL. CHEESE CRUMBLES (1/4 CUP PORT)	6	20		
						MANDARIN ORANGES(1/4 CUP PORT)	6	15		
	MISC PREP	SHIFTS	PAR	INV	PREP					
5	GARLIC BUTTER BROCCOLI(4 OZ)	4	200			67 CRANBERRY (1 OZ) PECAN (1 OZ)	6	15		
106	WW BROCCOLI(6 OZ PORT)	4	60			O'CHEESES	SHIFTS	PAR	INV	PREP
3	TERRIYAKI BOWL VEG 1X=9/8 OZ	4	4X			JACK/CHEDDAR 1/4 CUP 1 BAG = 88	10	2 BAG		
1	BROCCOLI FLORETTES 1 EA/3 OZ	4	25			PIZZA CHEESE 1/2 CUP 1 BAG=35	10	1 BAG		
						PARM 1/4 CUP 1 BAG=42	10	2 BAG		
80	SLICED MUSHROOMS 1X=10# BOX	4	10X			WW. LOW FAT CHEESE 1/4 CUP 1X=42	10	2 BAG		
25	VEGGIE PIZZA 1X=16/5 OZ	6	5X			72 PHILLY CHEESE SAUCE 2 OZ/1X=18	8	20		
136	SAUTEED ONIONS 1 PAN=10#	4	20X			11 BLUE CHEESE 1X=12/#40 DISHER	3	5		
135	SAUTEED GR. PEPPER 1X=10#	4	10#			23 QUESO CHEESE MIX 1X=4- 1/6 PANS	6	4X		
204	TOSTADAS (1/2 AND WHOLE)	2	30/30			20 PARM TOPPING 1X=7/320 DISHER	6	3X		
22	QUESA FILLING 1X=26/6 OZ	4	4X			PEPPER JACK CHEESE (1/4 CUP)	6	2BG		
100	WW LEMON HERB 2 OZ PORTION	4	5			BISTRO PORT(5.5 OZ) 5 SHAKE TABASCO	6	30		
92	WW CILANTRO DRESSING 1X=2OTS	4	1X			CRAB CAKE(2EA PORT)	6	1 BG		
92	WW CILANTRO DRESSING (PORTION)	4	10							
106	WW TERRI SAUCE 1X=21/1.5 OZ LADLE	4	2X			RED ONION SLICE(4 RINGS 1/2 CUT)	4	30		
105	WW SALSA RANCH 1X=26/1.5 OZ LADLE	4	1X			52 APPLE WALNUT DRESSING(1X=16/2 OZ)	4	2X		
98	WW BBO RANCH 1X=21/1.5 OZ LADLE	4	5X			28 GRANNY SMITH APPLES (3X=12 PORT)	2	1X		
12	ROAST GAR. BRUSHETTA (1X=12-1/4CUP)	3	2X			ZESTY RED SAUCE	6	1X		
49	BOURBON STREET MELT SAUCE	6	2X			200 SHREDDED BEEF MIX (1X=32/12 DISHER)	6	2X		
51	REMOULADE SAUCE	6	1X			202 SOUTHWEST VEGETABLE(1X=14 1/4 CUP)	4	4X		
50	ROASTED ASIAGO SAUCE (1X=44-#20)	6	2X			4 FAJITA VEG SET	4	4X		
						203 HONEY LIME CILANTRO VIN (1X=14/4 OZ)	4	3X		
73	FAJITA 5.5 OZ MARINADE	6	2X							
53	FAJITA SAUCE (1X=4 CUPS)	6	1X		*****	201 ENCHILADA SET (CREAMIC SKILLET)	4	20		

**FIGURE 9.3:** Production work sheet  
 Courtesy of Anna Maria Oyster Bar, Bradenton, Florida



A tempting dessert  
*Courtesy of Sysco*

and dessert station, to name just a few of the intricate parts that go into the setup of the back of the house.

The kitchen is set up according to what the guests order more frequently. For example, if guests order more broiled or sautéed items, the size of the broiler and sauté station set up must be larger to cope with the demand.

Teamwork, a prerequisite for success in all areas of the hospitality and tourism industry, is especially important in the kitchen. Due to the hectic pace, pressure builds, and unless each member of the team excels, the result will be food that is delayed or not up to standard, or both.

Organization and performance standards are necessary, but helping each other with preparing and cooking is what makes for teamwork. Teamwork in the back of the house is like a band playing in tune, each player adding to the harmony. Another example of organization and teamwork is T.G.I. Friday's five rules of control for running a kitchen:

1. Order it well.
2. Receive it well.
3. Store it well.
4. Make it to the recipe.
5. Don't let it die in the window.

A kitchen team in full swing, preparing and serving quality meals on time, is an amazing sight.

## **Production Procedures**

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Production in the kitchen is critical to the success of a restaurant since it relates directly to the recipes on the menu and how much product is on hand to produce the menu. One way to increase sustainability is to have menu items that require less cooking times, items that are prepared using less heat, and items that are prepared through cooking methods that require less heat and cooking time. Think about how much energy (and money) is saved by serving menu items such as salads, sushi, fruits, etc.!

In addition, timing is vital if guests are to get their food quickly. Thus, controlling the production process is a challenge.

The first step in creating the production sheets is to count the products on hand for each station. Once the production levels are determined, the amount of production required to reach the level for each recipe is decided. When these calculations are completed, the sheets are handed to the cooks.

It is important to make the calculations before the cooks arrive, taking into consideration the amount of prep time that is needed in order to produce before

the rush. For instance, if a restaurant is open for lunch and dinner, enough product should be on hand by 11:00 A.M. to ensure that the cooks are prepared to handle the lunch crowd.

When determining production, par levels should be changed according to sales trends. This will help control and minimize waste levels. Waste is a large contributor to food cost; therefore, the kitchen should determine the product levels necessary to make it through only one day.

Products have a particular shelf life, and if the kitchen overproduces and does not sell the product within its shelf life, it must be thrown away. More important, this practice allows for the freshest product to reach guests on a daily basis.

After the lunch rush, the kitchen checks to see how much product was sold and how much is left for dinner. (Running out of product is unacceptable and should not happen. If proper production procedures are followed, a restaurant will not have to cancel anything on the menu.)

After all production is completed on all stations, the cooks may be checked out. It is essential to check out the cooks and hold them accountable for production levels. If they are not checked out, production will slide, negatively impacting the restaurant and the guests.

The use of production sheets is critical in controlling how the cooks use the products. Every recipe has a particular spec (specification) to follow. When one deviates from the recipe, the quality goes down, consistency is lost, and food cost goes up. That is why it is important to follow the recipe at all times.

Production starts with *mise-en-place* (the assembly of ingredients and equipment for the recipe). The backbone for every service in the restaurant is having all the specific ingredients for the recipes prepped ahead of time. Stocks and sauces are done weekly; garnishes are prepped in the late afternoon, and marinated meats the day before or early in day of use and so on. Experience goes a long way in gauging how much product to prep. For example, what if you have 350 guests in two hours?

Everything is set up at the station—the proper number of pans, containers, sauce bins, and so on—and cooks try to avoid calling for extra ingredients.

During production, it is important that standards are maintained for quality and inventory control: the right size, measurement, portion, temperature, and compliance with food safety. Chefs need to work to a time frame and constantly check production for quality and quantity.

Normally, the menu for lunch is different from that for dinner. An inventory needs to be taken after the lunch service to see what was consumed and what can be used for dinner and what needs to be prepped.

After every meal service, it is important to clean the station and begin the preparations for the next service.

Once again, a production schedule is used to plan and organize stations. Both the quantity of an item and a timeline for the steps of production are listed so that the chef can check on progress.

Dinner normally has a more complicated menu with more selections available, which adds to the workload.

## Staffing and Scheduling

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Practicing proper staffing is absolutely critical to the successful running of a kitchen. It is important to have enough staff on the schedule for the restaurant to handle the volume on any shift. Often it is better to overstaff the kitchen rather than under staff it, for two reasons. First, it is much easier to send an employee home than it is to call someone in. Second, having extra staff on hand allows for cross-training and development, which is becoming a widely used method.

Problems can be eliminated if a manpower plan is created, for example, to set levels for staffing needs. These levels should be adjusted according to sales trends and a regular basis.

## Food-Borne Illness

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Posted in the kitchen of a large university is a sign “Cleanliness Is Next to Godliness.” Restaurant patrons may not believe in the religious implication of the statement, but they place implicit trust in the integrity of restaurant operators, believing that food served will be clean, free of harmful germs and foreign materials.

The United States Public Health Service identifies more than 40 diseases that can be transferred through food. Many can cause serious illness; some are even deadly. A food-borne illness is a disease that is carried or transmitted to human beings by food.

There are three types of hazards to safe food: biological, chemical, and physical. Of these three, biological hazards cause the highest percentage of food-borne illness outbreaks. Disease-causing microorganisms, otherwise known as pathogens, such as bacteria, molds, and yeast, are considered biological hazards.

Whether it's cookie dough or meat products that are contaminated prior to arrival at a restaurant, it still severely taints the restaurant's image. And while restaurants are not always associated directly with these food poisoning outbreaks, the industry nevertheless has felt the repercussions as concerned consumers react to an environment clouded by a growing fear of the food they consume.<sup>6</sup> In 2009, nine people died and more than 700 were sickened after they consumed foods containing salmonella-laced peanut products made by Peanut Corporation of America in Blakely, Georgia. After the tainted items were traced back to PCA, federal inspectors examined the company's facilities in Blakely and discovered filthy conditions there. In other incidents, 1,300 people became ill when they ate raw serrano peppers containing the rare saintpaul strain of salmonella. The FDA was eventually able to trace the source to peppers raised on a farm in Mexico.<sup>7</sup>

### BIOLOGICAL HAZARDS—BACTERIA

Bacteria, single-celled microorganisms that are capable of reproducing in about 20 minutes, cause the highest number of biological food-borne illness. Under favorable conditions, one bacterium can become a colony of 72 million bacteria,

more than enough to cause serious illness.<sup>8</sup> By understanding bacteria, we can destroy or control them and render them harmless. Like all living organisms, bacteria, need sustenance to function and multiply.

Bacteria can cause illness in two ways. The first is via disease-causing bacteria, known as *pathogens*, which feed on nutrients in hazardous foods and, given favorable conditions, multiply rapidly. Other bacteria, while not harmful themselves, discharge toxins as they multiply. These toxins poison humans who eat food containing them.

Pathogenic bacteria can cause illness in humans in one of the three ways: intoxication, infection, or toxin-mediated infection.<sup>9</sup>

The best-known example of intoxication is botulism, a toxin produced by some bacteria; it cannot be smelled, seen, or tasted. Unlike many other bacteria, high temperatures do not destroy botulism, so special care is required in food handling to avoid illness.

*Salmonella* is the best-known example of infection caused by bacteria. The bacteria live in the intestines of chickens, ducks, mice, and rats. Under favorable conditions, *salmonella* bacteria may cause illness to humans. Cooking foods to a temperature of 165°F or higher can kill them.

Toxin-mediated infection has characteristics of both intoxication and infection. Examples are *Clostridium perfringens* and *Escherichia coli* 0157:H7 (*E. coli*). After ingestion, these living organisms establish colonies in human or animal intestinal tracts, where they produce toxins. Young children and the elderly are vulnerable to these bacteria.

From time to time, the general public's faith in the safety of restaurant food is badly shaken by an outbreak of food-borne illness in a relatively few restaurants, cases that are widely publicized in the news and that frighten the public. A few such instances have resulted in death and caused serious financial damage not only to the restaurant where the outbreak occurred but to the restaurant industry in general.

Recently there was an outbreak of *E. coli* in packages of spinach that were traced to one production facility in California.

Food protection practices are not easy to enforce. It must be assumed that all employees carry potentially dangerous bacteria and are shedding them in their feces and urine and from noses and mouths.

To ensure clean hands and nails, double hand washing, using a fingertip brush, must be done. Proper hand washing includes using water as hot as the hands can comfortably stand, using a brush for the fingernails, and rubbing the hands together using friction for 20 seconds. The fingernail brush is not used during the second wash.

Should paper towels or heat be used to dry hands? Other food protection practices are discussed in the sections that follow.

## CAUSES OF FOOD-BORNE ILLNESS

Any kind of food can be the vehicle for food-borne illness. However, generally, the high-protein foods that we eat regularly are responsible for most food-borne

illnesses. The foods are classified as potentially hazardous by the U.S. Public Health Service and include any food that consists in whole or in part of milk or milk products, shell eggs, meats, poultry, fish, shellfish, edible crustaceans (shrimp, lobster, crab, etc.), tofu and other soy-protein foods, plant foods that have been heat treated, raw seed sprouts, or synthetic ingredients.<sup>10</sup>

Thousands of cases of stomach upset in the United States are traceable to restaurant food. The result of neglected food protection is seen more dramatically in some foreign countries. Many North American visitors who travel to developing countries come down with food-borne illness.

The foodservice operator should consider the cultural backgrounds of employees and understand that food sanitation practice and attitudes toward cleanliness vary widely from one culture to another. The Japanese are known for their emphasis on sanitation. In Tokyo, persons with colds wear face masks to curb the spread of the cold to others. Other cultures place less emphasis on cleanliness and sanitation.

In developing countries, the germs most likely to cause intestinal upsets are strains of *E. coli*, whose germs pass from bowel to hand to food. *E. coli* causes a majority of the tourist symptoms commonly experienced in developing nations. Food protection problems increase in hot, humid climates where cockroaches are endemic, flies abound, and rodents are searching for food and shelter.

While sanitation rules are straightforward and relatively simple, consistent implementation demands constant attention and concern. Habits are like giant flywheels; once learned and set in motion, they are difficult to change. Sanitarians are unanimous in their praise of the wonders of soap and water.

The NRA's *Sanitation Operations Manual* discusses a number of cases of food-borne illness in which the causes were tracked down.<sup>11</sup> Here is what typically happens in restaurants when food is not well prepared.

- In a large downtown restaurant, many patrons became ill after eating a Thanksgiving Day meal. Salmonella was allowed to grow in the turkey and gravy because the food was held between the noon and evening meal at a low temperature in the danger zone. A cook was identified as carrying a positive salmonella culture.
- At a sandwich shop, 22 cases of salmonella infection were traced to the owner and two employees. Barbecued pork was chopped by hand on a pine cutting board. The pork was not refrigerated for two hours.
- For a catered picnic, 100 pounds of potato salad was put in a tub while still warm, then placed in a walk-in refrigerator overnight. Salmonella was present and grew because the interior of the potato salad never cooled; the temperature was 50°F. Salmonella was found in the stool culture of the person who made the salad.
- Roast beef is sometimes infected with *Clostridium perfringens*. Beef was sliced on a wooden cutting board and contaminated by the liquid from plastic bags enveloping the turkeys previously cut up on the board.

- Staphylococcus poisoning at a drive-in restaurant was caused by a high staph count in chocolate and other cream pies. The pies had been stored in a refrigerator at a temperature between 52° and 60°F.

The three disease-causing microorganisms most commonly associated with food-borne illness in the United States are *Staphylococcus aureus*, salmonella, and *Clostridium perfringens*.

Staph bacteria live in our noses and on our skin and are concentrated in large numbers in boils, pimples, and other skin infections. Staphylococci present a special problem. In a favorable environment, they produce enterotoxins impervious to boiling water temperatures or the other temperatures commonly associated with food production. This means that you cannot destroy the staphylococci poisons. High-protein foods such as meats, poultry, fish, eggs, and dairy products that involve human handling are usually associated with staphylococci food poisoning. The microorganisms thrive and grow rapidly at temperatures above 44°F and survive to about 140°F or higher in certain circumstances.

*Salmonella* is the name of some 2,000 closely related bacteria that continually cycle through the environment in the intestinal tracts of people and animals. First discovered in swine by Dr. Daniel E. Salmon in 1885, salmonella occurs in hundreds of different species, essentially as infections in animals and animal products such as eggs, meat, and milk. Researchers believe that only 1 percent of the infections caused by salmonella germs are reported.

*Clostridium perfringens* ranks third as a cause of food-borne illness. The bacteria are present in the soil, the intestines of animals, including humans, and in sewage. It has been called the cafeteria germ because it grows so well in food left standing at temperatures between 70° and 170°F. A problem with *perfringens* is that while the vegetative cells of the germ are destroyed at normal cooking temperatures, the spores are not.

*Clostridium perfringens* is a natural contaminant of meat and is commonly found in the intestinal tract of healthy humans. It is around most of the time. Meat that has been cooked and then left out at room temperature for some time is almost certain to develop this bacteria.

Streptococcus food infection, found in contaminated nasal or oral discharges, is spread by sneezing or poor food handling and can cause scarlet fever and strep throat. Foods contaminated with excreta by unclean hands also cause intestinal strep infections.

*Bacillus cereus* organisms are found in soil, water, and dust. Keeping hot foods hot, cold foods cold, and preventing cross-contamination controls this bacteria.

*Shigella dysenteriae* is another serious threat in foodservice. As few as 10 germs of this kind in a salad can make healthy people ill.

Parasites also cause infections. Trichinosis, fish tapeworm, and some kinds of amoebas are the parasites that North Americans are most likely to encounter.

Viral infections—the common cold and hepatitis—are other hazards found in the restaurant. Viruses are transmitted to food by humans. Luckily, viruses do not multiply in food. Unfortunately, heat does not kill them.

Raw or insufficiently cooked pork can support the parasite *Trichinella spiralis*, which burrows into the muscles of the host. Fish tapeworms in some fish taken from infected waters are another hazard and make the practice of serving any raw fish questionable. Tapeworms, also found in raw beef, attach themselves to the intestinal wall of the host and can grow to 30 feet in length.

Some food-borne diseases are parasites that have quite serious consequences.

Amoebic dysentery, for example, is not a self-limiting diarrhea and can last for months. Bacillary dysentery, a self-limiting diarrhea that is widespread in the tropics, may have an onset period of about two days and last about six days.

Cholera is spread by ingesting food and liquids contaminated by sewage that contain the virus *Vibrio comma*.

Infectious hepatitis is dangerous, often lethal. Unlike food poisoning, which usually runs its course in a few days, infectious hepatitis has a long incubation period, 10 to 50 days, before its symptoms of yellow discoloration, severe loss of appetite, weight loss, fever, and extreme tiredness set in. Caused by a virus, infectious hepatitis is found in feces and urine of infected persons and in raw shellfish harvested from infected waters.

The paradox of food-borne illness is that most of it can be avoided by clean hands and by following a few simple precautionary practices. Salmonella presents no problem if suspect foods are heated to 165°F or higher. Make sure the hands do not brush the hair, fingers are not in the nose, and the hands are washed after changing money or working with any potentially contaminated object, such as garbage.

How does one know which of the three principal pathogens is the cause of food-borne illness? One cannot be sure, but the symptoms manifested are a clue to the microorganisms at fault. All three types of bacteria cause vomiting and diarrhea. *Staphylococcus aureus* (staph) symptoms appear two to six hours after eating infected food and last a day or two. Salmonella symptoms normally show up later, 12 to 36 hours after eating, and last longer—two to seven days. *Perfringens* symptoms appear as diarrhea and pains 8 to 24 hours after consumption and often end within a day.

Microorganisms for causing food-borne illness are not visible to the naked eye.

Staph germs are grapelike cells; salmonella are rod-shaped cells that cluster together. *Perfringens* germs are also rod-shaped but not clustered together like salmonella.

The most frequently cited errors in food handling are:

1. Failure to cool food properly
2. Failure to heat or cook food thoroughly
3. Infected employees who practice poor personal hygiene at home and at the workplace
4. Foods prepared a day or more before they are served
5. Raw, contaminated ingredients incorporated into foods that receive no further cooking
6. Foods allowed remaining at bacteria-incubation temperatures

7. Failure to reheat cooked foods to temperatures that kill bacteria
8. Cross-contamination of cooked foods with raw foods, or by employees who mishandle foods, or through improperly cleaned equipment<sup>12</sup>

## CONTROLLING OR DESTROYING BACTERIA

Bacteria, like other living things, have a comfort zone. In order to grow, bacteria require food and moisture, the proper pH, and time. The food on which bacteria thrive is called potentially hazardous. Among the potentially hazardous foods are those high in protein, like meat, milk and dairy products, and especially eggs, fish, and shellfish. Items like custard, mayonnaise, hollandaise sauce, and quiche are particularly susceptible to contamination.

Temperature is the most important element for bacteria survival and growth; it is also the easiest for restaurateurs to control. The temperature danger zone—between 40° and 140°F—is the range in which bacteria can thrive and multiply most rapidly. Outside of these temperatures, bacteria become dormant, only to reactivate when more favorable conditions return.

It is critical for operators to heat the internal food temperature to a minimum of 140°F. Other safe practices include:

1. Hold foods at internal temperatures of at least 140°F.
2. Heat foods rapidly to avoid the danger zone.
3. Heat small quantities at a time.
4. Heat foods close to service time.
5. Do not use a steam table to reheat foods; instead, heat them rapidly to an internal temperature of 140°F, then transfer them to the steam table for holding.
6. When hot foods must be cooled, chill them quickly in an ice bath or with running water.
7. Place cooked foods in the refrigerator above uncooked foods; this will help avoid cross-contamination.
8. Do not thaw foods at room temperature.
9. Thaw foods gradually in the refrigerator. Put them in a container to prevent them dripping onto other foods.

The golden rule in restaurant operations is to keep hot foods hot and cold foods cold. By controlling the environment in which bacteria may grow and thrive, restaurant operators can prevent outbreaks of food-borne illness. Additionally, raw foods should not be stored above ready-to-eat products, so as to prevent drippings from contaminating food.<sup>13</sup>

Bacteria thrive on protein foods that contain moisture and are neutral or slightly acidic. Generally, microorganisms do not grow in foods that are highly acidic or highly alkaline.

## BACTERIA AND TEMPERATURE

Most bacteria, harmful or not, are destroyed by heat. For example, heat of 180°F is used in the final rinse of dishwashing machines.

Chemical sanitation is most effective at temperatures between 75° and 120°F. Three commonly used chemical sanitizers are chlorine, quaternary compounds, and iodine. If, for some reason, the usual dishwashing methods are not available, chlorine performs well if at least 50 parts per million of water are used for one minute. Dishes and utensils are immersed for one minute in solution at least 75°F in temperature.

Microwave heat, as used in microwave ovens, acts by the agitation of water molecules in the food. Because of unequal water distribution in the food and uneven microwave distribution in the oven, food cooked in a microwave is not heated properly. An important guideline to ensure that the safe internal temperature is achieved in microwave cooking is to add a minimum of 25°F to the recommended internal cooking temperature of food when prepared the conventional way. This means, for example, that chicken cooked in a microwave oven should have an internal temperature of 190°F instead of the usual 165°F recommended. Figure 9.4 shows the minimum safe temperatures for various hot foods.

## VIRUSES

Viruses are another type of microorganism of concern to restaurant operators because they can cause food-borne illness such as hepatitis A and Norwalk virus. Viruses do not require a hazardous food in order to survive. They can survive on any food or surface, do not multiply, and are not as affected by heat or cold as are bacteria. They simply use the food or other surface as means of transportation. Once the virus enters a body cell, it takes over, forcing the cell to assist in the production of more viruses.

Outbreaks of food-borne or water-borne diseases are usually caused by unfiltered drinking water, shellfish from polluted waters, and, especially, poor personal hygiene. Foods not cooked after handling are those most likely to cause a viral disease. Examples include salads, baked products, milk, sandwich meats, fish, and shellfish.

Product	Temperature
Pork, ham, sausage, and bacon in a microwave	170°F (76.6°C)
All foods previously served and cooled that are reheated	165°F (73.9°C) within two hours
All poultry and game birds	165°F (73.9°C)
Stuffed meats	165°F (73.9°C)
Stuffing	165°F (73.9°C)
Pork, ham, and bacon in another heating element	150°F (65.6°C)
Potentially hazardous foods	140°F (60°C)
Beef roasts (rare)	130°F (54.4°C) for two hours
Beef steaks (rare)	130°F (54.4°C) (or as customer requests)

**FIGURE 9.4:** Minimum safe internal temperatures for various hot foods

A hepatitis outbreak in Los Angeles had health officials preparing to examine the cost and benefits of mandatory vaccinations. Health officials issued warnings to 3,500 people who attended more than a dozen events catered by the company, including a *Sports Illustrated* bash celebrating the magazine's swimsuit issue.<sup>14</sup>

## CHEMICAL CONTAMINANTS

The increased use of pesticides has caused concern about the chemical contamination of foods. Besides pesticides, other types of chemical contamination can, and do, occur along the food supply chain.

1. Restaurant chemicals like detergents, sanitizers and similar products are poisonous to humans.
2. Overuse of preservatives like sulfating agents (used for maintaining the freshness and color) and nitrates (used as a curing agent to prevent bacterial growth and as a flavor enhancer).
3. Acidic reaction of foods with metal-lined containers.
4. Contamination of food with toxic metals (may occur when carbonated beverages that pass through copper pipes).

There is a common misconception that cleaning products have to be packed with strong chemicals to be effective. Many excellent sustainable cleaners are now available made from 100 percent nontoxic, biodegradable ingredients. They work just as well as the others, without the detrimental health effects.<sup>15</sup> Natural products, such as baking soda, vinegar, and lemon may also be use as cleaning agents.

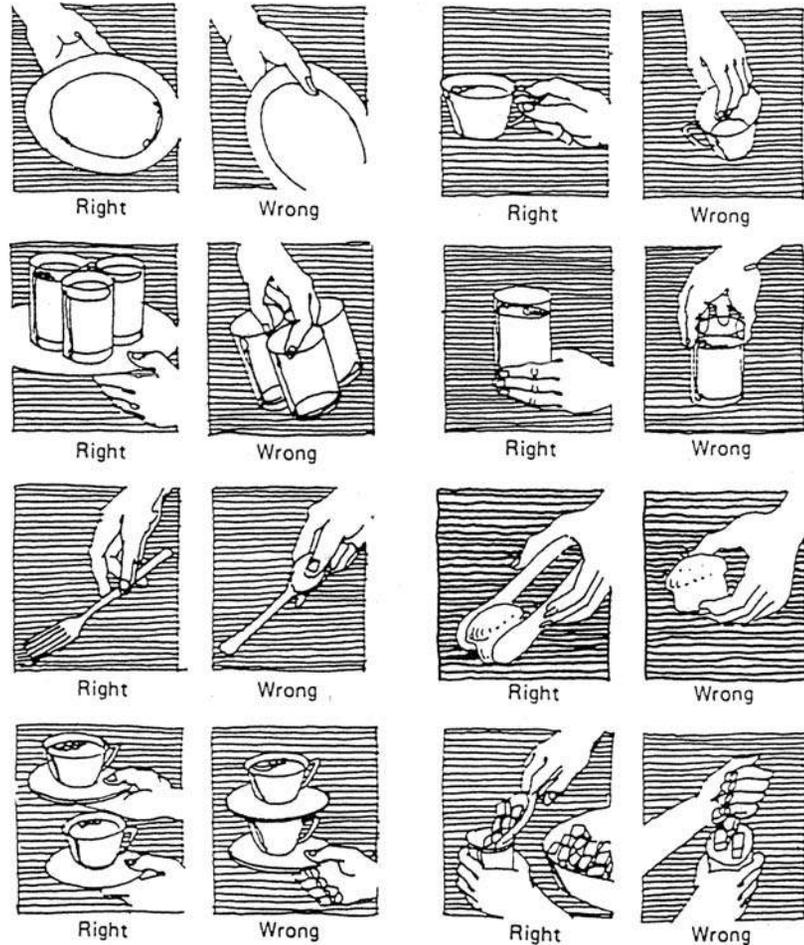
Many outbreaks of food-borne illness are caused by humans who do not observe proper personal hygiene. By not washing hands frequently, especially after dealing with potentially hazardous foods, and by not wearing protective gloves when handling foods, employees may contaminate foods. Even healthy people can carry microorganisms like staphylococci in their mouth, throat, and nose. Other microorganisms passed on by humans are shigella, *Clostridium perfringens*, salmonella, and hepatitis A. The way to prevent outbreaks of food-borne illness caused by humans is to practice personal cleanliness.

Because germs are ubiquitous in restaurants, management should set the tone that every staff member is also a sanitarian—a person constantly aware of the importance of personally controlling pathogens. There is a right and a wrong way of carrying utensils and serving food (see Figure 9.5). Parts of food handling courses cover the subject.

## Hazard Analysis of Critical Control Points

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Because of the necessity of avoiding any kind of illness among astronauts, the National Aeronautics and Space Administration (NASA) developed a program that attempts to ensure that space fliers do not become ill from food-borne diseases. The program, called Hazard Analysis of Critical Control Point (HACCP), presents



**FIGURE 9.5:** Sanitary ways to carry utensils and serve food

Source: Applied Foodservice Sanitation, A Certification Coursebook, 4th ed. (Educational Foundation of the National Restaurant Association, 1995), pg. 141.

methods for systematically ridding kitchens of pathogens. The system follows seven basic steps.

1. Identify hazards and assess their severity and risks.
2. Determine critical control points (CCPs) in food preparation.
3. Determine critical control limits (CCLs) for each CCP identified.
4. Monitor CCPs and record data.
5. Take corrective action whenever monitoring indicates a CCL is exceeded.
6. Establish an effective record-keeping system to document the HACCP system.
7. Establish procedures to verify that the HACCP system is working.<sup>16</sup>

The first step is to decide what hazards exist at each stage of a food's journey through the kitchen and to decide how serious each is in terms of overall safety priorities. On your own checklist, this may include these items:

- Reviewing recipes; paying careful attention to times for thawing, cooking, cooling, reheating, and handling of leftovers
- Giving employees thermometers and teaching them how to use them; correctly calibrating the thermometers
- Inspecting all fresh and frozen products upon delivery
- Requiring hand washing at certain points in the food preparation process and showing employees the correct way to wash for maximum sanitation
- Adding quick-chill capability to cool foods more quickly in amounts over 1 gallon or 4 pounds

There are as many of these possibilities as there are restaurants.

The second step is to identify critical control points. A CCP is any point or procedure in your system where loss of control may result in a health risk.

If workers use the same cutting boards to dice vegetables and debone chickens without washing them between uses, that is a CCP in need of improvement. Vendor delivery vehicles should be inspected for cleanliness; product temperatures must be kept within 5 degrees of optimum; expiration dates on food items must be clearly marked; utensils must be sanitized; and the list goes on and on.

The third step is to determine the standards and limits for what is acceptable and what is not in each of the CCP areas in your kitchen.

The fourth step in the HACCP system is to monitor all the steps you pointed out in step 2 for a specific period of time to be sure each area of concern is taken care of correctly. Some CCPs may remain on the list indefinitely for constant monitoring; others, once you correct the procedure, may be removed from the list after several months. Still others may be added to the monitoring list as needed.

The fifth step kicks in whenever you see that one of your CCLs (see step 3) has been exceeded and corrective action must be taken.

The sixth step requires that you document this whole process. Without documentation, it is difficult, at best, to chart whatever progress your facility might be making. If there is a problem that affects customer health or safety, having written records is also very important.

Finally, the seventh step requires that you establish a procedure to verify whether the HACCP system is working for you. This may mean a committee that meets regularly to discuss health and safety issues and to go over the documentation required in step 6.



Setting up a cleanliness program is critical to food production and the sanitation of restaurants

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## Common Food Safety Mistakes

Some of the most common food safety risks in day-to-day food production fall into three key areas: time/temperature abuse, cross-contamination, and poor personal hygiene. Following are useful tips to avoid them.



Sanitizing the dishwasher is an important step in maintaining a sanitary operation

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### TIME/TEMPERATURE

Here's the drill: The danger zone in which bacteria thrives lies between 40° to 140°F. Keep all cool foods below 40°F and all hot foods above 140°F.

- Invest in digital thermometers with long probes or thermocouples. (Some new thermometers even record temperatures for record keeping.) Make use of oven and refrigerator thermometers.
- Randomly take temperatures of sample food shipments to ensure that proper chilling temperature is maintained through transport. Food shipments that require cold storage must be chilled immediately.
- When cooling hot foods, place them into shallow pans and cool them with an ice bath or a cooling paddle, or use ice as an ingredient before placing them in the cooler. Placing hot foods in the cooler not only raises the cooler temperature, but many foods simply won't cool to 40°F within the four hours prescribed.
- Cook foods to the temperature recommended in the Food and Drug Administration (FDA)

Food Code. Reheat foods, one time only, to 165°F. Once foods are cooked or reheated, temperature must be held above 140°F.

- Prepare foods in batches; avoid leaving large quantities of food at room temperature during preparation.

### CROSS-CONTAMINATION

Most cross-contamination occurs in food preparation. It is easy to engage in unsanitary food practices without realizing the dangers. Picking up a spoon by the bowl is like sticking your fingers in someone's mouth. Picking up ice has the same effect. Handling money definitely transfers germs to the hands. Sneezing in the hand has the same effect.

Have you ever seen a server grab a piece of pie and shovel it in his mouth while picking up an order for the dining room? He has almost certainly

contaminated his hands. Dragging on a cigarette and failing to wash the hands afterward also means germs from the mouth go onto the hands.

- Buy a plentiful supply of color-coded cutting boards and dedicate the colors to specific foods: chicken only, vegetables only, bread only, for example. Wash the board in hot water and sanitize after every use. When boards go black, that's bacteria growing in the scores. Throw them out!
- Buy nonabsorbent, washable mats to anchor cutting boards instead of using towels that can absorb contaminated juices. Replace mats between each cutting job.
- As with cutting boards, dedicate knives to specific foods, and clean and sanitize them between all cutting jobs. Label the drawers where the knives are kept so that they stay dedicated.
- Wipe down the slicer blade with a clean, hot cloth between jobs and sanitize.
- Invest in an antiseptic block (a block of solidified sanitizer that you slice on the slicer).
- Clean and sanitize the counter between each cutting job.
- When storing foods in the cooler, follow this rule: Cooked foods and foods to be served raw go on top shelves, uncooked raw foods go on bottom shelves. This eliminates the chance of contaminated juices dripping onto ready-to-eat foods.
- Buffets are prime situations for cross-contamination. Tongs, ladles, and spoons get dropped, switched in the bins, touched by many hands, coughed on—you name it. They need to be cleaned and sanitized, or replaced, every half hour.

## **Approaches to Food Safety**

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Overall responsibility for foodservice has been given to the FDA. States and local health authorities draw up ordinances that specify standards and practice for the protection of employees and patrons and provide for regular inspection and enforcement of the ordinances. The FDA provides a model ordinance that is the basis for most local health ordinances.

A public health license to operate a restaurant is required; the license can be revoked if standards are not met or if a dangerous health hazard is found or suspected.

When operating a new restaurant facility or taking over an existing one, a sanitarian or other health officer makes an inspection and may call for changes, such as the installation of sneeze guards over salad bars or changes in plumbing, floor coverings, and number or kind of toilet facilities. Most jurisdictions require a toilet for the people who are physically handicapped.

While the requirements and inspections may appear onerous to the operator, they should be welcomed as a means of safeguarding the public and avoiding problems that could destroy a restaurant. Some restaurant chain operators want

more, not less, food protection and monitoring and hire their own bacteriologists to perform regular bacteria counts on foodservice equipment and on such items as glass, china, and flatware.

Regular physical examination of personnel is an excellent practice, one that too few restaurateurs follow because of time and cost. At the very least, newly hired employees should be given physical examinations for no other reason than to protect current employees and to learn of any physical limitations, and to counter claims that a disability was caused on the job. Some health departments provide free or low-cost exams.

That a person is examined and found healthy does not in any way reduce the necessity for following all the rules for food protection. Individuals can harbor infectious agents in their bodies. These people, known as carriers, can transmit the disease to others without themselves exhibiting symptoms. A number of outbreaks of disease have occurred through such carriers.

All states and many local communities monitor restaurants for cleanliness and adherence to food protection ordinances. Most, however, lack the staff to do more than a few inspections. Several states mandate that all foodservice employees complete a food protection course and become certified food handlers.

A number of municipalities have assigned to their public health director the responsibility for ensuring that every restaurant employee completes an elementary course in food protection. Certificates and pins are awarded to those who pass the course. With high employee turnover, however, it is virtually impossible to enforce health codes that mandate such courses. Management interest in food protection and insistence on sanitation is the only practical way to protect employees and the public from diseases that are most certainly present when hundreds of people sit down to eat in a public restaurant.

Many restaurants require kitchen staff to wear gloves when handling food. This lessens the risk of contamination.

Uneven enforcement of regulations causes some confusion in the industry. For example, in some communities, public health officers do not permit tables to be set, prior to serving a meal, with glasses, cups, knives, forks, and spoons unless the glasses and cups are inverted and the knives, forks, and spoons are wrapped or otherwise covered.

## **Food Protection as a System**

Up to a point, the more sanitation practices that can be built into a system, the more likely they will be carried out. The system includes details that can be otherwise overlooked. Personnel trained in the system are carried along by it. One of the reasons for the success of chains like McDonald's is their emphasis on the sanitation system. "Why is that toothpick on the floor?" asks a McDonald's inspector. "Why hasn't that table been cleaned?" "Why is the restroom not cleaned?"

To systematize sanitation practices, they should be built into the manager's daily schedule, as shown in Figure 9.6.

LOCATION: \_\_\_\_\_ DATE: \_\_\_\_\_ TIME: \_\_\_\_\_ DAY: \_\_\_\_\_

Does this Heritage Restaurant meet the following acceptable cleanliness standards?

	Yes	No		Yes	No		Yes	No
EXTERIOR			REST ROOMS (MEN'S)			DISH AREA (CONT.)		
Parking Lot			Floor			Garbage Cans		
Planters			Urinals			Floor		
Weeded			Stools			Walls		
Watered			Wash Basin			Ceiling		
Dumpster Area			Mirrors			Dish Racks		
Grease Area			Wastebasket			Mops and Buckets		
Front Door			Toilet Paper			Employee Table		
Walks			Seat Covers			WALK-IN		
Lights			Towels			Floors		
Signs			Soap Dispenser			Walls		
Back Door Locked			Other:			Ceilings		
Other:			REST ROOMS (WOMEN'S)			Racks Labeled		
INTERIOR			Floor			Containers		
Floors Swept			Stools			Labels and Dates		
Floors Clean			Wash Basin			FREEZER		
Door/Handles			Mirrors			Floors		
Greeting Sign			Wastebasket			Racks Labeled		
Floor Drains			Seat Covers			Containers		
Windows			Towels			STOREROOM		
Window Sills			Kotex dispenser			Floors		
Walls			Soap dispenser			Racks		
Ceilings			Other:			Shelves		
Vents			KITCHEN			Walls		
Light Fixtures			Floor			Containers		
Light Bulbs			Walls			Labels		
Table Bases			Ceiling			OTHER:		
Chairs			Light Fixtures			OTHER:		
Counter Stools			Ovens			OTHER:		
High Chairs			Shelves			EMPLOYEES		
Counter Top and Front			Sinks			Waitstaff Appearance		
Other:			Work Tables			Uniforms		
EQUIPMENT			Mixer			Name Badge		
Cigarette Machine			Slicer			Hair		
Coffee Makers			Steam Tables			Cooks' Appearance		
Cash Register			Filters			Hat and Scarf		
Cutting Bar			Grills			Clean Aprons		
Waitstaff Stations			Reach-ins			Utility Appearance		
Wait Station Stock			Cold Table			SERVICE STANDARDS		
Wait Station Cleaned			Grease Traps			Greeting		
Fountain Area			Other:			Service Times		
Pie Case Area			Other:			Cooperation		
Reach-ins			Other:			Customer Awareness		
Menus			UTILITY AREA			Cooking Times		
Salt and Peppers			Dish Machine			Service Priorities		
Sugar Dispensers			Sinks			Waitstaff Callbacks		
Creamers			Shelves			Managers' Appearance		

Comments: \_\_\_\_\_

Supervisor's Signature: \_\_\_\_\_ Manager's Signature: \_\_\_\_\_

**FIGURE 9.6:** Heritage Restaurant's inspection report

Source: Courtesy of Heritage Restaurants

The Waffle House, Inc., an Alabama-based chain, provides a schedule that takes the manager through the day from 6:30 A.M., when he or she arrives and checks the building for appearance, until 9:00 P.M., when the cash register and supplies are checked as the manager leaves.

The first duty, on arrival, is to check around the building for paper, trash, and beer cans before opening. Five minutes later, the manager checks the front door glass, the floor, the booths, the rest rooms, and the floor behind the counter. At 10:30 A.M., the floor is swept; at 2:00 P.M., it is mopped. At 4:30 P.M., the whole unit is gone over for cleanliness.

To take care of major cleaning, a weekly cleaning schedule is laid out. Each day something major is cleaned: the back bar on Sunday; grills and light globes on Monday; sidewalks and blinds on Tuesday; ceiling and booths on Wednesday; refrigerators and under the dishwashing machine on Thursday; display case, cigarette, and music machines on Friday; menus, office window, and parking lot on Saturday.

Each operator can design and copy a checklist that fits his or her restaurant. The checklist can be a reminder to check those things that, over time, may be overlooked. Without a checklist, the unacceptable becomes acceptable. The dirty carpet is overlooked; the soiled uniform becomes normal. If used on a regular basis, the checklist systemizes sanitation. Final responsibility for sanitation must remain a management priority.

## Summary

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Our culinary heritage draws heavily on the cuisines of other countries, notably Italy, France, China, and to a lesser extent several other countries. The cuisines of Native Americans and African Americans also influenced our culinary heritage. French chefs dominated our culinary history.

The French influence in seasonings and sauces is evident in the use of the leading, or mother, sauces: béchamel, velouté, espagnole, hollandaise, and tomato.

Nouvelle cuisine was introduced as people became more health conscious and was followed by fusion cuisine: the blending of techniques and foods from two cuisines. Today, a number of renowned chefs offer guests culinary delights including natural and local foods.

For the purpose of this chapter, food production begins with receiving. Restaurateurs need to specify convenient delivery times; check everything, especially the most expensive items; weigh everything and check for freshness; check temperature; and ensure that what is delivered is what was ordered.

Storage is a part of the food production system where items are stored according to their special needs. Items are labeled and dated then stored in rotation with storage temperatures controlled.

Kitchen managers/chefs plan their food production by determining the expected number of guests for the day and next few days, then making a production schedule to bring the stock of prepped food up to the par stock level.

Each station on the line will make its mise-en-place, then prep and cook as orders come in. Plates are prepared, garnished, and checked by the expediter.

Restaurants, like hospitals and schools, are public places where people from many walks of life and backgrounds come together. Every person carries harmful microorganisms or viruses that can be transmitted by food or drink. The restaurant operator is necessarily engaged in preventing that transfer of pathogens, a relentless war in which hot water, heat, refrigeration, and chemicals are used. Vermin and insects are excluded from the kitchen and cleanliness is part of the restaurant's credo. The National Restaurant Association publishes a number of booklets on the topic of sanitation. The NRAEF Web site can be viewed at [www.nraef.org](http://www.nraef.org).

## Key Terms and Concepts

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Basic, leading, or mother sauces	LIFO and FIFO
Clostridium perfringens	Mise-en-place
Cooking line	Nouvelle cuisine
Culinary heritage	Outbreak
E. coli	Par levels
Food infection	Pathogen
Food poisoning	Prep
Food protection system	Production sheet
Fusion cuisine	Salmonella
Infectious hepatitis	Shigella
Kitchen manager/chef	Staphylococcus

## Review Questions

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1. Describe the French influence on our culinary heritage.
2. What were Escoffier's contributions to the culinary world?
3. Name the five "mother," or leading/basic, sauces.
4. Explain the terms *nouvelle cuisine* and *fusion cuisine*.
5. Outline the main elements of food production.
6. What can you, as a restaurant owner, do to avoid food poisoning in your operation?
7. Describe the common germs associated with food poisoning.
8. If you are manager of a restaurant, what are your daily food protection and sanitation responsibilities?

## Internet Exercise

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Go to the National Restaurant Association's Web site ([www.restaurant.org](http://www.restaurant.org) or [www.nraef.org](http://www.nraef.org)) and click on Educational Foundation courses. See what sanitation publications and courses are available in the area of food safety.

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