CHAPTER

1

Professional Knowledge
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1.1 Professional Ethics

Professional ethics can be defined as the rules and standards governing the conduct of the members of a profession and the moral choices made by the individual professional in his or her relationships with others. Every day the professional cook must consider his or her actions at work and take ethical positions that affect such activities as:

- Reducing food and material waste
- Respecting all living creatures
- Conserving energy
- Purchasing local and seasonal products
- Preparing tasty and nutritious meals for all people
- Selecting and using biodegradable cleaning materials
- Recycling

Even in the computer age, the culinary profession can be very creative, multifaceted, and exciting. But such an environment can be achieved only when all members of the organization cooperate and work together. Table 1-1 shows the qualities necessary for teamwork.

Table 1-1. The components and benefits of teamwork.
Swiss foods and the food industries are governed by a law called Lebensmittelgesetz (LMG). Specific product regulations and ordinances are contained in the Lebensmittelverordnung (LMV); meat inspection and production is regulated in a body of laws called Eidgenössische Fleischschauverordnung (EFV); additives are governed by regulations called Zusatzstoffverordnung (ZuV); and food-processing remains and foreign matter are regulated in a body of laws called Fremd- und Inhaltsstoffverordnung (FIV).

Because one’s health and well-being are closely linked to the food one eats, food laws are designed:

- To protect consumers from food and household commodities that could threaten their health
- To ensure sanitary handling of food products
- To protect the consumer from fraud in the food industry

### Areas Governed by Swiss Food Laws (LMG)

The law regulates:

- The manufacture, treatment, storage, transportation, and delivery of food and household commodities
- The labeling and advertising of foods and household commodities
- The import, transit, and export of food and household commodities
- The agricultural production of food products, from planting and harvesting or raising animals through the delivery of the end product to the consumer

More recent law expands the responsibilities of governing bodies; for example, they are required to:

- Provide information to the public about nutritional developments and warnings about unhealthy food products
- Evaluate substances and set limits and tolerances
- Prohibit future genetic engineering methods that prove harmful to the public health
- Improve border inspections to deter the uncontrolled use of medication in animals
- Institute slaughter weight standards for the livestock trade
- Unify enforcement codes and provide clear definition of agency responsibilities

This law specifically cites the self-governing responsibilities of food producers and manufacturers. The law is future oriented and is in compliance with food laws throughout Europe.

### 1.2.1 Swiss Regulation of Foods

In addition to the basic food law (LMG), the following detailed regulations govern food and household commodities.

**Part A** contains general regulations concerning jurisdiction, areas governed by regulations; definitions of food products, spices, household articles, and products; and food sanitation.

**Part B** contains detailed food product regulations, including exact definitions, detailed specifications, sanitation rules, production regulations, and the like. Culinary apprentices will find this part a valuable source of information for basic and luxury food products.

**Part C** contains regulations of the materials used in the production and handling of food products, such as legal additives in food and wine production, food coloring, and emulsifiers.

**Part D** contains the regulations governing household articles and household products, such as dishes, packaging materials, toys, paints, and clothes.

**Part E** contains penalties and final and temporary regulations.

Swiss food laws are all positive laws; that is, anything that is not specifically permitted is illegal.

### Areas Covered by Swiss Food Regulations

- Foods: from raw ingredients to finished product
- Food additives: food coloring, preservatives, thickeners, emulsifiers (more in additives regulations)
- Household articles: dishes, containers, pots, pans, utensils, and toys
- Household commodities: packaging material, cosmetic articles, crayons and paints for toys and school products
- Gadgets, equipment, furniture, and space: used in the production, preparation, storage, and sale of foods
- Persons employed in the food industry: hygiene and disease

### 1.2.2 Swiss Regulation of Meat Inspection

Meat inspection regulations are controlled and governed by the Swiss food laws.

### Areas Covered by Meat Inspection Regulations

- All meats and meat products sold for human consumption
- All facilities, equipment, transportation, tools, and ingredients used in the production or sale of meat and meat products
- All personnel involved in the production or sale of meat and meat products

More recent meat inspection laws have revised or reformulated requirements in the following areas:
PROFESSIONAL KNOWLEDGE

Additives are materials used in the production of foods, such as sodium benzoate (E200), benzoic acid (E236), sodium nitrate (E250), lecithin (E322), and manitol (E421). (The figures in parentheses pertain to the Swiss additives code.) Table 1-2 lists examples of different types of additives. The Swiss Department of the Interior (EDI) controls the Acceptable Daily Intake (ADI) values. The ADI value is the acceptable daily intake of a substance in milligrams per kilogram of body weight; that is, the amount that can be consumed daily for a lifetime without causing physical harm.

Classification of Additives

- Colorings
- Preservatives
- Stabilizers and thickeners
- Alkalines, acids, and minerals
- Flavor enhancers
- Coating materials
- Antioxidants
- Emulsifiers
- Anticaking agents
- Enzymes
- Sweeteners

For a complete listing, the additive regulations should be consulted.

**1.2.3 Swiss Regulation of Additives**

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**Table 1-2. Examples of additives.**

<table>
<thead>
<tr>
<th>Colors</th>
<th>Origin</th>
<th>Color (U.S. FD&amp;C color)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turmeric (E100)</td>
<td>Turmeric root</td>
<td>Yellow (Yellow no. 5)</td>
</tr>
<tr>
<td>Chlorophyll (E140)</td>
<td>Nettles, grass</td>
<td>Green</td>
</tr>
<tr>
<td>Indigo (E132)</td>
<td>Synthetic</td>
<td>Blue (Blue no. 1)</td>
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<tr>
<td>Betaine (E162)</td>
<td>Beets</td>
<td>Red (Red no. 2 or no. 40)</td>
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<tr>
<td>Gold (E175)</td>
<td>Minerals, metal</td>
<td>Gold</td>
</tr>
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<table>
<thead>
<tr>
<th>Preservatives</th>
<th>Origin</th>
<th>Used For</th>
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</thead>
<tbody>
<tr>
<td>Sorbic acid (E200)</td>
<td>Synthetic</td>
<td>Deli foods, margarine</td>
</tr>
<tr>
<td>Formic acid (E236)</td>
<td>Synthetic</td>
<td>Acidic canned goods, fruit juice products</td>
</tr>
<tr>
<td>Sodium nitrate (E249)</td>
<td>Synthetic</td>
<td>Pickled meat and fish</td>
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<thead>
<tr>
<th>Stabilizers and Thickeners</th>
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<tbody>
<tr>
<td>Agar-agar (E406)</td>
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<tr>
<td>Pectin (E440a)</td>
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<td></td>
</tr>
<tr>
<td>Carob bean gum (E410)</td>
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<td></td>
</tr>
<tr>
<td>Alginic acid (E400)</td>
<td></td>
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<tr>
<td>Carrageenan, or red algae (E407)</td>
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<tr>
<th>Natural Antioxidants</th>
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<tbody>
<tr>
<td>Lactic acid (E270)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lecithin (E322)</td>
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<td></td>
</tr>
<tr>
<td>Vitamin E (E306)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ascorbic acid (E300L)</td>
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<td></td>
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<tr>
<td>Citric acid (E330)</td>
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<tr>
<th>Emulsifiers</th>
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<tr>
<td>Lecithin (E322)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acetic acid (E472a)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lactic acid (E472b)</td>
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<td></td>
</tr>
<tr>
<td>Tartaric acid (E472d)</td>
<td></td>
<td></td>
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<tr>
<td>Sodium potassium compounds (E470)</td>
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<th>Sweeteners</th>
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<tr>
<td>Saccharine No. I</td>
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<td></td>
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<tr>
<td>Cyclamate No. II</td>
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<td></td>
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<tr>
<td>Aspartame No. III</td>
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<tr>
<td>Acesulfame-K</td>
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1.2.4 Swiss Regulation of Food-processing Remains and Impurities

Foreign matter are substances not naturally found in foods (either raw ingredients or partially processed products), but are introduced via a processing method or environmental contamination. Examples of foreign matter are pesticides, sanitizers, mercury, and nitrates. The Swiss Department of the Interior (EDI) controls and regulates foreign matter and sets concentration limits.

Naturally occurring impurities present in foods include solanine and histamine. These naturally occurring substances are also regulated by the EDI, and potentially harmful limits are indicated.

1.2.5 Swiss Federal (Bund) and State (Canton) Roles in Food Law

Generally, writing and administering food laws and regulations are responsibilities of the federal government (Bund) in Switzerland, as are import and export controls. Enforcement and control of laws and regulations are responsibilities of the individual cantons (states). Table 1-3 shows how food-inspection responsibilities are divided. Table 1-4 lists the roles of individual personnel in each area of government.

Table 1-3. Organization of Swiss food controls.
Table 1-4. Enforcement and inspection personnel.

<table>
<thead>
<tr>
<th>Rank</th>
<th>Personnel</th>
<th>Responsibility</th>
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<tbody>
<tr>
<td>Federal</td>
<td>Customs officials</td>
<td>Border control</td>
</tr>
<tr>
<td></td>
<td>Border veterinarians</td>
<td>Border control</td>
</tr>
<tr>
<td>Canton</td>
<td>Canton food chemist</td>
<td>Chief of state food inspections</td>
</tr>
<tr>
<td>Top rank</td>
<td>Canton veterinarian</td>
<td>Chief of animal disease control, animal protection, feeding practices, and slaughter of animals for consumption</td>
</tr>
<tr>
<td>Middle rank</td>
<td>Health inspectors</td>
<td>On-site inspections; supervision of local inspectors</td>
</tr>
<tr>
<td></td>
<td>Meat inspectors</td>
<td>Inspection and control of all aspects of meat production; supervision of local inspectors</td>
</tr>
<tr>
<td>Municipality</td>
<td>Health inspectors</td>
<td>Inspection of farms, slaughterhouses, storage areas, and stores</td>
</tr>
<tr>
<td>Front-line defense</td>
<td>Health inspectors,</td>
<td></td>
</tr>
<tr>
<td></td>
<td>meat inspectors</td>
<td></td>
</tr>
</tbody>
</table>

1.2.6 Investigation, Penalty, and Protection of Rights

Excerpts of Some Articles in the Swiss Food Law

Article 23
Inspection and test samples
2 The inspection officials are entitled to take samples and, if necessary, have access to delivery slips, receipts, and other control measures.

3 As a part of their official inquiry, they can enter grounds, rooms, facilities, and vehicles during regular operation hours.

Article 24
3 The inspected party can request a written report of the investigation’s results.

Article 26
Objection
1 An objection indicates noncompliance with the law.

Article 27
Control action
3 Official actions will be taken to protect the public health if safe limits are exceeded.

Article 29
2 In case of suspected contamination, food products may be confiscated.

Article 47
Violation
2 If convicted of fraud, the perpetrator will be punished by up to to five years in jail or heavy fines.

1.2.7 U.S. Food Laws and Regulatory Agencies

Although the regulation of the food-production and foodservice industries involves government agencies at the municipal, county, state, and federal levels, much of the responsibility for ensuring food safety in the United States falls to two cabinet-level departments in the federal government, the Department of Health and Human Services and the Department of Agriculture.

The Department of Health and Human Services includes the U.S. Public Health Service, which has regulatory authority over the sanitary quality of drinking water, as well as foodservice on interstate and international carriers (planes, ships, trains, and the like).

Within the Public Health Service is one of the most important food-safety agencies in the country, the Food and Drug Administration. The FDA administers the Food, Drug, and Cosmetic Act of 1938 and associated laws to ensure that all foods in interstate commerce (except meat and poultry, which are under the Department of Agriculture’s control) are pure, wholesome, produced under sanitary conditions, and properly labeled. Factories where such foods are prepared receive periodic inspections covering sanitation, raw materials, adequate processing, and finished product. Some food-processing industries under the FDA’s oversight, including fish processors and canned-soup and -vegetable processors, participate in the Hazard Analysis Critical Control Point (HACCP) program, which requires processors to analyze their production methods, identify potential risk points in the production process, and find means of preventing problems from occurring at those points. They must keep careful records to demonstrate to the FDA that quality control is being maintained and any problems have been eliminated.
The FDA is also charged with administering federal/state programs that ensure the safety of milk and seafood. In addition, the FDA is responsible for monitoring food additives. In 1938, the Delaney clause amended the 1938 act to require manufacturers to prove to the FDA the safety of additives before introducing them into foods. In 1960 another amendment tightened requirements on synthetic or extracted coloring agents used in foods. Both amendments banned the use in foods of substances that cause cancer in animals. The amendments included lists of additives generally recognized as safe (GRAS). Such substances are not legally considered to be food additives and need no safety clearance to be included in foods. The GRAS list today contains thousands of ingredients. The FDA adds and deletes substances every year, based on scientific testing. Examples of GRAS substances include:

- Common spices and natural seasonings and flavorings
- Baking powders, such as sodium bicarbonate and monocalcium phosphate
- Fruit and beverage acids, such as citric acid, malic acid, and phosphoric acid
- Gums, such as agar-agar and gum arabic
- Emulsifiers, such as fatty-acid monoglycerides and diglycerides

The FDA also enforces the tolerance standards for pesticide residue in food commodities, which are established by the Environmental Protection Agency.

Also part of the Public Health Service are the Centers for Disease Control, which investigate outbreaks of food-borne disease, analyze surveillance data, and provide training materials and services concerning sanitation for foodservice personnel.

The Department of Agriculture oversees the distribution, grading, and inspection of meat, poultry, and related products. Its Agricultural Marketing Service ensures the safe and efficient movement of products from producer to consumer. The Animal and Plant Health Inspection Service safeguards the health and quality of animals and plants and protects the consumer by means of federal and state meat and poultry inspection. The Food Safety and Inspection Service provides for federal inspection of poultry, meat, and related products to be sure they are labeled honestly and informatively and that they are safe and wholesome. The Federal Grain Inspection Service sets standards and regulates the inspection and weighing of all types of grain.

In addition to mandatory inspections enforced by the FDA and Department of Agriculture, other government agencies administer voluntary inspection services. Examples include:

- National Marine Fisheries Service, of the Department of Commerce’s National Oceanic and Atmospheric Administration (NOAA) for fish, shellfish, and seafood
- Bureau of Alcohol, Tobacco, and Firearms (ATF), of the Internal Revenue Service (IRS) for alcoholic beverages
- National Bureau of Standards (NBS) for weights and measures
- Office of Technical Services (OTS) for packaging and food containers
- Federal Trade Commission (FTC) for prevention of unfair and deceptive trade practices

The Occupational Safety and Health Administration (OSHA) of the Department of Labor enforces the 1970 Occupational Safety and Health Act, which protects the safety and health of workers throughout the United States. OSHA’s Hazard Communication Standard requires employers to inform staff about hazardous chemicals they may be required to use on the job (such as cleaning compounds, fuels, and pesticides). A material safety data sheet (MSDS) must be available for each chemical.

### State and Local Regulations

Every state and many municipalities in the United States have their own food laws as well as being subject to federal regulations. State and local health departments provide training for and inspect foodservice establishments.

### Other Foodservice Organizations and Associations

The following groups promote professionalism and provide training and educational material to the foodservice industry:

- American Culinary Federation (ACF)
- American Dietetic Association (ADA)
- American Hotel and Motel Association (AHMA)
- American Public Health Association (APHA)
- Association of Food and Drug Officials (AFDO)
- Food Research Institute (FRI)
- Foodservice Consultants Society International (FCSI)
- International Association of Culinary Professionals (IACP)
- International Food Manufacturers Association (IFMA)
- International Association of Milk, Food, and Environmental Sanitarians (IAMFES)
- International Food Service Executives Association (IFSEA)
- National Association of College and University Food Services (NACUFS)
- National Environmental Health Association (NEHA)
- National Institute for the Food Service Industry (NIFI)
- National Restaurant Association (NRA)
- National Sanitation Foundation (NSF)
- Society for the Advancement of Foodservice Research (SAFSR)
- Society for Foodservice Management (SFM)

The FAO and WHO, through their joint Codex Alimentarius Commission, set international standards and evaluate food additives and pesticides.
Microorganisms are minute living creatures; they are so small that they can be seen only through a microscope. They consume food, give off waste products, and under the right conditions, can multiply in a very short time.

To understand foodservice sanitation methods, it is essential to have a basic knowledge of microorganisms. Bacteria, molds, and yeast are the most important to consider. These microorganisms can be harmless, beneficial, or very dangerous to human beings. High-quality food products have no or very small amounts of harmful microorganisms. Microorganisms are everywhere. They live in water and air, on furnishings, equipment, appliances, utensils, work and storage surfaces, dish cloths, and cleaning materials. They also live on animals and plants, living and dead. People carry microorganisms on their hands, skin, and hair, in the mouth and nasal passages, and in especially large numbers in the colon (feces) and on uniforms and work shoes.

Helpful and harmful microorganisms live on all food products. During all phases of food production, harmful microorganisms can be transmitted from food to humans or from humans to food. If present in large numbers, they can cause food-borne illnesses. Toxin-producing types can cause an outbreak of food poisoning. Some microorganisms cause food spoilage.

Careful control of food quality and environmental conditions can prevent or reduce the presence and multiplication of harmful microorganisms. Food-borne illnesses and food spoilage are preventable when conditions that allow microorganisms to survive and multiply are eliminated.

### 1.3.1 Bacteria

**Appearance**

Bacteria are extremely small (0.001 millimeter in size) single-celled living organisms, which are not usually visible to the human eye. Under the microscope bacteria appear round, rod-shaped, or spiral-shaped.

**Growth and Multiplication**

Bacteria reproduce by cell division (mitosis). Given enough nourishment, the cell doubles in size, separates in the middle to form two complete cells, then splits apart. Under ideal conditions bacteria multiply explosively. When bacteria multiply, they ingest food and leave waste products. Some types of bacteria can be highly toxic. For bacteria to multiply, they need:

- **Time:** Many bacteria need only twenty to thirty minutes to multiply. Within a few hours, millions of bacteria can be present in food.
- **Food:** Bacteria prefer protein- and carbohydrate-rich foods that are not too salty or too sweet and not acidic. Bacteria prefer a pH of 8.5 to 4.5. Bacteria are not particular and will feed on the best of foods as well as the most disgusting garbage.

**Warmth:** Most types of bacteria prefer temperatures between 50°F and 120°F (10°F and 50°C). Pathogens, which are disease-producing organisms, thrive at body temperature, 98.6°F (37°C). At temperatures below 32°F (0°C) or above 150°F (65°C), growth practically stops.

**Moisture:** Bacteria need moisture to multiply. The available moisture content of a food product must be at least 20 percent to host bacteria. A moist food may be safe if its moisture is bound by sugar or salt.

**Destruction**

Heat destroys bacteria. Most bacteria cannot tolerate temperatures between 150°F and 212°F (65°C and 100°C) and die. Some types of bacteria, such as Clostridium botulinum, form spores that can survive such temperatures. Heating foods to 250°F (120°C) for at least twenty minutes kills these spores. However, toxins already present in the food will not be destroyed by normal cooking temperatures.

**Beneficial Bacteria**

Nature assigns bacteria the job of consuming dead organisms (decomposition). These and other microorganisms therefore multiply in food.
products, but they have other, beneficial roles as well. Bacteria are essential for the decomposition of dead plants and animals. They help in purifying lakes and streams and in the decomposition of waste in sewage. In the human body, they protect against the multiplication of disease-causing pathogens. They are also required in the production of certain foods, including yogurt, sour cream, cheese, sauerkraut, vinegar, and sausages. They can enhance the flavor of butter, yogurt, and cheese. Bacteria are also used in the production of medicines and drugs.

Harmful Bacteria

Harmful bacteria cause food spoilage and illness. They cause food spoilage by breaking down proteins, sugars, and fats. *E. coli* bacteria are one type that spoils food.

Bacteria can cause sickness either through ingestion of the harmful bacteria themselves or through the toxins they produce as waste.

*Staphylococci* include pathogens that infect sores, cuts, rashes, and boils. They are also present in the mouth and nasal passages. They contaminate food by direct contact or through sneezing and coughing. Under favorable conditions (warmth), they multiply quickly. As they multiply and die, they leave behind a toxin that is highly heat-resistant. Eating food contaminated with staphylococcus toxin can cause nausea, vomiting, diarrhea, and abdominal cramps within one to seven hours. Serious poisoning can lead to death.

Intestinal bacteria, such as *E. coli*, are present in huge numbers in human feces: 1 gram of feces contains about 1 million *E. coli*. Contamination of food with these bacteria can cause such health problems as nausea, vomiting, and diarrhea; in young children and the infirm or elderly, it can cause death. Hands must be washed thoroughly after using toilets to prevent contamination of foods with *E. coli*.

Salmonella bacteria are a large group of dangerous intestinal bacteria that reproduce rapidly in nonrefrigerated food products. Salmonella-infected food will cause flu-like symptoms from within a few hours to up to two days after consumption. In the case of typhoid, symptoms may not appear for up to twenty-one days. Salmonella infection causes nausea, vomiting, headaches, aching bones, and high fever. A serious infection in very young children and the elderly can lead to death. Salmonella bacteria do not produce toxins in food. Instead, the toxin in salmonella is released during the body’s digestive process.

1.3.2 Molds

**Appearance**

Molds, the largest of the food-borne microorganisms, are composed of many cells. They are usually no more than about ½ to ¾ inch (1 to 2 mm) long. However, some molds form colonies that are many inches long. Molds are visible as fuzzy patches of various colors on foods, walls, ceilings, and furnishings.

**Growth and Multiplication**

Molds are fungi composed of hyphae, which are threadlike. Molds are asexual but do require oxygen to multiply. They reproduce by forming microscopic spores (seeds), which are very lightweight and find their way into foods through the air or via hands, utensils, or other objects that contact food. The spores form a mycelium, which spreads its many threadlike branches into foods and removes valuable nutrients. At the same time, molds change the taste and flavor of foods, leaving a musty taste or odor. Many molds produce very toxic waste products (mycotoxins) and can cause mold poisoning, a rare food-borne illness. To multiply, molds need:

**Time:** Molds reproduce more slowly than bacteria or yeast do.

**Food:** Molds prefer to grow on carbohydrate-rich and sour (acidic) foods but can grow on all foods, even on very dry foods, if the pH is between 3 and 7.

**Warmth:** The preferred temperature of many molds is between 70°F and 75°F (22°C and 25°C), but they can grow in temperatures as low as 10°F (-12°C). Toxin-forming molds prefer temperatures from 85°F to 105°F (30°C to 40°C).

**Moisture:** Molds can exist in an environment that has as little as 12 percent moisture. They can also remove moisture from the air to survive. It is thus very important to protect foods from mold by storing them in dry rooms.

**Beneficial Molds**

Like bacteria, some molds are beneficial while others are harmful. For example, one mold is intentionally introduced into some cheeses to create special flavors, as is the case for blue cheeses such as Roquefort and some white cheeses, such as Brie and Camembert. Cultured molds are also introduced into the natural casings of some sausages, such as salami, to preserve them and enhance their flavor. In addition, penicillin was originally made from molds; today it is manufactured synthetically.

**Harmful Molds**

Harmful molds cause food spoilage and food poisoning. Molds are usually detected by their fuzzy growth. Depending on the type, moldy patches can be white, gray, blue-green, black, or yellow. Some molds penetrate the food host deeply and leave behind cancer-causing waste and toxins (such as aflatoxins, which...
can cause liver malfunction and lead to death). These wastes are not destroyed by cooking or other preparation methods. Scraping mold from food surfaces is not a safe protective measure, because toxins could still remain in the food’s interior. Moldy food products are inedible and must be discarded. They should not be fed to people or animals.

### 1.3.3 Yeasts

**Appearance**

Yeasts are single-celled organisms that are round, spherical, or oval. Like molds, they are fungi. Yeast cells are ten times larger than bacteria. They are important in fermentation and leavening processes.

**Growth and Multiplication**

Yeasts multiply by a process called budding; rarely do they reproduce through spore formation. When yeast cells bud, they form a bulge that grows quickly into a daughter cell. Some yeast cells separate at this stage, whereas others remain connected. The new cell also buds, forming more cells.

Yeasts need oxygen to grow. In the absence of oxygen, yeast cells grow very slowly. However, their ability to survive with little oxygen is essential in alcoholic fermentation. To multiply, yeasts need:

- **Time:** Yeasts can double in volume in from thirty minutes to two hours.
- **Food:** Yeasts prefer foods high in glucose (pH 3 to 7); they convert the sugar, through fermentation, into alcohol and carbon dioxide.
- **Warmth:** Yeasts multiply rapidly at temperatures between 60°F and 95°F (15°C and 35°C). Many types prefer temperatures from 70°F to 75°F (22°C to 25°C).
- **Moisture:** Like bacteria, yeasts need food that is at least 20 percent moisture.

**Destruction**

Yeast cells are destroyed at temperatures above 140°F (60°C).

**Beneficial Yeasts**

Bakers’ yeast is grown using pure cultures. Baking yeast multiplies best at temperatures from 75°F to 80°F (25°C to 27°C); the best temperature for fermentation is from 87°F to 95°F (30°C to 35°C). Wine yeast, fruit yeast, and brewers’ yeast have been used for centuries in the fermentation of alcoholic beverages. In addition, special strains of yeast are added to some cured sausages to improve color, flavor, and taste. Yeasts are also used in such pharmaceutical products as vitamins and cosmetics and to produce carbonated beverages and dry ice.

**Harmful Yeasts**

Harmful yeasts cause food spoilage. Especially vulnerable are foods high in both liquid and sugar (for example, fruit juices, compotes, and fruit salads), tomato sauces, and vegetable soups. Typical signs of yeast contamination are the formation of gas bubbles, foam, and cloudiness.

### 1.3.4 Causes of Food-borne Illness

Food-borne illnesses, food poisoning, and food spoilage result from the rapid reproduction and toxin production of microorganisms in food. Causes include:

- Unclean hands and fingernails, infected wounds, dirt attached to wrist watches, rings, and other jewelry
- Coughing, sneezing, nose picking, seasoning and tasting foods with fingers
- Dirty utensils, dishes, appliances, equipment, cleaning rags, sponges, and brushes
- Contaminated work surfaces (such as cutting boards)
- Touching pets
- Roaches, flies, mice, rats, and insects (germs are present in their saliva, urine, and feces and on their bodies)
- Leaving raw products or prepared dishes for long periods at room temperature
- Defrosting frozen foods incorrectly

Consumption of spoiled foods that contain lethal toxins can cause serious health problems. Aflatoxins present in moldy grain products and nuts can cause liver cancer. Toxins from anaerobic bacteria, such as Clostridium botulinum, which form spores in the absence of oxygen, can cause death. They can grow in sausages, meat products, vacuum-packed meat, and fish. They cause cans to bulge if the contents have been processed improperly and not sterilized completely. Botulism spores are destroyed only at temperatures above 250°F (121°C). In addition, spoiled mushrooms, fish, shellfish, mollusks, and meat may contain not only bacterial toxins but also highly poisonous waste products released during protein decomposition.

### 1.3.5 Principles for Preventing Food-borne Illness

The two most important principles in preventing food-borne illness are:

1. Start with food products that contain very few harmful microorganisms.
2. Prevent conditions that allow microorganisms to multiply.

One must follow these principles and implement strict professional food sanitation procedures.
1.4 Foodservice Sanitation

1.4.1 Basic Principles

The customer expects healthy and wholesome food, and the law requires it. The goal of foodservice sanitation is to protect public health.

The primary tenet of foodservice sanitation is absolute cleanliness. It begins with personal hygiene; the safe handling of foods during preparation; clean utensils, equipment, and appliances; clean storage facilities, kitchens, and dining rooms; and ends with sanitary service to the customer.

For kitchen staff this must be the guiding principle; poor sanitation has serious consequences, not only for public health but also for the financial health of the business.

1.4.2 Personal Hygiene

The most important hygienic measure in the kitchen is frequent and thorough hand washing. Germs pass from hand to hand. Clean hands and trimmed fingernails reduce the risk of contamination. Hands must be washed with warm water and liquid soap in hand-washing sinks, which should be equipped with foot pedals. Washing hands in food preparation sinks should be prohibited.

Hands should be washed
- Immediately before starting food preparation
- After taking a break
- After blowing the nose
- After visiting the toilet
- After preparing fresh fruit, potatoes, and raw vegetables
- After handling raw meats, fish, and eggs
- After touching contaminated articles (soiled dishes, packaging, garbage, money, door handles, cigarettes)

Hands should be dried with single-use towels. They should not be wiped on aprons or side towels.

Kitchen staff should minimize contact with potentially hazardous foods. They should wear plastic gloves whenever possible, especially when handling foods that will not be heated (such as cold salads, luncheon meats, and desserts).

Food should never be touched by hands that have rashes, open sores, or infected wounds. Even very small cuts or abrasions should be bandaged and covered with waterproof protectors.

The tasting of food with fingers should be prohibited, as should the repeated use of the same spoon for tasting.

Millions of bacteria are present in the mouth and nasal passages. Kitchen personnel should never sneeze or cough unguardedly on or near foods. Nose picking is both disgusting and unsanitary. Tissues should be used for nose blowing, and they should be discarded immediately after use. Hands should then be washed thoroughly. Food handlers with acute respiratory infections or colds should not work with food.

Persons with repeated cases of diarrhea could be carriers of intestinal diseases. They should be treated by a physician before being allowed back at work.

Food handlers should bathe or shower daily. Hair is a breeding ground for bacteria. It must be washed regularly. Hair restraints are not only necessary but should be mandatory.

Smoking and gum chewing should be prohibited in all food-preparation areas.

Soiled clothing carries enormous numbers of germs. Underwear should be changed daily. A clean uniform should be donned at work. Sleeve length should be adjusted to the work situation. Clean and appropriate shoes should be worn in the kitchen, preferably of leather. Absorbent socks should be worn and changed daily. Aprons and side towels should be removed before entering the bathroom. Jewelry (watches and rings) are germ collectors and should not be worn at work.

1.4.3 Food Storage and Sanitation

A sanitary kitchen is most important in a foodservice operation but is very difficult to achieve. Absolute cleanliness during food preparation and correct food storage procedures are essential for all food-handling personnel. These rules should be followed:

Potentially hazardous foods should be kept continuously refrigerated.
- Below 40°F (4°C): Milk, heavy cream, cream products, butter, margarine, eggs, creams, stuffing, meats, aspic, mayonnaise, cold roast beef, chicken, turkey, and all other luncheon meats, prepared sandwiches, and all salads that contain meat
- At 32°F (0°C): Raw fish and seafood

Frozen products should be stored at 0°F (-18°C) and defrosted only in refrigerators or microwave ovens. Other foods should be protected from cross-contamination by placing defrosting food in pans on the lowest shelf in the refrigerator.

Products should be inspected daily for freshness and edibility, especially highly perishable foods.

Raw ground meats and fish should be kept no longer than one day.

Strict time/temperature controls should be observed for prepared food products such as rice, pasta, eggs, mushroom dishes, and sauces, which should not be held for longer than thirty minutes at room temperature. Cold dishes must be held at 40°F (4°C) until service. Hot or warm dishes that are held for any length of time before service must register at
an internal temperature of at least 165°F (74°C).

Foods that must be chilled rapidly after cooking, so that they can be included later in other preparations, require special consideration. Stocks, soups, and thin sauces and creams should be placed in a cold-water or ice bath and stirred repeatedly to cool them quickly. They should then be covered (to prevent mold spores from entering) and placed in the refrigerator. Mushroom dishes, fillings, and thick sauces and creams should be spread on sheet pans and placed in the refrigerator or freezer for a quick chill. The chilled product should be removed from the sheet pans (in the refrigerator, not the warm kitchen) and then stored, covered, in the refrigerator until needed.

Deep-frying oils should be filtered and checked daily for usability. Used oil should not be discarded down the drain; it should be collected and recycled via a rendering company.

Prepared dishes should be stored separately from raw products.

Foods should be reheated to a safe internal temperature as rapidly as possible.

Canned goods should be stored in a cool (60°F / 16°C), dry room (to prevent rust). Once a can has been opened, food should be removed from it, or the metal interior will corrode, stain the food, and impart an unpleasant taste. Discard bulging cans, as they may be contaminated with botulism.

Usable leftovers must be sanitary and should be used quickly, ideally within twenty-four hours. Uneaten foods from guests’ plates must be discarded.

1.4.4 Sanitation of Utensils, Appliances, Equipment, and Facilities

These guidelines should be enforced:
- Keep utensils (dishes, pots and pans, kitchen tools) and cutting boards clean and in good condition.
- Clean equipment (electric slicers, mixers, etc.) frequently. Sanitize at least once daily with a chlorine or iodine solution.
- Thoroughly clean large equipment such as stoves, grills, rotisseries after each service period.
- Clean the kitchen at least once a day. The surfaces of floors, ceilings, and walls must be hard and smooth to facilitate easy cleaning. Wash floors after each service period.
- Keep coolers and refrigerators clean and thoroughly clean them once a week. All refrigerators must have thermometers for monitoring temperature.
- Keep the storage area clean and well ventilated.
- Provide proper water and air controls for lobster and fresh fish tanks and inspect them daily for dead specimens. Clean frequently.
- Change kitchen towels, dish rags, and all other cloths daily. Dirty laundry (such as aprons) should not be stored in the kitchen.
- Keep work tables, butcher blocks, and work counters clean at all times.
- Store garbage in lined, easy-to-clean containers with lids. Whenever possible, containers should be placed in a refrigerated room. In any case garbage should be removed from the kitchen daily. Garbage containers should be washed and sanitized frequently, or they will become breeding grounds for germs.
- Check deliveries, which can bring pests (roaches, bugs, moths) into the kitchen. Dirty containers are breeding grounds for dangerous bacteria and should be kept out of the kitchen and storage areas. Control roaches and mice or rats with approved materials. Food must not contact poison. A licensed pest-control company should be regularly employed.

Such things should not remain in the kitchen, as they are food for bacteria. To be most effective, the water temperature should be about 120°F (49°C). In cool water, grease is insoluble and is smeared over, rather than removed from the surface. Boiling hot water creates hard-to-remove deposits on surfaces. Manufacturers’ directions should be followed carefully when using cleaning products. After applying cleansers, surfaces should be rinsed with plenty of potable water. Kitchen machines should be disassembled, and their parts washed and sanitized separately. Parts should be placed on a clean, dry surface and allowed to air-dry (or blow dry with high-pressure air).

To sanitize means to destroy microorganisms with chemicals or heat (water above 180°F / 82°C or steam). All equipment used to prepare food must be sanitized regularly. Special care should be given to hard-to-clean items such as automatic whipped-cream dispensers, icecream makers, grinders, food processors, and cutting boards. All local health codes should be met or exceeded.

No sanitation procedure will be effective until utensils, equipment, and surfaces have been thoroughly cleaned and all obvious dirt and residue have been removed before sanitizers are applied.

Procedure
1. Remove all dirt and food residue; that is, properly clean all objects that will be sanitized.
2. Rinse in very hot potable water to remove all traces of detergent or food that may interfere with the sanitizing solution.
3. Sanitize by immersing in hot water with a temperature of 180°F to 200°F (82°C to 93°C) or by using chemical disinfectants. The most common are chlorine, iodine, and quaternary ammonia (Quats). These compounds are regulated by the U.S. Environmental Protection
Almost everyone recognizes dangerous situations at work, but in fact most accidents are caused by carelessness in seemingly harmless settings. The maxim “Prevention is the best cure” still holds. Every foodservice establishment should institute a safety training program and enforce safety procedures.

Prevent Accidents

Accidents do not happen; they are caused. To prevent them, follow these guidelines:

- All equipment, machines, work surfaces and facilities should be kept in good repair and working order.
- Nonslip flooring should be specified when building or remodeling the kitchen and other work areas. Nonskid runners should be used on slippery surfaces in existing facilities.
- Adequate lighting should be installed in work areas, corridors, and near all entrances and exits. Light bulbs should be protected with a metal guard.
- Electric equipment must be properly grounded. Safety circuit breakers must be installed. Electric wires and cords must be properly insulated. Defects should be repaired immediately.
- Fire extinguishers must be installed correctly in appropriate locations and periodically inspected and maintained.
- The building must be equipped with smoke detectors and fire alarms to protect the safety of guests and employees. Exits must be clearly marked and remain unobstructed.
- Emergency numbers for police, ambulance, emergency rooms, fire department, and the poison information center should be posted near telephones.
- Safety glass should be installed in all service doors.
- Coolers and freezer doors must be possible to open from the inside.

Foodservice establishments should have a first-aid kit fully stocked with the following:

- Gauze bandages
- Bandage rolls
- Sterile dressings in sealed envelopes
- Heavy dressings (ABD pads) for heavy bleeding
- Flannel compresses
- Adhesive pads
- Hydrogen peroxide
- Sterile cotton balls
- Elastoplast bandages
- Triangular bandages with safety pins
- Tweezers and blunt-nose scissors
- Assorted adhesive strips (include flexible fingertips)
- Adhesive tape
- Bandage closures
- Surgical plastic gloves
- Eye cup

Fire Prevention

In addition to the dangers posed to human life by fire, every year many establishments and jobs are lost to careless fires. Many restaurants never reopen. Fire prevention training and fire drills should be held periodically.

To prevent fires from becoming disasters, follow these guidelines:

- If there is a fire, pull the alarm or call fire department first. Then save human life and use fire extinguishers.
- Post the fire department number at all telephones.
- Post the location of fire extinguishers, and teach employees how to use them.
- Clearly mark the location of emergency exits. Never lock them during working hours (insert keys in the locks). Keep exits and fire escapes free of obstacles.
- Close fire doors.
- Keep hoods, ventilation equipment, ranges, fryers, griddles, and broilers free from accumulated grease.
- Open and ventilate gas ovens before lighting them.
- Quickly extinguish fires in fryers with a dry-chemical or CO₂ extinguisher.
- Maintain a nonsmoking policy.

Prevention of Burns and Electrical Shocks

- Wear protective gloves while handling hot pans and cooking utensils.
- Stand back when opening doors of pressure steamers and lids of steam-jacketed kettles (long-handled hooks should be used).
- Stir the contents of steam kettles with long-handled paddles or ladles.
- Lift the lids of boiling pots away from oneself to allow steam to escape.
• Keep the handles of pans over the range and away from open flames or hot burners.
• Identify hot pans, lids, or handles of oven-baked dishes to protect others from burns (dust the handle with flour).
• When moving large pots filled with hot foods, seek assistance. Carriers should walk next to each other.
• Alert coworkers of danger using warning shouts of “Attention, hot!”
• Avoid overfilling pans and containers with hot food. Never place them on the floor.
• Wear clean, well-fitting uniforms. Loose sleeves, aprons, and cloths (rags) may catch on equipment or contact a source of heat. To protect against injury from spills of hot foods, wear shoes that have closed toes and heels.

Prevention of Cuts

**Important:** Read and understand the directions and operating instructions of all machines before operating the equipment.
• Do not remove safety guards from slicers, grinders, or choppers.
• Secure all machine parts before starting the equipment.
• Keep blades of knives and slicers sharp.
• Store knives in safe holders or racks. Never leave knives in places coworkers will not expect to find them, such as in sinks or hidden under peelings.
• Use the right knife for the intended job.
• Never use knives to open lids, cans, or other containers.
• Hold knives and sharp tools by their handles only.
• Secure cutting boards by placing a damp cloth or sterilized rubber rings beneath them.
• Hold knives correctly.
• Never try to catch a falling knife. Step aside and let it fall.
• When boning meat, cut away from the body. Wear protective aprons and hand guards for extra safety.
• Do not remove foods from a machine until the machine has come to a complete stop.
• Turn equipment switches to “off” when a job is finished.
• Disconnect equipment from the electrical source before cleaning.
• Drain water from a sink before removing broken glass.
• Dispose of chipped and broken glass in separate containers. Do not place it in the garbage or waste containers.
• Sweep up breakage carefully. Use wet paper towels to pick up slivers.

Prevention of Falls

• Use only safe ladders to clean elevated kitchen equipment, lamps, hoods, and the like. Do not use chairs, stools, boxes, or crates.
• Clean and dry wet spots and greasy floors immediately.
• Place “Attention, slippery floor” signs in wet areas.
• Keep stairways and traffic areas free of cleaning equipment, boxes, and other obstructions.
• Stack carts and trolleys below eye level.
• Wear shoes with nonslip soles.

First Aid for Accidents

First aid can mean the difference between life and death for an accident victim. Every member of the staff should be required to know how to administer first aid. In an emergency, follow these guidelines:
• First think, then act.
• Use common sense.
• Keep calm and comfort the victim. Never leave the victim alone unless you must summon help.
• Evaluate the victim’s condition.
• Can the victim speak?
• Is the victim conscious?
• Is the victim breathing?
• Is the victim bleeding?
• Is there a pulse?

If the victim is not conscious, summon emergency help. Then follow the ABC method to determine the first aid needed: check Airway, Breathing, and Circulation. Certified first-aid training (available through the American Red Cross and the American Heart Association) will enable employees to perform CPR or other emergency measures until trained personnel arrive.

Wounds

Any cut, puncture, or break in the skin requires first aid. Clean small wounds with hydrogen peroxide and...
cover with a clean bandage. Large wounds should be examined by a physician as soon as possible. Generally wounds that bleed are less likely to get infected.

Burns
Burns are classified by their depth:
- First-degree burns — redness or discoloration
- Second-degree burns — formation of blisters
- Third-degree burns — blackened skin, destruction of cells

Small first-degree burns seldom require medical attention. Such burns should be cooled immediately with ice or cold water. Second- or third-degree burns require the attention of a physician. In the case of large burns, emergency medical personnel should be summoned immediately.

1.6 Personal recipe and menu books are a part of the culinary professional's library and are important tools and valuable resources in a professional career. Culinary apprentices in Switzerland and Germany must keep such books and present them to the head chef upon request.

1.6.1 The Recipe Book and File

Standardized recipes are the basis for excellence in food production. A properly followed recipe guarantees the same quality and quantity at all times. A standardized recipe also serves as a solid basis for cost calculations, because the yield is calculated for an exact quantity and a specific portion size.

Procedure
Develop recipes and record the quantities and production steps. Or type and copy tested recipes from other sources, adapt if necessary, and file.

Recipe Format
A recipe consists of the following:
- Title
- Portion size, yield; pan size and equipment information; time and temperature
- Ingredients
- Mise en place (advance preparation steps)
- Method
- Suggestions for service and garnishes (optional)

The ingredients are clearly specified and accurate measurements are given. Ingredients are listed in the order that they are used. Table 1-6 shows a sample recipe.

Recipe Systems
All of the systems that follow depend on an index for quick reference. Group recipes by category and assign each a reference number.

Recipe Book
Use ring binders for recipe books so that additional recipes can be inserted easily. Keep a small notebook handy while developing recipes in the kitchen. Rewrite notes at a more leisurely time.

Advantages: Recipe books are convenient. Recipes can be added without problems. Revised or photocopied versions can be quickly substituted. They also allow for personal creative touches.

Disadvantages: Recipe books are difficult to view. It takes time to find a recipe.

Recipe Card File
File recipe cards in a box alphabetized by heading. Separate the sections with colored cards, with the headings on tabs. Protect the cards: laminate them or place them in plastic sleeves. Cards are very handy for in-house use.

Advantages: Recipe card files are easy to use. Recipes can be quickly located. Recipe cards can be easily corrected, added, or removed. The
cards can be used directly in the production area.

Disadvantages: File cards need more space than books. This system is more difficult and expensive to set up.

Computerized Recipe Systems
More and more foodservice operations rely on a computerized recipe system. Choose from many available software programs or customize your own (especially appropriate for large operations and foodservice management companies). Program functions can change and correct recipes, calculate cost or nutrients, evaluate purchasing needs, keep inventory up-to-date, and revise the yield and print recipes for production needs.

Advantages: Computerized systems offer a fast way to correct and change recipes. Recipes are accessible with a couple of keystrokes or mouse clicks and can be instantly printed. Complete computer programs are now available.

Disadvantages: The initial financial outlay is very high. Different computers or software systems may not

Table 1-6. Example of a recipe.

1.4 Soups

Recipe Number: 115

Cream of Broccoli Soup

BROCCOLICREMESUPPE

Crème de brocoli

YIELD: 2 QT, 20 OZ (2.5 L)

<table>
<thead>
<tr>
<th>Ingredients</th>
<th>U.S. Measures</th>
<th>Metric Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broccoli, fresh</td>
<td>2 lb, 10 oz</td>
<td>1.2 kg</td>
</tr>
<tr>
<td>Vegetable bouillon (Recipe 27)</td>
<td>2 qt, 20 oz</td>
<td>2.5 L</td>
</tr>
<tr>
<td>Onions</td>
<td>3½ oz</td>
<td>100 g</td>
</tr>
<tr>
<td>Knob celery (celeriac)</td>
<td>1½ oz</td>
<td>40 g</td>
</tr>
<tr>
<td>Leeks</td>
<td>3½ oz</td>
<td>100 g</td>
</tr>
<tr>
<td>Butter</td>
<td>1½ oz</td>
<td>40 g</td>
</tr>
<tr>
<td>All-purpose flour</td>
<td>1½ oz</td>
<td>40 g</td>
</tr>
<tr>
<td>Heavy cream (36%)</td>
<td>6¼ oz</td>
<td>200 ml</td>
</tr>
<tr>
<td>Milk</td>
<td>3½ oz</td>
<td>100 ml</td>
</tr>
<tr>
<td>Seasoning</td>
<td>1 x</td>
<td>1 x</td>
</tr>
</tbody>
</table>

Mise en Place

Clean and trim broccoli.
Select 3½ oz (100 g) broccoli florets for garnish; steam or simmer in vegetable bouillon, reserve liquid.
Dice remaining broccoli.
Dice onions and knob celery.
Wash, trim, and dice leeks.

Method

Sauté onions, knob celery, and leeks in butter. Add diced broccoli, and continue cooking.
Sprinkle with flour; let cool slightly.
Add hot vegetable bouillon. Bring to a simmer, stirring constantly.
Simmer, skimming occasionally, until vegetables are soft.
Puree with immersion blender and pass through a fine-mesh china cap.
Bring to a simmer; add cream and milk.
Season to taste.
Garnish soup with broccoli florets.
be compatible. Sometimes they are useful only in a single facility.

1.6.2 The Menu Book

Recorded and collected menus form a basis for all menu planning. They provide a useful reference for future menu suggestions. They can also be used to document valuable information about problems or successes.

**Procedure**

Write your own menus or collect and copy others. Organize in a format useful to your operation. Contents might include:

- Daily menus
- Holiday menus
- Banquet menus
- Specialty menus: low-calorie diets, fish, vegetarian, spa (health food)
- Special-event menus: international cuisine, seasonal menus
- Buffets

Menu books can be organized in the same way as recipes are: in ring binders, on file cards, or by computer.

For menu design information, see chapter 5, "Menu Planning."