CHAPTER 1

BAKING EQUIPMENT, SANITATION, AND INGREDIENTS

Equipment

Introduction

As a baker, you should know how to clean your equipment.

Condition

You will be provided appropriate personnel and work area.

Standard

Take care of your equipment.

Care of Your Equipment

The table below shows how to clean and care for your equipment.

Step	Action
Remove Dry Ingredients	• Use a soft bristle brush, avoid steel bristle brushes because they will scratch the surface and make it more difficult to clean.
Remove Grease and Other Foreign Matter	• Use a cellulose sponge or disposable paper towel with the approved cleaner. • Remove hardened material with a brush or disposable towel, which has been dipped in the appropriate detergent solution.
Clean All Equipment After Use	• Clean all equipment inside and out after every use. • Clean spills promptly.
Wash All Detachable Equipment Parts	• Detach, thoroughly wash and rinse, and air-dry all parts coming in contact with food before reassembling.
Dry All Equipment	• Clean and hand wipe dry all equipment to prevent rust, corrosion, or an accumulation of dust on damp surfaces.
Keep Refrigerator Neat and Clean	• Use a disinfectant to prevent bacterial growth from developing.

Summary

This section covered the baking equipment. The next section covers mold and salmonella food poisoning.

Mold and Salmonella Food Poisoning

Condition

You will be provided appropriate personnel and work area.

Standard

All possible contamination must be controlled.

Mold

Mold is a tiny vegetable plant that grows from spores in the air. These spores grow into easily recognized, dark, velvety spots on the outside of baked items. The conditions that speed up the development of mold are listed below:

- Poor sanitation
- Warmth
- Moisture
- Darkness

Controlling Mold

To avoid mold

- Use sanitary equipment.
- Store ingredients and baked items in a cool, dry room with sunlight and ventilation.
- Eat baked goods promptly.

Ingredient Inhibitors of Mold

Some ingredients that can inhibit the growth of mold are listed below:

- Sodium propionate
- Calcium propionate
- Sodium diacetate

Salmonella

Salmonella refers to a group of about 900 kinds of bacteria. The ones to be concerned with frequently contaminate foods and cause illness from these food-borne bacteria. The severity of the illness depends on the kind of bacteria, the number of bacteria in the food, and the susceptibility of the consumer.

In central pastry and messhall kitchens, the most common source of infection is eggs; however, salmonella has also been found in flour and dried coconut.

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Mold and Salmonella Food Poisoning, Continued

Infected Ingredients

Infected ingredients are a serious hazard. Causes for contamination when preparing food are listed below:

- Food is not adequately cooked
- Containers (principally egg cans) reused
- Dust or droplets can infect other products during handling

Contamination Control

Precautions for contamination control are listed below:

- Use only specification ingredients. Frozen eggs and meringue powder procured and inspected, as provided in current specifications, should be salmonella free.
- Thaw eggs in cold running water or at refrigerator temperature. The practice of thawing frozen eggs at room temperature permits rapid growth of organisms that might contaminate the eggs.
- Keep thawed eggs at 32°F to 34°F until used.
- Keep ingredient containers covered at all times when not in use to minimize possible contamination from air-borne sources or from other factors.
- Never use egg cans in any production operation or for the storage of ingredients or partially finished products. Egg cans are manufactured as single service containers and are **not** designed for reuse.
- Sterilize and sanitize all mops and rags used to mop up eggs or other materials that might be contaminated before using again.
- Handle the product no more than necessary. Hand dipping and hand finishing greatly increase the chances for recontamination of the product.
- Use only seamless equipment, which can be adequately cleaned and sterilized in the preparation and handling of cream fillings and other perishable items.

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Mold and Salmonella Food Poisoning, Continued

Contamination Control, continued

- Make certain the temperatures used in the production of cream fillings are adequate to destroy the germs. Cream filling should be heated to at least 185°F.
- Fill pie shells with cream filling after the filling has been cooked and while it is still hot. Filling that has been cooked sufficiently will have a low bacteria count. If the filling is dispensed hot, the chance for contamination of the filling during the production of the individual pies will be reduced.
- Dispose of any leftover cream filling. Do **not** blend it with fresh filling the next day because the leftover filling could well have been contaminated during storage.
- Refrigerate any cream filled or custard-filled products. Should these products be contaminated with small numbers of harmful organisms, proper refrigeration will prevent their developing in sufficient numbers to cause illness.

Fillings

Do **not** develop a false sense of security through using synthetic fillings, which by them are incapable of supporting bacterial growth. The U.S. Public Health service has demonstrated that such fillings, when in contact with more nutritious materials such as pie shells, will permit micro-organisms to live and even increase in numbers.

Summary

This section covered the mold and salmonella food poisoning. The next section covers sweetening agents.

Sweetening Agents

Condition

You will be provided appropriate sweetening agents.

Standard

You must know the correct sweetening agent to use for your purpose.

Note: Sugar belongs to a group of compounds called carbohydrates that are composed of carbon, hydrogen, and oxygen.

Sugar Characteristics

Common characteristics of sugar are listed below:

- Tastes sweet
- Dissolves easily in water
- Ferments in solution
- Tenderizes because of its softening effect on flour proteins
- Caramelizes at a lower oven temperature during the baking process to give a darker color to the crust
- Improves the keeping qualities of a baked item by retaining moisture

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Sweetening Agents, Continued

Types of Sweeteners

The table below lists the five types of sweeteners used in the preparation of bakery goods:

Type	Use
Granulated Sugar	This is the most common type of sweetening agent used in the preparation of baked items.
Powdered Sugar	This is a finely ground, compact powdery sugar used mainly in the preparation of frostings, icings, and glazes.
Brown Sugar	This is a type of sugar that is not as refined or as sweet as granulated sugar. It is used in baked items for its distinct flavor and color.
Molasses	This is a thick, brown liquid obtained in the sugar making process. It contains caramel and is used to flavor and color some cakes, cookies, and brown breads. Recipes calling for molasses have been adjusted to make up for its acidity and moisture.
Honey	This is a viscous liquid used in baking for its flavor. It also adds a chewy texture and causes a darker crust color.

Summary

This section covered the sweetening agents. The next section covers leavening agents.

Leavening Agents

Condition

You will be provided appropriate personnel and work area.

Standard

Use the correct leavening agent the proper way.

Note: Dough and batters are lightened or made to rise by leavening. Leavening agents put tiny bubbles of gas into the dough or batter, which give a light and spongy texture to the finished product.

Types of Leavening Agents

The three types of leavening agents and their functions are listed in the table below:

Type	Function
Physical	• Air is incorporated in the dough or batter during the mixing process. • Expansion of moisture in the batter or dough caused by oven heat. • Usually combined with chemical or biological leavening agent. • Used in a sponge or angel food cake where air is mixed into the ingredients to cause the batter to reach a desired volume.
Chemical	• Baking soda or baking powder is added to the dry ingredients in the recipe. • Under certain conditions, the baking soda or baking powder produces carbon dioxide gas that causes the batter to expand. • Used in batter type cakes.
Biological	• Enzymes in yeast convert sugar to carbon dioxide gas. • Used in sweet dough mixes and occurs when the yeast is added to the ingredients and causes the batter to ferment and rise.

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Leavening Agents, Continued

Caution

The important thing to remember about leavening is to use only the leavening method given by the recipe. Although chemical and biological leavening each produce carbon dioxide gas, they should **not** be substituted for each other.

Summary

This section covered the leavening agents. The next section covers the effects of ingredients.

Effects of Ingredients

Condition

You will be provided appropriate personnel and work area.

Standard

You should know the origin and effect of the following ingredients in your product:

- Shortening
- Milk
- Eggs
- Salt

The Origin of Shortening

The origin of shortening is listed below:

- Shortening is made from animal fat, vegetable oil, or a blend of the two. Most shortening used for baking in the Armed Forces is made from vegetable oil.
- Vegetable oils are taken from seeds of oil-bearing plants. The oil is then refined, filtered, and deodorized. Edible oil is changed into shortening by hydrogenation (adding hydrogen gas); add enough to give a workable consistency to the finished product. A bakery type-shortening compound that contains an emulsifying agent is produced for use in batter type cakes. For best results, use hydrogenated shortening at a temperature of 70°F to 80°F.
- Butter is made from milk fat, but is not used very often in large-scale bakery operations because of the expense.

The Effects of Shortening

The use of shortening causes three things to happen when it is incorporated into a dough or batter:

- Produces a soft velvety crumb
- Tenderizes and moisturizes the baked items
- Increases the volume of the dough or batter

When shortening is solid at room temperature, it is called fat; when it is liquid, it is called oil. Mineral oil used for lubrication purposes is not shortening!

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The Origin of Milk

The origin of milk is listed below:

- The word, *milk* means the liquid whole milk that is obtained from cows. In its original state, milk will not retain its freshness for long. For purposes of prolonging its shelf-life and facilitating handling and storage, milk is packed in various concentrated forms:
  - Dry whole milk
  - Nonfat dry milk

Note: When properly handled, either type of milk may be used in pastry products.

- Liquid whole milk (fresh milk) is never used in baking because it spoils easily and is difficult to handle.
- Most milk used in baking is nonfat dry milk obtained by removing the fat and water from liquid whole milk. It contains lactose, milk proteins, and minerals in the same amounts as those found in fresh milk.
- If you need to substitute one milk for another, use the table of milk equivalents in Section A of the Armed Forces Recipe Service.

The Effects of Milk

Milk has three effects in pastry products:

- **Nutritional value:** Milk adds to the nutritional value of a pastry product and enhances the flavor of the pastry item. Increased nutritional value is the most important effect of the use of milk on a pastry product.
- **Texture:** Milk gives a soft, velvety texture to the finished pastry item. This occurs because the milk has a binding effect on the flour proteins, which toughen the finished product.
- **Crust color:** The sugar in milk gives a richer color to the crust of finished pastry items.

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Effects of Ingredients, Continued

The Origin of Eggs

Shell eggs may be fresh eggs or refrigerated storage eggs. Frozen whole eggs are eggs removed from the shell and then frozen. Removing most of the moisture from eggs makes dehydrated egg mix. To substitute one type of egg for another, use the table of egg equivalents in Section A of the Armed Forces Recipe Service.

The Effects of Eggs

Eggs have five effects in pastry products:

- **Volume:** Eggs help to support the weight of sugar and shortening and keep the product from being heavy. In sponge type cakes, eggs are the main leavening agent because when whipped they hold air. The function of eggs as a leavening agent is probably the single most important contribution of eggs in pastry products.

- **Color:** Eggs contribute to the color of pastry items. For example, white cakes use egg whites and yellow cakes use the yolks.

- **Moisture:** Since eggs are a semi-liquid material, they add moisture to many bakery items.

- **Flavor:** The use of eggs in pastry products adds considerably to the overall flavor and richness of the pastry items.

- **Nutrition:** The yolks of eggs contain vitamins A and D, thiamin, riboflavin, calcium, and iron. The use of eggs adds significantly to the nutritional value of the pastry product.

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Effects of Ingredients, Continued

The Origin of Salt

The salt used in baking is sodium chloride, usually called table salt. Store salt in a clean dry place where it can be kept free from dust and moisture. Too much moisture tends to cause salt to lump and harden.

The Effects of Salt

Salt causes three things to happen when it is incorporated into baked products:

- Improves and intensifies flavors
- Helps to regulate the fermentation of yeast in dough products
  - Less salt--faster fermentation
  - More salt--slower fermentation
- Strengthens the gluten and makes it more stable

Summary

This section covered the effects of ingredients. The next section covers flavoring agents.

Flavoring Agents

Condition You will be provided the correct flavoring for the product.

Standard Use the correct flavoring for your product.

Classes of Flavorings For every type of pastry product, there is a flavoring or spice that is more appropriate than any other. Flavorings improve the taste of a product when you use them as directed by the recipe. The table below lists four main classes of flavorings used in pastry baking.

Flavoring	Nomenclature and Use
Liquid	These agents are concentrated alcoholic solutions of a particular flavor. Lemon and orange flavorings are made from natural oils. Imitation flavors include almond, banana, cherry, black walnut, brandy, maple, pineapple, rum, and vanilla.
Dried Spices and Seeds	Spices come from the roots, seeds, fruit, or bark of certain flavor producing plants. The main spices of this type used in baking are cinnamon, cloves, mace, allspice, nutmeg, and ginger. Seeds such as caraway, poppy, and sesame are used in many yeast doughs.
Cocoa and Chocolate	Both cocoa and chocolate are used to give a chocolate flavor. The main difference between the two is that the natural fat, cocoa butter, is partially removed from cocoa before the cocoa is powdered. Chocolate is in a solid form that is usually melted down before using.
Miscellaneous Flavors	These flavors include juices, prepared fruits, oatmeal, coconut, peanut butter, nuts, raisins, and chocolate (chocolate chips), which are sometimes added to dough and batters to produce particular flavors and textures.

Summary This section covered the flavoring agents. The next section covers measuring by weight and volume.

Measuring by Weight and Volume

Condition

You will be provided proper equipment to measure ingredients.

Standard

All ingredients must be weighed.

Note: Whenever you are producing a pastry item, one of the most important steps is measuring the right amount of all the ingredients that go into the product. If for any reason, the ingredients are wrong, you will produce a poor product.

Measuring Ingredients

There are two specific ways to measure all the ingredients that go into pastry items:

- **Weight:** This method is the most accurate means of measurement. Recipe ingredients should be measured by weight whenever possible.
- **Volume:** This method should be used only if there are no scales available. Measuring devices include items such as cups, pitchers, dippers, and spoons.

Measuring Device Rules

The table below lists certain rules observed when using measuring devices.

Ingredient	Method
Flour	When specified, sift before measuring. Place flour lightly in measuring utensil. Level with straight edge of knife. **Do not shake utensil and do not pack flour.**
Granulated Sugar	Fill measuring utensil without shaking. Level with straight edge of knife. If sugar is lumpy, sift before measuring.
Brown Sugar	When specified, pack firmly into measuring utensil. If sugar is lumpy, roll with a rolling pin to break up any lumps before measuring.
Nonfat Dry Milk	Stir lightly with a fork or spoon. Place lightly in measuring utensil. **Do not shake utensil.** Level with straight edge of knife.
Baking Powder and Spices	Stir lightly with fork or spoon. Dip dry measuring spoon into container, bringing spoon up heaping full. Level with straight edge of knife.
Solid Fats	Press fat firmly into measuring utensil. Level with straight edge of knife.

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Measuring by Weight and Volume, Continued

Summary

This chapter covered baking equipment, sanitation, and ingredients. The next chapter covers cake baking and possible faults.