SECTION 28-1

Yeast Dough Basics

KEY TERMS

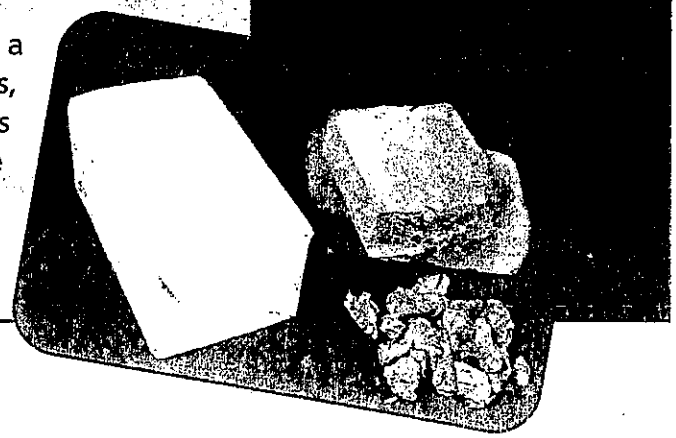
- leavens
- peel
- starter
- hard lean dough
- soft medium dough
- sweet rich dough
- rolled-in fat yeast dough

OBJECTIVES

After reading this section, you will be able to:

- Describe the characteristics of quality yeast products.
- Identify types of yeast.
- Distinguish various types of yeast doughs.
- Identify products made from regular yeast doughs and rolled-in fat yeast doughs.

FROM bagels to flaky croissants, breads are usually a part of every meal. Yeast breads appeal to your eyes, nose, and taste buds. Learning about the characteristics of quality yeast products is important to foodservice professionals. It will help you plan a variety of nutritious and flavorful menu accompaniments that delight customers.



LEAVENING

Yeast breads and rolls are made from dough. Dough is a mixture of flour, water, salt, and other ingredients to which yeast has been added. Yeast **leavens** (LEH-vuns), or causes dough to rise as it fills with CO_2 bubbles. This process is called fermentation. See Fig. 28-1.

Quality yeast products are the result of a careful balancing act. The leavening action of the yeast is balanced with the development of gluten. Gluten, along with wheat protein, gives bread its characteristic texture. The formation of gluten is controlled by mixing water and wheat, and by the way dough is handled during preparation. Most yeast doughs are oven-baked in pans, on sheets, or pushed into the oven on peels. A peel is a wooden board that a baker uses to slide breads onto the oven floor or hearth (HARTH).

Yeast

As described in Chapter 27, the three most commonly used yeasts in baking are compressed yeast, active dry yeast, and quick-rise dry yeast. See Fig. 28-2.

Be sure to note which form of yeast is called for in a formula. Dry yeast is about twice as strong as compressed yeast, yet the two forms are similar in taste when the correct proportions are used.

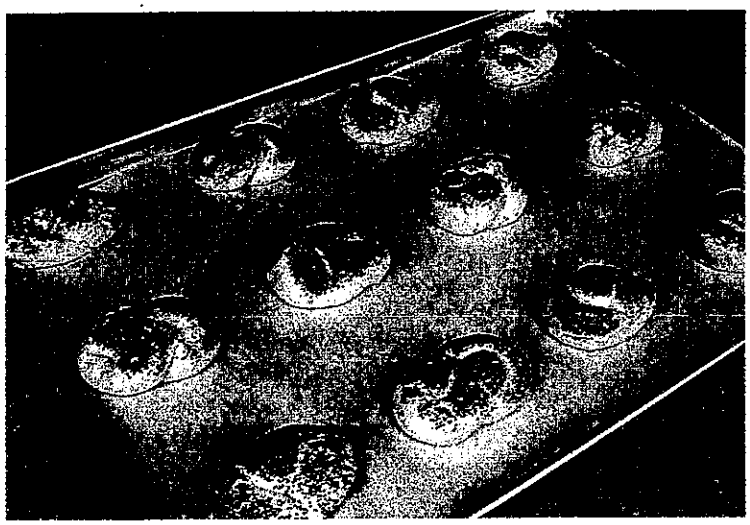


Fig. 28-1. The leavening action of yeast increases the volume of the dough. What kinds of products can be made from yeast dough?

When substituting compressed yeast for dry yeast, use double the amount of dry yeast called for in the formula. When substituting dry yeast for compressed yeast, use half the amount. Too much or too little yeast will affect the yeast fermentation. Quick-rise dry yeast can be used in the same proportions as active dry yeast.

All yeast is sensitive to temperature and other conditions. Yeast growth slows down at temperatures below 34°F. Temperatures above 138°F kill yeast cells. The ideal temperature range for yeast fermentation is 78°F–82°F.

Since yeast loses its potency as it ages, all yeast is labeled with an expiration date. Yeast must be used before this date to produce the best quality yeast products.

CULINARY TIP

USING COMPRESSED YEAST—In order to blend compressed yeast with other ingredients, you must first soften the yeast. To soften compressed yeast, mix it with liquid that is about 85°F. Use a portion of the liquid to be used with the dough.

Starters

The unique flavor and texture of some breads, such as sourdough, come from the use of a starter. A **starter** is a mixture of flour, yeast, and a warm liquid that begins the leavening action. A portion of the starter is then used to leaven dough. Sourdough starters are also available as active dry cultures and are used much like dry yeast.

Other Yeast Dough Ingredients

The variety of yeast products you see in a bakery display case all begin with flour, water, and yeast. The type and amount of additional ingredients, along with factors such as shaping and baking methods, determine the end product. Each ingredient in a yeast dough carries out a special function with regard to the end product. See Fig. 28-3.

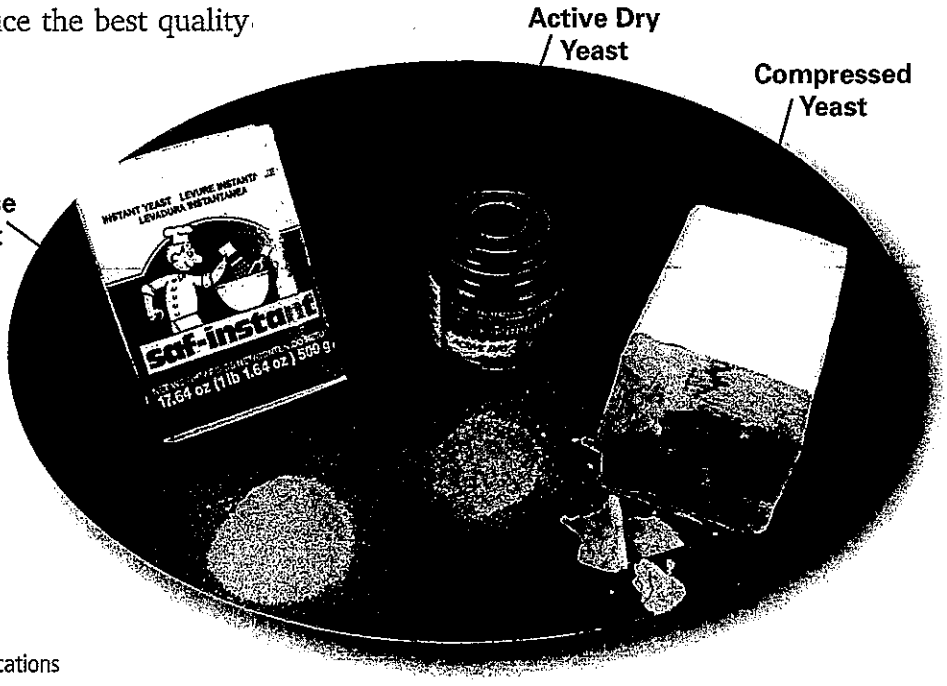
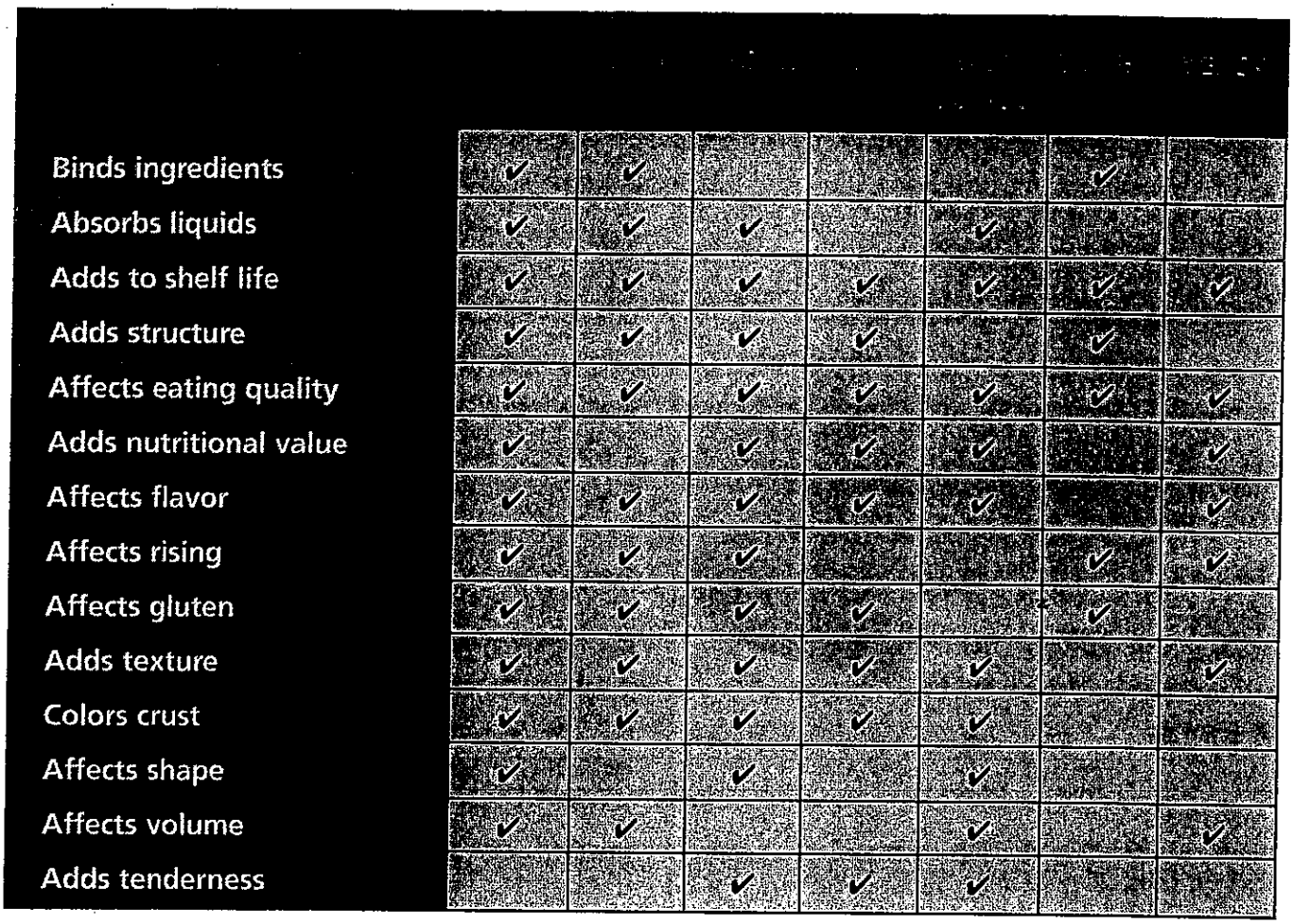


Fig. 28-2. Here are three common types of yeast used in baking. Why is temperature control important in preparing yeast doughs?

Fig. 28-3.



Choosing the appropriate flour is critical to the preparation of quality yeast breads and rolls. Different types of flour give the product different qualities. For more information on flour, see Chapter 27.

REGULAR YEAST DOUGHS

Yeast products are generally classified according to the type of dough used to produce them. Regular yeast doughs are prepared by combining yeast with the other ingredients into one mixture. The three most common regular yeast doughs used in foodservice operations are:

- Hard lean doughs.
- Soft medium doughs.
- Sweet rich doughs.

Hard Lean Doughs

A **hard lean dough** consists of 0–1% fat and sugar. Hard lean doughs are the most basic yeast doughs. They are often made solely from flour, water, salt, and yeast. Hard lean doughs yield products with a relatively dry, chewy crumb and a hard crust. The crumb is the internal texture of a bread or roll. The crust is the outer surface of a bread or roll. See Fig. 28-4.

Fats make a hard lean dough easier to handle, but they also soften the crumb. In commercial baking operations, chemical dough conditioners such as chlorine dioxide (KLOR-een die-AHK-side) are sometimes used. These conditioners may be added to strengthen the glutens that give hard lean-dough products their dense structure.

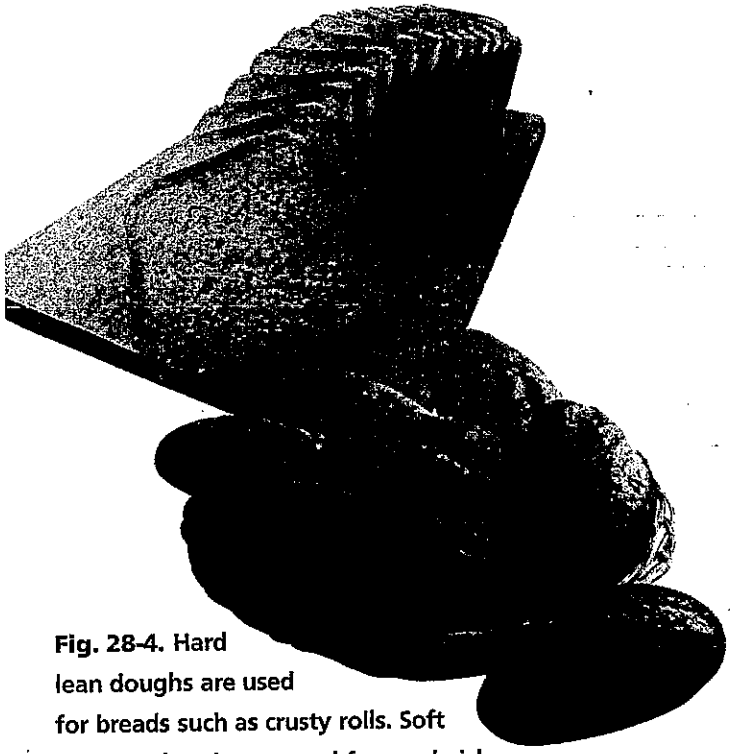


Fig. 28-4. Hard lean doughs are used for breads such as crusty rolls. Soft medium doughs are used for sandwich breads and buns.

Similar to traditional hard lean doughs are whole-grain breads, rye breads, and sourdoughs. Their textures are much more dense because of the coarser, heavier flours and hotter baking methods used. The crumb is chewier and the crust is usually darker and crisper.

CULINARY TIP

ENRICHING HARD LEAN DOUGHS—Hard lean doughs are stiff, dry, and more difficult to work with than soft medium doughs. Therefore, some bakers add oil. You can add eggs or oil to hard lean doughs to make them richer. Whole eggs may be added for color, fat, or additional moisture.

a LINK to the Past

The Origins of Yeast Doughs

The world's earliest breads were unleavened—simple mixtures of ground grain or flour and water. They were flattened into circles and cooked on an open fire. No one knows who made the first yeast doughs, although evidence suggests that the Egyptians were making leavened bread as early as 10,000 B.C. The first yeast breads were probably an accident. Unbaked flat bread dough left out in the open air probably picked up wild yeast spores and began to bubble and rise. The first person to bake and taste the resulting loaf instead of tossing it out as spoiled opened up the world of yeast breads and rolls.

Today, yeast is a part of every yeast bread formula. Yeast provides the leavening action in many of the baked goods produced in food service. Foodservice professionals know how to expertly use yeast to produce the breads and rolls desired. From sourdough to Kaiser rolls and Pullman loaves, yeast is the ingredient that gave rise to this portion of the foodservice industry.

Soft Medium Doughs

Soft medium doughs produce items with a soft crumb and crust. The percentage of fat and sugar in these doughs is 6–9%. Soft medium dough is elastic and tears easily.

Yeast products made from soft medium dough include Pullman bread. Pullman bread is white or wheat sandwich bread that is made into squared-off loaves. These loaves get their shape from baking in a 2-lb. loaf pan that's enclosed on all sides. Other soft medium dough products include dinner rolls, such as cloverleaf and Parker House rolls.

Sweet Rich Doughs

At the other extreme of regular yeast doughs, are sweet rich doughs. A **sweet rich dough** incorporates up to 25% of both fat and sugar. Because sweet rich doughs use such large amounts of fat and sugar, their structure is soft and heavy. The high gluten content of bread flour helps sweet rich doughs support the additional fat and sugar.

Most sweet rich doughs are moist and soft. In working with a sweet rich dough, you may be tempted to add more flour to make the dough easier to handle. However, adding flour will toughen the final product. Use only a light dusting of flour on your hands and work surfaces when working with sweet rich doughs.

Many sweet rich dough products are famous for their golden yellow crumb and brown crust. The traditional means of achieving this golden color is to add numerous eggs to the dough. However, the egg can break down the gluten and make the dough too heavy. Many commercial kitchens use yellow food coloring to enhance the color of dough. You can also add shortening to increase the dough's richness. Some examples of sweet rich dough products are yeast-raised coffee cakes, cinnamon buns, and doughnuts. See Fig. 28-5A.

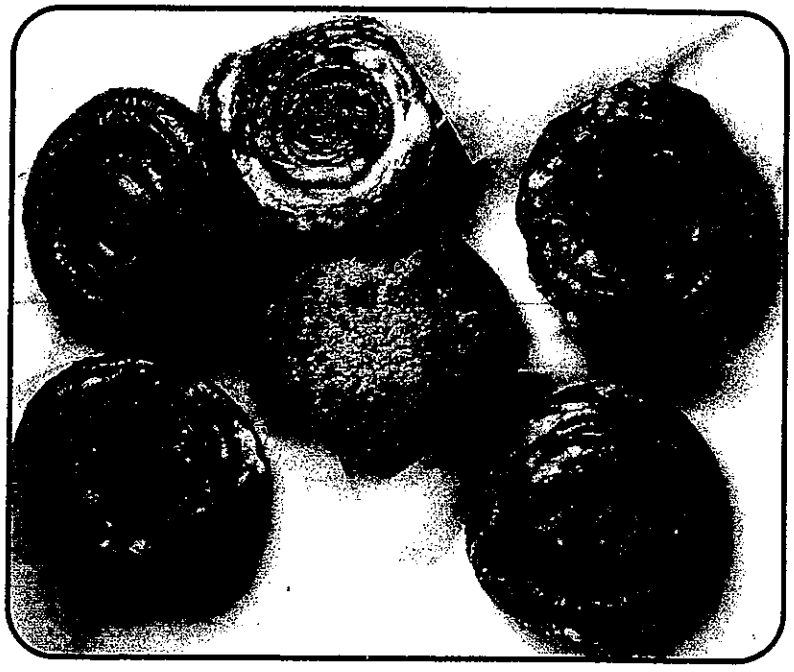


Fig. 28-5A. Sweet rich doughs can be used to create a vast array of taste-tempting bread products.

ROLLED-IN FAT YEAST DOUGHS

In addition to regular yeast doughs, bakers use rolled-in fat yeast doughs to make rolls and pastries. Rolled-in doughs differ from regular yeast doughs in their preparation.

When making a **rolled-in fat yeast dough**, combine the fat into the dough through a rolling and folding action. This process yields a dough made of many thin, alternating layers of fat and dough. As the dough bakes, the heated fat layers release moisture in the form of steam. The steam becomes trapped between the layers of dough, pushing them apart and lifting them. The finished products of rolled-in fat yeast doughs are notable for their rich, flaky texture. Two popular kinds of rolled-in fat yeast dough products are croissants and Danish pastries.

Rolled-in fat yeast doughs traditionally use butter for the fat layers. Butter adds a rich flavor and aroma, but it is difficult to handle while rolling and folding. Warm butter is too soft to roll, and cold butter cracks when folded. Instead, you may want to use other high-moisture fats, such as margarine or shortening. They may be substituted partially or completely for the butter. This will improve handling ability and lower costs.

Rolled-in fat yeast doughs also differ from regular yeast doughs in gluten development. Gluten develops during folding and rolling, so little kneading is required with rolled-in fat yeast doughs. Overdeveloping the gluten in a rolled-in fat yeast dough will make the finished product tough and chewy. Larger foodservice operations often use sheeters to ensure consistent rolled-in fat yeast dough production.

Croissants

Croissants (kwah-SAHNTS) are crescent-shaped, flaky rolls. Croissant dough is a soft, wet mixture of bread flour, yeast, cold milk, salt, butter, and a little sugar. You can add dry milk solids and cold water instead of milk. The cold water or milk slows the leavening action of the yeast. Eggs are not part of the traditional formula, but can be added for additional richness. Butter or another high-moisture fat equal to 25–50% of the weight of the dough is rolled in.

A freshly baked croissant should be light golden brown. It should have a flaky, layered texture and an open grain or crumb. Croissant dough can be shaped into traditional crescents or the tighter half circles that Swiss and German bakers call gipfels (gape-fells).

Danish Pastry

Danish pastry dough is sweeter and richer than croissant dough. Danish pastry is usually eaten as a breakfast or dessert item. Unlike croissant dough, Danish pastry dough is rich in eggs. It can also include milk.

Danish pastry is also softer, flakier, and more tender than croissants. These characteristics, along with a more intense flavor, are due to the Danish pastry's higher percentage of rolled-in fat. This percentage can range from 10–50%. See Fig. 28-5B.

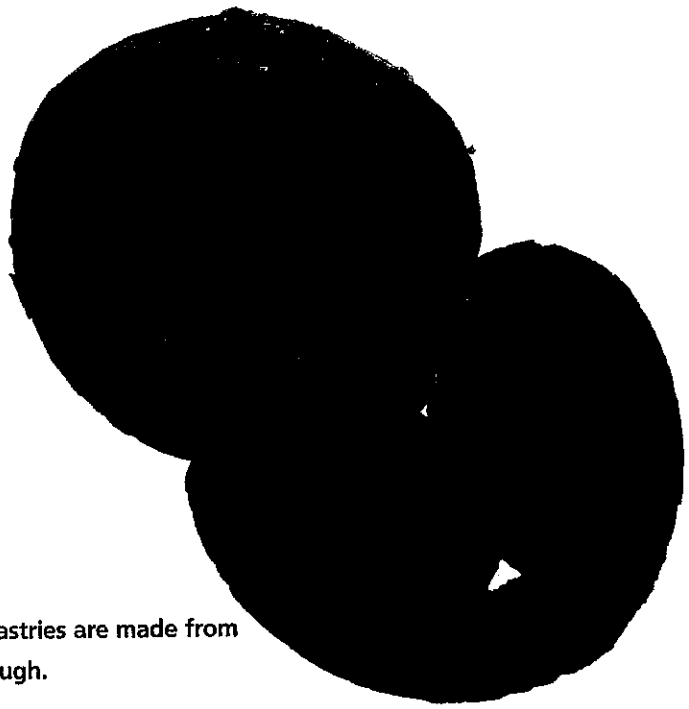


Fig. 28-5B. Danish pastries are made from rolled-in fat yeast dough.

SECTION 28-1 Knowledge Check

1. Describe the characteristics of quality yeast products.
2. What is a "starter," and how is it used?
3. Name the three types of regular yeast doughs. Give examples of products made from each type.

MINI LAB

Imagine that you work in a small bakery. The bakery's croissants keep turning out heavy and chewy. What three factors might be responsible for this? Offer a solution for each factor.

SECTION 28-2

Yeast Dough Production

KEY TERMS

- preferment
- kneading
- let down
- punching
- bench rest
- shaping
- panning
- proofing
- slashing
- docking
- oven spring

OBJECTIVES

After reading this section, you will be able to:

- Explain proper methods of preparing yeast breads and rolls.
- Describe the process of fermentation in yeast doughs.
- Identify common causes of failure in yeast bread production.
- Prepare quality yeast breads.

The production of quality yeast breads and rolls requires good technique, patience, and creativity. To produce a good yeast product, you will need to learn different dough mixing methods. The process of making yeast breads and rolls is a fascinating one. This section will help you understand that process. Practice will help you produce quality yeast dough products.

YEAST DOUGH PREPARATION

Yeast breads and rolls can be prepared by traditional "hand" methods. However, larger quantities and faster turnover times are often required. Yeast breads and rolls can also be prepared through an automated process known as continuous bread making.

The steps involved in making yeast breads vary depending on the type of dough used and the item being produced. However, the same general stages apply to all yeast dough products.

1. Scaling ingredients.
2. Mixing and kneading.
3. Fermentation.
4. Dividing dough.
5. Rounding dough.
6. Bench rest.
7. Shaping dough.
8. Panning dough.
9. Final proofing.
10. Baking dough.
11. Cooling dough.
12. Packaging dough.

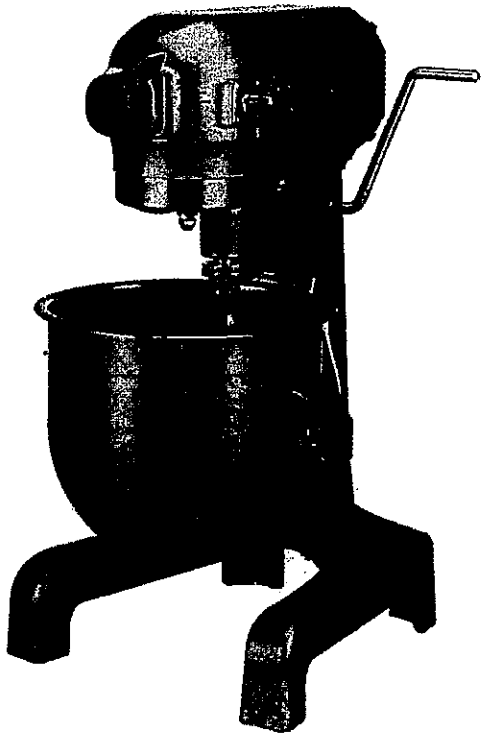
Keep the following quality guidelines in mind when producing yeast breads and rolls:

- Maintain personal cleanliness at all times.
- Keep utensils, materials, and machinery clean and in good working order.
- Use the best quality ingredients.
- Read all formulas carefully and measure ingredients properly.
- Maintain the appropriate environmental temperatures.
- Regulate dough temperatures.
- Serve only freshly baked and properly stored yeast products.

MIXING METHODS

There are three basic methods of mixing yeast dough ingredients: the straight-dough method, the modified straight-dough method, and the sponge method. Each of these methods gives its own characteristics to the finished product. Each method also affects the activity of the yeast and the formation of the gluten.

Fig. 28-6. A bench mixer is used to mix the ingredients of yeast breads and rolls.



Straight-Dough Method

You will use the straight-dough method to mix the ingredients for most basic breads. The straight-dough method calls for mixing all the ingredients together in a single step. Ingredients may be mixed by hand or with a bench mixer. See Fig. 28-6.

In doughs mixed by the straight-dough method, the yeast begins acting on all the ingredients immediately. As you continue mixing or working the dough, the gluten develops.

Modified Straight-Dough Method

The modified straight-dough method breaks the straight-dough method into steps. These steps allow for a more even distribution of sugars and fats throughout the dough. This modification is commonly used when preparing rich doughs.

1. Dissolve the yeast in part of the water.
2. Combine the fat, sugar, salt, milk solids, and flavorings.
3. Mix well, but do not whip.
4. Add eggs one at a time, as they are absorbed into the mixture.
5. Add the rest of the liquids and mix briefly.
6. Add the flour and the dissolved yeast last.
7. Mix until a smooth dough forms.

Sponge Method

Some yeast products, such as crusty hearth breads or sweeter doughs, benefit from the sponge method. The sponge method allows the yeast to develop separately before it is mixed with the other ingredients. This method results in a more intense flavor and a lighter, airy texture. The sponge method makes a very soft, moist, and absorbent dough. Here are the basic steps:

- Combine 50% water with 50% flour.
- Add the yeast. Sugar or malt may also be added to this mixture to promote faster yeast growth.

KEY Math SKILLS

USING THE "240 FACTOR"

Ideally, achieving and maintaining the desired dough temperature would be a simple matter of controlling the room temperature. Because the desired dough temperature for yeast doughs is 80°F, and $80 \times 3 = 240$, the correct water temperature is often called the "240 factor." You can control water temperature by adding ice to cool the water until it reaches 240°F. Several factors affect dough temperature, including:

- Flour temperature.
- Room temperature.
- Friction temperature of the mixer speed. This is 10–20°F for first speed, 20–30°F for second speed, and 30–40°F for third speed. In most cases, the friction temperature used is 30°F.
- Water temperature.

Of these, only the water temperature can be easily modified by the baker. Commercial bakers have developed a formula for calculating the correct water temperature to achieve the desired dough temperature, no matter what the other temperatures may be.

The following example shows how the desired dough temperature is used to calculate the ideal water temperature:

Step 1. Check the desired dough temperature in the formula.

Step 2. Multiply the desired dough temperature by 3.

Step 3. Add together the flour, room, and friction temperatures.

Step 4. Subtract the result of Step 3 from 240°F in Step 2.

Step 5. The result of Step 4 is the correct water temperature for achieving the desired dough temperature.

For example:

1. Desired dough temperature = 80°F
   Flour temperature = 66°F
   Room temperature = 70°F
   Friction temperature = 30°F
2. $80°F \times 3 = 240°F$
3. $66°F + 70°F + 30°F = 166°F$
4. $240°F - 166°F = 74°F$
5. The ideal water temperature is 74°F.

TRY IT!

Find the ideal water temperature for yeast rolls considering the following factors: the desired dough temperature = 80°F; the flour temperature = 62°F; the room temperature = 78°F; and the friction temperature = 30°F.

- Cover the sponge. Let it rise in a warm place for two to three hours or until it doubles in bulk.
- Combine the sponge with the remaining ingredients either by hand or in a mixer.

One modification of the sponge method is sometimes called the preferment method. **Preferment** is the process of removing a portion of the dough. It is kept dormant for 8–24 hours and then added to the next day's bread products. This method enhances the fermentation, color, and taste of the final baked products.

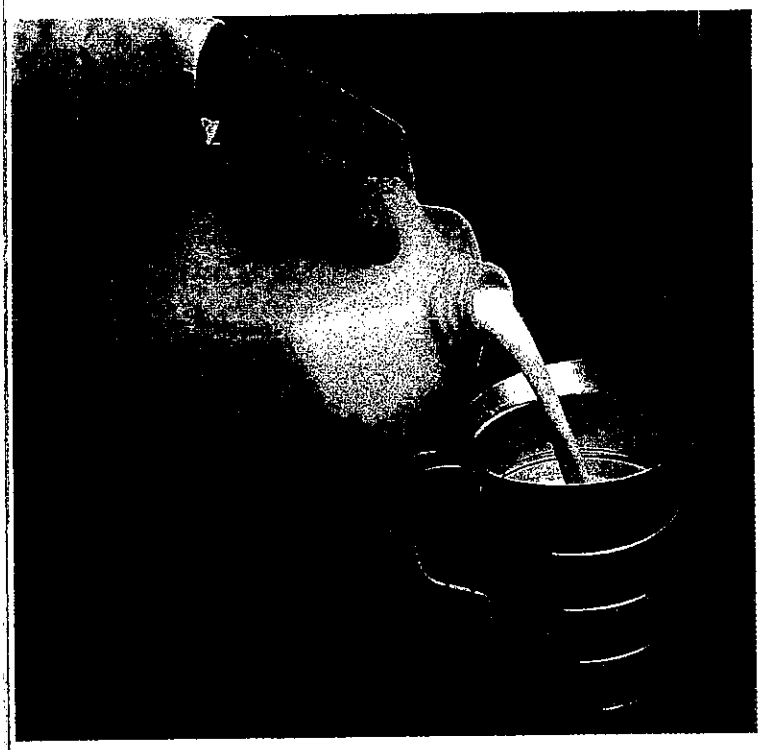


Fig. 28-7. Accurate measuring of ingredients contributes to successful yeast dough products.

SCALING INGREDIENTS

Accurate measurement, or scaling, of all ingredients is critical in the preparation of yeast doughs. Successful formulas are based on proportional mixtures of ingredients. Too much or too little of an ingredient will affect yeast activity, gluten formation, and product quality.

Use a baker's scale to weigh all ingredients that are denser than milk or water. This includes flour, yeast, shortening, eggs, honey, molasses, malt, and oil. Milk and water may be measured with volume measures. See Fig. 28-7.

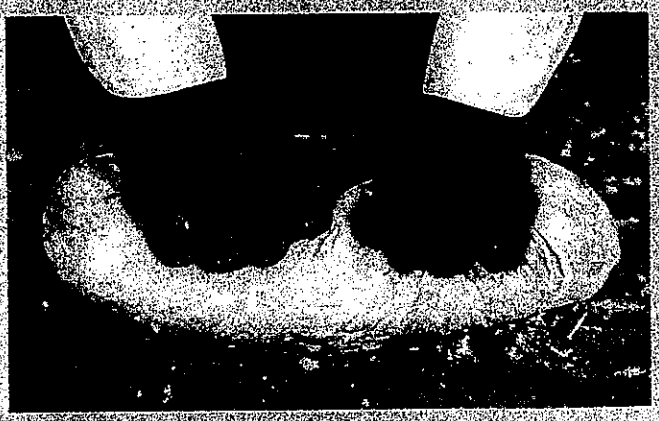
Scale each ingredient separately. Make sure the weight of each ingredient corresponds to the weights called for in the formula. In some formulas, ingredients are given as a percentage of the total weight of the flour. Foodservice operations usually post procedures for converting percentages to weights and weights to percentages.

MIXING & KNEADING

When you mix dough ingredients thoroughly, it ensures even yeast distribution, gluten development, and a uniform mixture. Once the ingredients are mixed, the dough must be kneaded to further develop the gluten. **Kneading** means to work the dough until it is smooth and elastic.

1. Grasp the dough and bring it toward you. See Fig. 28-8A below.

2. Form a fist and push the dough away with your knuckles. See Fig. 28-8B below.



3. Repeat the process until the dough is smooth and elastic. See Fig. 28-8C below.

In continuous bread making or commercial baking, mixing and kneading are done in a spiral mixer. There are four stages to this process.

- **Pickup.** Use a low speed to mix the water and yeast. If oil is used, add it immediately after the liquid ingredients. Then incorporate the dry ingredients, and add solid fats or shortenings last. Once all ingredients have been added to the mixer, turn the speed to medium.
- **Cleanup.** During this stage the ingredients come together into a ball around the dough hook. The bottom of the mixing bowl can be clearly seen. At this stage all liquid is absorbed into the flour.
- **Development.** During this longest stage of mixing and kneading, oxygen is incorporated into the dough and gluten is developed. The dough will be uneven in color and will tear easily.
- **Final clear.** This stage is reached when proper gluten has developed. To verify gluten formation, cut off a small piece of dough and stretch it apart with your fingers. It should stretch to such a thinness that light can be seen through the dough. You should also be able to stretch the dough several times without it breaking. At this point, remove the dough from the mixer.

CULINARY

OVERMIXING—If you overmix or overknead a regular yeast dough, you will cause the ingredients in the dough to "let down." A **let down** is a condition in which the ingredients in a dough completely break down. Overmixed dough is warm and sticky and falls apart easily. Adding flour can help offset overmixing to a certain extent.

FERMENTATION

Once a regular yeast dough has been kneaded thoroughly by hand or has reached the final clear stage in a mixer, the dough is ready for fermentation. Fermentation (fuhr-muhn-TAY-shuhn) is the process by which yeast converts the sugars in dough into alcohol and carbon dioxide. Gases that are trapped in the gluten cause the dough to rise.

For fermentation to take place in dough, do the following:

- Shape the kneaded dough into a ball.
- Coat it with a thin film of oil.
- Cover the dough to keep it from drying out. Avoid popping any bubbles that may appear beneath the dough surface.
- Place the dough in a proofing cabinet, or proofer, which shields the dough from drafts and temperature changes.

Use a probe thermometer to measure the dough temperature before placing it in the proofer. See Fig. 28-9. If you're not using a proofer, regularly measure dough temperature throughout fermentation. Remember that allowing dough to become too cool will slow yeast action, while heat over 90°F will cause fermentation to accelerate.

Fermentation is complete when the dough has approximately doubled in size. You can test whether fermentation is complete by inserting two fingers into the dough up to the knuckles and then removing them. If the finger pressure leaves a slight impression around which the dough closes very slowly, fermentation is complete. The dough is then ready to be punched.

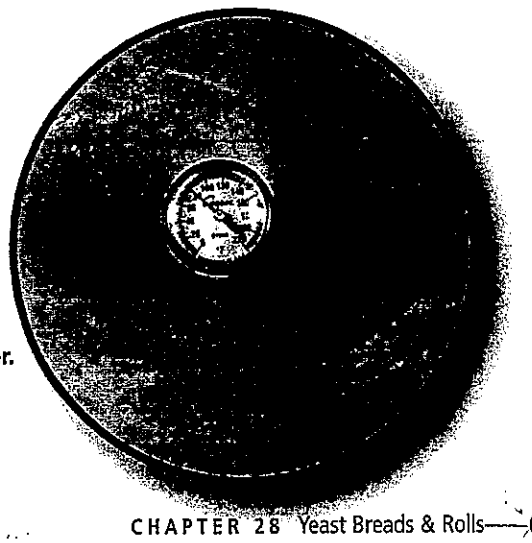


Fig. 28-9. This is a dough thermometer.

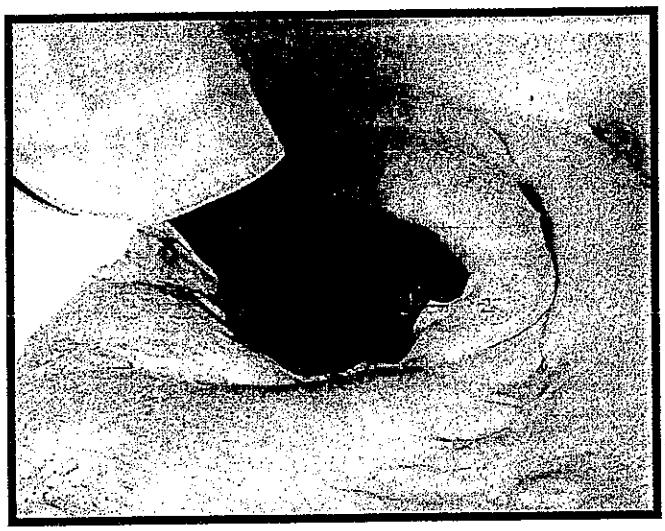


Fig. 28-10. To punch down dough, press your fist into the middle of the dough. Then fold the outer edges to the middle.

Punching

The action of turning the sides of the dough into the middle and turning the dough over is called **punching**. See Fig. 28-10. This is done by pressing gently and firmly, not by hitting or kneading the dough. Punching accomplishes four important actions.

- **Maintaining the dough temperature.** By effectively turning the dough inside out, punching moves the cooler exterior surfaces to the middle. This evens the dough temperature.
- **Releasing carbon dioxide.** If too much of the gas developed during this first stage of fermentation remains within the dough, it will become concentrated and slow the later stages of fermentation.
- **Introducing oxygen.** Punching the dough incorporates oxygen from the air.
- **Developing gluten.** Any handling of the dough strengthens the gluten.

Dividing Dough

Once the dough has been punched, it must be divided for baking. Commercial bread formulas give portions by weight. To divide dough, use a bench scraper to cut the dough into uniform pieces. See Fig. 28-11. Weigh the pieces on a baker's scale, as when scaling ingredients.

You will need to work quickly when portioning dough. Fermentation continues during this process. The last pieces portioned may become overfermented if there is any delay. Keep the large mass of dough covered as you work so its surface does not dry out. If any small pieces of dough are left, divide them evenly and add them to the larger pieces. Tuck them under each portion so they will be well incorporated. Otherwise the smaller pieces will ferment too fast.

Rounding Dough

Divided dough must be rounded, or shaped, into smooth balls. To do this, scale the dough with a dough cutter. Put the dough on the bench. With the palm of your hand, cup the dough with a circular motion, working the dough with your fingertips. This will cause the dough to form into a smooth, firm, round ball.

Rounding dough provides it with a skin to prevent the loss of too much carbon dioxide. Some formulas call for the dough to be folded over during rounding. This provides a kind of secondary punching after dividing. If the dough is not rounded, it will rise and bake unevenly, with a lumpy or rough surface.

Fig. 28-11. Use a bench scraper to divide dough.

When rounding, perform each of the subsequent actions, such as shaping and panning, in the same order, so the dough ferments consistently. The first portion rounded should also be the first piece to be shaped, and so on.

Bench Rest

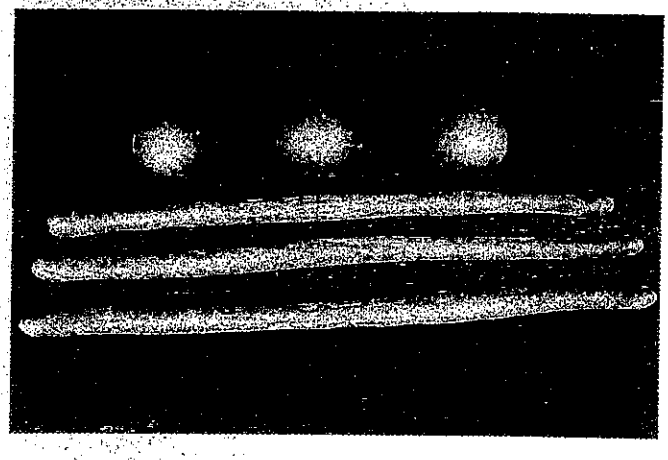
Depending on the formula, at this time the rounded portions may need to be placed in bench boxes or left covered on the work bench. A bench box is a covered container in which dough can be placed before shaping. This short, intermediate proofing stage, called a **bench rest**, allows the gluten to relax. The dough becomes lighter, softer, and easier to shape.

Shaping Dough

Once the portions have been properly rounded and, if necessary, rested, they must be shaped. **Shaping** forms the dough into the distinctive shapes associated with yeast products. Some general principles apply to the shaping process.

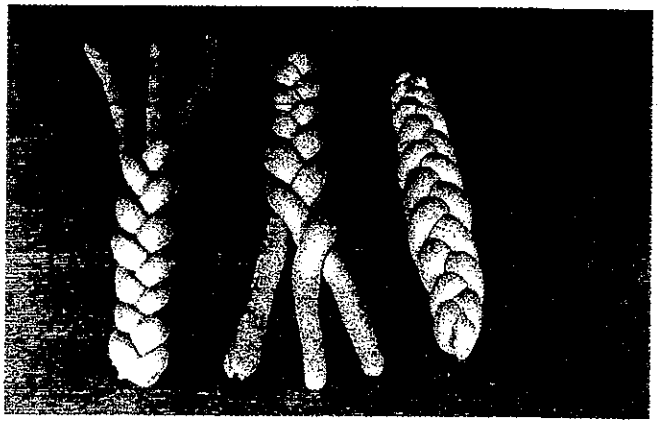
- **Work quickly.** Fermentation continues during shaping. Cover the portions you are not working with to prevent them from drying out.
- **Shape pieces in order.** Start with the first piece you rounded. Maintain the same order to ensure consistency.
- **Use very little flour.** A dusting of flour on your hands and the work surface will keep the dough from sticking. Too much will dry it out.
- **Place any seam at the bottom.** Seams, or the places where edges of the dough meet, should be straight and tight. The seam is the weakest part of the piece. Seams can open during baking and ruin the product's shape.
- **Shaping loaves.** Although bread loaves come in a wide variety of textures and tastes, there are essentially two ways to shape dough into loaves. Pan loaves are rolled and placed, seam down, into prepared loaf pans. In baking, loaves receive their characteristic shape from the support offered by the high sides of the loaf pans. Free-form loaves, such as braided loaves, are shaped by hand. They are baked, seam side down, on flat pans or paddles, or directly on a hearth. Use the following steps to make braided loaves:

1. Divide dough into three parts. Roll into three equal strips. See Fig. 28-12A below.



2. Cross strip 2 over strip 3. Cross strip 1 over strip 2. Cross strip 2 over strip 1. Repeat until half the bread is braided. See Fig. 28-12B below.

3. Flip the bread over so the three unbraided strips are facing you. Repeat step 2 until the whole loaf is braided. See Fig. 28-12C below.



Soft Rolls

PASTRY TECHNIQUE:
See the Method of Preparation.

NUTRITION:
Calories: 141
Fat: 4.35 g
Protein: 2.62 g

Variations:
1. Rolls
2. Pecan rolls
3. Cinnamon rolls
4. Coffee cakes

YIELD: 26 LBS., 15 OZ. (18 DOZEN) SERVING SIZE: ONE, 2-OZ. ROLL

INGREDIENTS

9 lbs.	Water
1 lb.	Dry milk solids
1 lb.	Sugar, granulated
8 oz.	Yeast, compressed
14 lbs.	Flour, bread
4½ oz.	Salt
1 lb.	Shortening, vegetable

METHOD OF PREPARATION:

1. Gather the equipment and ingredients.
2. Scale the ingredients.
3. Soften the compressed yeast in part of the water. The water temperature should be 78°–82°F.
4. Use the straight-dough method for mixing the dough. Combine all of the ingredients in the bench mixing bowl.
5. Mix until proper gluten development occurs. To test the gluten development, cut a small piece of dough from the mass in the bowl. Stretch the dough to a thinness that allows light to clearly shine through. If the dough can be stretched a few times without tearing, it is ready for fermentation.
6. Lightly coat the dough with oil before putting it into the proof box.
7. Ferment the dough.
8. Punch the dough down when it is almost double in bulk. To test the dough for punching readiness, insert two fingers into the dough. If the indentation remains, the dough is ready for punching.
9. Divide the dough using a bench scraper.
10. Round the dough.
11. Allow the dough to rest for a short time to relax the gluten.
12. Shape the rolls.
13. Place the rolls in parchment-lined or lightly-greased pans.
14. Put the panned rolls into the proofing cabinet to ferment prior to baking. The rolls are properly proofed when almost double in bulk, or when the dough closes around a finger indentation without collapsing.
15. Bake the rolls at 375°F for 20 minutes or until evenly browned.

■ **Shaping rolls.** Yeast rolls are like individually portioned loaves. Shape rolls with the same care used to shape loaves. This will produce items with an attractive, even surface and uniform size.

Depending on the formula, rolls may be shaped and baked on flat sheets, like free-form loaves. They may also be placed in special pans that offer additional structure during baking. Cloverleaf and butterflake rolls, for example, are baked in greased muffin pans. Brioche (bree-OSH) rolls, like brioche loaves, are baked in special fluted tins. Pan rolls, Parker House rolls, and knots are baked on flat sheets or in shallow baking pans.

When panning rolls, allow enough room between the rolls to ensure even browning. Avoid crowding. Most formulas indicate how many rolls will fit on a sheet and how they should be placed. See Fig. 28-13.

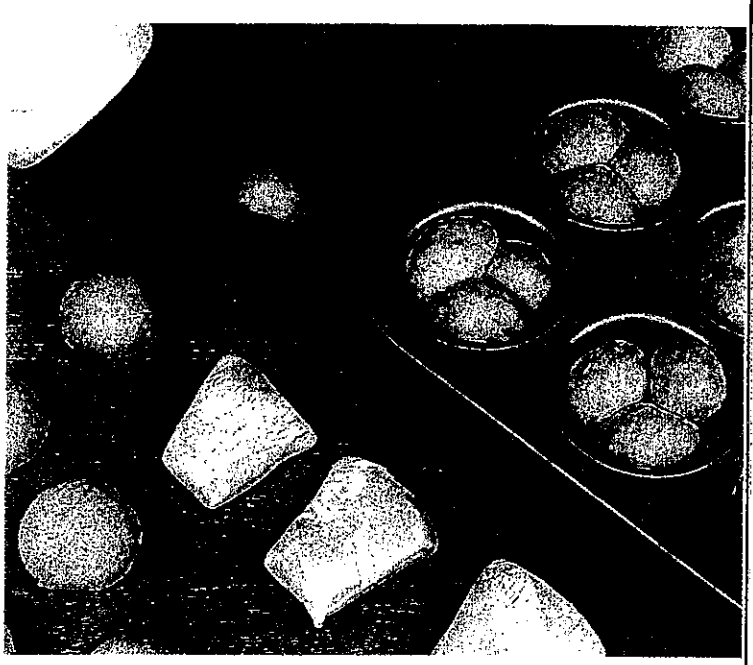


Fig. 28-13. A variety of rolls can be made by shaping dough, ranging from simple pan rolls to more elaborate Brioche, Parker house, clover leafs, and knots.

Panning Dough

Shaped dough is ready for **panning,** or placing in the correct type of pan. Some items should be shaped directly on the pan such as baguettes and hearth-style breads. Each formula specifies the size and type of pan to be used and indicates how the pan should be prepared. In general, perforated pans dusted with cornmeal are used for baking lean doughs. Sheet pans lined with parchment or lightly greased are used for soft medium doughs.

FINAL PROOFING

The final fermentation stage for regular yeast dough items is called final proofing. **Proofing** allows the leavening action of yeast to achieve its final strength before yeast cells are killed by hot oven temperatures. Yeast dough items are proofed once they have been shaped and panned.

Final proofing requires higher temperatures and humidity levels than fermentation—temperatures of 85°F–95°F and humidity levels of 80–90%. The use of a proofer is essential to maintain these conditions.

The length of the final proofing time depends on the type of dough. Most doughs are fully proofed when finger pressure leaves an indentation that closes slowly around the center but does not collapse. Fully proofed items are slightly less than double in size.

Proofing time is shortened for rich and sweet doughs. This is done to keep the weight of the heavier dough from collapsing during baking. Some other items, such as rye breads, are also deliberately underproofed. Underproofed dough is known as young dough. Overproofed dough—dough that has more than doubled in size during final proofing—is called old dough.

WASHING, SLASHING & DOCKING

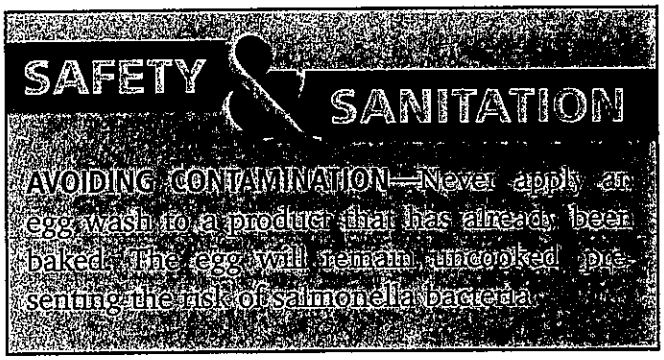
Many yeast dough products require special additional preparations before baking. These preparations, called washing, slashing, and docking, affect the baking quality and eye appeal of the finished items.

■ **Washing.** Applying a thin glaze of liquid to the dough's surface before baking is called adding a wash. Depending on the type of item and the wash used, washing can lighten or darken the crust's color, and make the surface shiny and glossy. See Fig. 28-14.

Apply the wash with a pastry brush, either before or after proofing. Check the formula for timing. If you apply the wash after proofing, be careful not to puncture the surface and deflate the dough. Use a small amount of wash for each item. Avoid puddling or dripping egg washes, which cause uneven browning. Excess washing can burn or cause items to stick to the pan.

Fig. 28-14.

DESIRED EFFECT	TYPE OF WASH
A crisp crust	Water
A glossy, firm crust	Egg white & water
A deep-colored, glossy crust	Whole egg & water
A deep-colored, soft, glossy crust	Whole egg & milk
A deep-colored, soft crust	Milk



■ **Slashing.** Making shallow cuts in the surface of the item, done just before baking, is called **slashing**. Slashing, also called stippling, helps gases escape from hard-crusted breads during baking. This allows for higher rising and the development of a more tender crumb. Improperly slashed breads will burst or break along the sides during baking. The patterns made by slashing, which leave a scarred or cross-hatched impression in the baked crust, also add visual appeal. See Fig. 28-15. To slash dough, follow these guidelines:

- Use both hands, steadying the item with one hand while you cut with the other.
- Use a utility blade; a sharp, unserrated knife; or a clean, sharp razor. Blunt or serrated edges bruise or tear the surface of the dough.
- Make shallow, slightly angled cuts, just under the surface of the dough.
- Make all cuts of equal length, overlapping cuts by one-third of their length.
- Make the slashes on the full surface of the dough in a symmetrical pattern.

■ **Docking.** The process of making small holes in the surface of an item before baking is called **docking**. Used primarily with rich doughs or rolled-in doughs, docking allows steam to escape and promotes even baking. Docking also keeps rich doughs from rising too much during baking. Follow the formula's directions for docking. Use a sharp-tined fork or a skewer to dock the dough.

BAKING YEAST DOUGH

Baking is the process that changes dough into breads or rolls through the application of heat. Oven temperature and baking time are determined by five factors.

■ **Dough type.** Young, underfermented doughs require cooler oven temperatures, higher humidity, and longer baking times than fully proofed doughs. Old, overfermented doughs require higher oven temperatures, less humidity, and shorter baking times.

■ **Dough richness.** Lean doughs require higher oven temperatures and shorter baking times. Rich doughs require lower oven temperatures and longer baking times.

■ **Portion size.** Smaller items, such as rolls, require shorter baking times than larger items, such as loaves.

■ **Desired color.** The desired color of the crust often depends on the tastes of the customer. Higher oven temperatures and longer baking

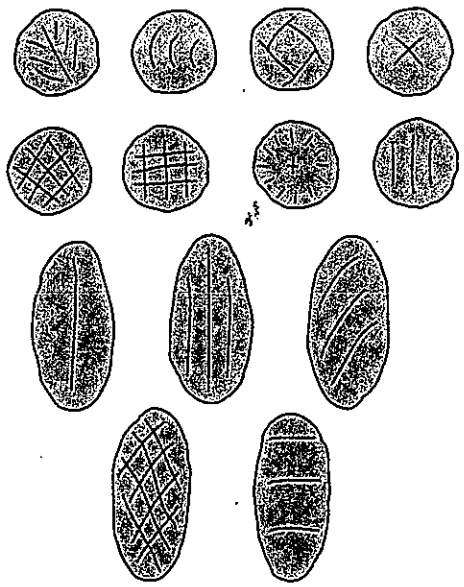


Fig. 28-15. Use a utility blade or sharp knife to make slashes. Why are many breads slashed before baking?

times generally yield a darker crust color than lower temperatures and shorter baking times. An egg wash can add color to a crust that must be baked at a low temperature or for a short time.

- **Weather.** Oven temperatures may need to be adjusted to compensate for less-than-ideal temperature and humidity conditions during dough preparation. Altitude (AL-tuh-tood), or the location of the baking site above sea level, affects baking, too. The moisture in dough evaporates more slowly at higher altitudes, such as those found in mountainous areas. Oven temperatures may be increased slightly to prevent the dough from expanding too much and breaking down the cell structure in the bread.

Formulas will list the ideal oven temperature and baking time. Slight adjustments may be necessary. Appropriate placement of pans in the oven is also important. Air and heat must be allowed to circulate freely around the pans. This can be accomplished by placing pans at the appropriate distance from the heating element. Crowding the oven slows baking time and results in unevenly baked items.

Baking with Steam

Breads with thin, crispy crusts, such as French and Italian loaves, benefit from the addition of steam to the oven during baking. The steam keeps the crumb soft while adding a glossy shine to the surface. As the sugars in the crust caramelize, a thin, crispy crust is formed. See Fig. 28-16.

Some bakery ovens are equipped to inject a desired amount of steam into the oven for several seconds depending on the type of bread and the formula. In ovens without steam injectors, a pan can be added with just enough water so the water evaporates during the early stages of baking.

Stages of Baking

As yeast dough products bake, their internal temperatures rise. Each of the four stages of the baking process contributes to the final product:

1. **Oven spring.** During the first five minutes of baking, the dough suddenly rises and expands as the yeast reacts to the heat of the oven. This final leavening effort, occurring before internal temperatures become hot enough to kill the yeast cells, is called **oven spring**. Steam injection helps achieve oven spring. Oven spring will not occur if there is too much salt or not enough yeast in the dough or if the dough was overproofed. At this early stage, the dough is very soft and will collapse if touched.

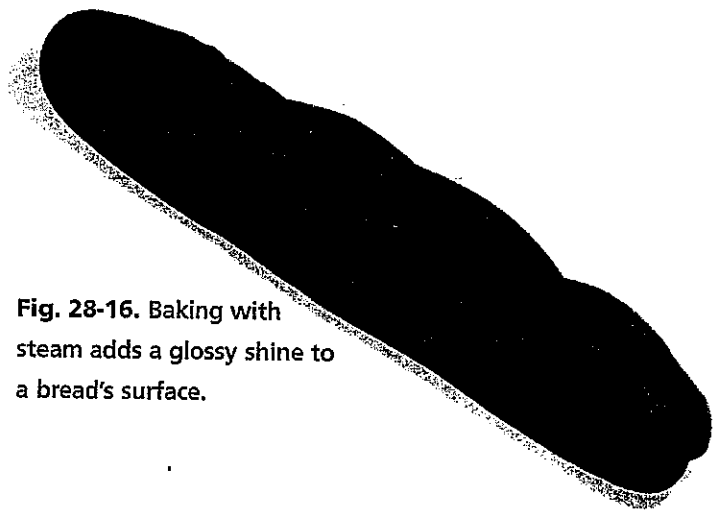


Fig. 28-16. Baking with steam adds a glossy shine to a bread's surface.

2. **Structure develops.** As the internal temperature rises from 130°F, starch granules in the dough begin to absorb moisture and swell up. At 150°F, the starches gel and become the final structure of the bread. At 165°F, the gluten begins to dry out and coagulate as the starch gel replaces it. The crumb is formed during this stage.
3. **Crust forms.** At 165°F, the crust begins to form as the starches and sugar on the surface of the dough brown and thicken. The product will appear done at this stage, but additional baking time is needed to evaporate the alcohol given off by the yeast. Yeast products removed from the oven too early will not taste right.
4. **Finished product.** By the time the internal temperature has reached 176°F, the alcohol will have evaporated. Finished products have an internal temperature of approximately 220°F.

Fig. 28-17.

PRODUCT FAILURE	POSSIBLE CAUSE
Poor shape	• Too much liquid in dough • Improper shaping of dough • Incorrect proofing • Too much steam in oven
Blisters on crust	• Too much liquid in dough • Improper fermentation
Top crust separates from the loaf	• Loaf poorly shaped • Top not slashed • Dough dried out during proofing • Lack of moisture in oven
Large holes in crumb	• Too much yeast • Overkneaded dough • Inadequate punching of dough
Poor flavor	• Improper fermentation • Inferior, spoiled, or rancid ingredients

Testing for Doneness

Appearance is not the best test for doneness. A better gauge of whether a product is done is the thump test. Tap the top of the loaf. If the loaf gives off a hollow sound, indicating that it is filled with air and not moisture, it's done. If the bottom of the loaf is damp or heavy, it probably requires additional baking. Watch rolls and small loaves carefully, as their bottom surfaces may burn before the crust color develops fully.

Another way to test for doneness is to look at the crust. If it is evenly brown on top and bottom, it's done. With practice, you will come to recognize the appropriate degree of browning and crust formation. Fig. 28-17 explains some causes of problems with yeast dough.

COOLING & STORING YEAST PRODUCTS

Once a yeast dough product is removed from the oven, it must be cooled and stored properly to maintain the highest possible quality.

- Remove yeast products from their pans immediately.
- Place them on cooling racks or screens at room temperature. One exception is rolls baked on sheets. These may be left on the sheets to cool, if they are well spaced.
- Cool yeast products completely before slicing or wrapping.

■ **Glazing.** In some cases, you will brush melted butter or shortening or a glaze onto a hot yeast dough product immediately after removing it from the oven. Sweet dough products such as coffee cake and Danish pastry may be glazed with a mixture of water and sugar or corn syrup while they are still warm.

■ **Staling prevention.** Yeast dough products begin the process of staling as soon as they are baked. Staling causes yeast dough products to

lose their freshness. During staling, the crust becomes moist and tough, while the interior crumb of the bread becomes dry and crumbly. Staling also causes breads to lose flavor. There are several procedures for slowing the staling process.

1. **Additions to dough.** Depending on the formula, ingredients such as malt syrup may be added to the dough at the mixing process to help slow staling. Commercial bakeries may also add chemicals such as monoglycerides (MAH-noh-glih-suh-ryds) and calcium propionate (PRO-pee-uh-nate) to lengthen shelf life.
2. **Adequate proofing.** Underproofed items stale more quickly than those that have received proper proofing.
3. **Avoid refrigeration.** Refrigeration speeds up the staling process of yeast breads.

■ **Proper packaging and storage.** Do not wrap products while they are still warm. Most breads should not be kept for more than one day in a foodservice operation. If you're keeping them longer than one day, wrap them tightly in moisture-proof wrapping and store them in a freezer to prevent staling. Wrap items with thin, crisp crusts, such as French baguettes, in paper. They will lose their characteristic crunchiness and become soggy if wrapped in plastic. Soft dough products can be packaged in paper or plastic. Sweet dough products can be packaged in a pastry box or wrapped in plastic. See Fig. 28-18.

SERVING BREADS & ROLLS

Yeast breads and rolls can be served at breakfast, lunch, or dinner. They can be part of or served with every course of a meal, from appetizers to salads to desserts.

A variety of spreads can be used with yeast breads and rolls. In addition to butter, other common spreads include cream cheese, flavored butter, jellies and jams, and olive oil.

Fig. 28-18. Properly wrapping and storing yeast products is essential for maintaining quality products.

Knowledge Check

1. List, in order, the stages involved in making regular yeast dough products.
2. Define fermentation and explain when it takes place.
3. Explain how to prevent staling in yeast doughs.

MINI LAB

Prepare the Soft Rolls formula on page 644. Follow the formula directions carefully. Serve and evaluate the rolls.

CHAPTER 28 Review & Activities

SECTION SUMMARIES

28-1 One characteristic of a quality yeast product is a texture that is full of tiny air holes.

28-1 Active dry yeast is one of three common types of yeast.

28-1 Yeast breads are made from dough, a mixture of flour, water, salt, yeast, and other ingredients.

28-1 Yeast dough products are generally classified according to the type of dough used to produce them.

28-1 Bagels, brioches, and croissants are examples of hard lean regular dough, sweet rich regular dough, and rolled-in fat yeast dough.

28-2 The straight-dough method is one of three proper methods used to produce yeast products.

28-2 The fermentation stage is reached after regular yeast dough has been kneaded thoroughly, either by hand or machine.

28-2 The common cause of failure in yeast bread production is often the lack of interaction between ingredients.

CHECK YOUR KNOWLEDGE

1. How are most yeast breads baked?
2. Describe the state of yeast at temperatures below 34°F and above 138°F.
3. Name the types of doughs that produce a hamburger bun, a Kaiser roll, and cinnamon raisin bread.
4. Explain the sponge method and its use.
5. What are the benefits of thoroughly mixing the yeast dough?
6. Explain what occurs in each stage of kneading dough with a commercial mixer.
7. Describe the let down stage. When does it occur?
8. Name two ingredients used as washes. What purpose do they serve?

CRITICAL-THINKING ACTIVITIES

1. Suppose that one of your bakery customers is following a low-fat diet. He is deciding between Italian bread, Parker House rolls, and croissants. Which of these do you think best matches his dietary needs? Explain your answer.
2. You have a basic formula for white yeast bread. What could you do to make the final product more flavorful?

WORKPLACE KNOW-HOW

Communications. Your catering team is preparing Danish pastries for a corporate breakfast meeting. You want each Danish pastry to be tender, flaky, and delicious. How will you communicate this to your team? What techniques will you emphasize to achieve these results?

LAB-BASED ACTIVITY: Baking Brioche

STEP 1 In teams, review the formula for Brioche. Note the necessary ingredients and equipment that will be used.

STEP 2 Assign each team member a task and produce the baked product.

STEP 3 As you prepare the dough, note your team's observations to the following:

- What type of yeast was used? What is the optimal temperature for the yeast?
- What was the texture of the dough? How did it feel?
- Which mixing method was used?
- What bread-making stages were followed? What were your observations at each stage?
- How did you test for doneness?
- What are the characteristics of the end product?

STEP 4 Have a contest to determine which team produced the best Brioche. Evaluate each team's bread using the following categories:

- Shape.
- Volume.
- Crumb.
- Crust.
- Color.
- Tenderness.
- Taste.

Rate each category using the following scale:

1 = Poor; 2 = Fair; 3 = Good; 4 = Great

Brioche

YIELD: 10 LBS., 5 OZ. SERVING SIZE: 2 OZ.

INGREDIENTS

3 oz.	Yeast, compressed
1 lb.	Milk, whole
2 lbs.	Eggs, whole
1 lb., 2 oz.	Flour, pastry
3 lbs., 6 oz.	Flour, bread
5 oz.	Sugar, granulated
1 oz.	Salt
2 lbs., 4 oz.	Butter, unsalted, soft

METHOD OF PREPARATION:

1. Gather equipment and scale the ingredients.
2. Dissolve the yeast in the milk and eggs in a 5-qt. mixing bowl.
3. Add all of the dry ingredients to the yeast, milk, and egg mixture; mix on medium speed for 5 minutes.
4. Slice the butter into ½-in. pieces; incorporate into dough on medium speed for 2 minutes.
5. Refrigerate overnight on a floured surface. Cover with a damp cloth, and seal in a plastic bag.
6. On the next day, remove the dough from the refrigerator.
7. Scale into 2-oz. portions.
8. Mold the dough and place in lightly-greased brioche pans.
9. Proof the dough.
10. Brush the dough with an egg wash just before baking.
11. Bake at 375°F for approximately 20 minutes, or until brown on all sides.