

17.2

Yeast Dough

READING PREVIEW

Key Concepts

- Identifying basic types of yeast dough
- Understanding the straight dough-mixing method
- Modifying the straight dough-mixing method

Vocabulary

- biga
- brioche
- challah
- chlorine dioxide
- dough starter
- enriched dough
- fermentation
- gluten window test
- hard dough
- hot cross bun
- kuchen
- kugelhopf
- laminated yeast dough
- lean dough
- medium dough
- modified straight dough-mixing method
- pan de muertos
- pâte fermentée
- pickup
- poolish
- pre-ferment
- rolled-in yeast dough
- scaling
- soft dough
- sourdough
- sponge
- stollen
- straight dough-mixing method
- sweet rich dough
- yeast hydration

Basic Types of Yeast Dough

Yeast dough is the blank canvas of baking. You can make it plain or add different ingredients to create a variety of products such as bread and cakes. Master the art of basic yeast dough techniques and the sky's the limit.

Lean Dough *Lean dough* (also called **hard dough**) is the most basic type of yeast dough. Only the bare essentials—flour, yeast, salt, and water—are used to make it. Spices, herbs, dried nuts, and fruit may be added, but very little (if any) sugar and fat is included.

Pizza crust, hard rolls, Italian-style bread, and the slender French baguette, with its chewy texture and hard crust, are classic examples of products made with lean dough. Whole-wheat, rye, pumpernickel, and sourdough breads are also variations of lean dough. The coarse flour used in these breads makes for a denser texture.

Lean dough can be difficult to handle because little or no fat is used. Commercial bakeries sometimes use chemical dough conditioners such as **chlorine dioxide** (klor-EEN die-OX-ide) to produce a more stable dough, increase loaf volume, and prevent the loss of leavening.

A pizza crust is made from a lean dough that is stretched or rolled until it is thin. There are several options for shaping



Source: Culinary Institute of America



FIGURE 17-14

Lean Dough

French baguettes, pumpernickel, and rolls.

CLASSIFYING *What percentage of the yeast bread and pastry you eat is made from lean dough?*

Source: © 1506965/Fotolia



Chef's Tip

Sweet Nothing

Added fat and sugar make enriched dough moist and soft. Be very sparing with extra flour on the work surface or in shaping the dough because too much flour can toughen the finished product.

the dough once it is properly fermented. You may simply stretch it out by pulling on the edges of the dough. Or you can use a rolling pin to stretch it out. The most entertaining approach calls for the dough to be draped over your fist and repeatedly spun off your fists and into the air. Each time you toss and catch the dough, it stretches a bit more.

Soft Dough The soft slices of Pullman bread, which is typically used for sandwiches, are made with **soft dough** (also called **medium dough**). It is lean dough with sugar and fat added. The amounts of fat and sugar vary from 6 percent to 9 percent.

As you know from Section 11.1, Pullman slices get their square shape from the covered loaf pans in which the loaves are baked. You can also use soft dough to make soft rolls that you can shape into knots or cloverleaf balls. Fat and sugar help make soft dough tender when it's baked and give it a soft crust.

Enriched Dough When lean dough is enriched with butter, oil, sugar, eggs, or milk products, it becomes **enriched dough** (also called **sweet rich dough**). Enriched dough has fat and sugar amounts up to 25 percent, making the dough sweet and rich. The addition of fat and other ingredients changes the texture of the dough, making it softer and a bit more difficult to handle. It also slows down the yeast activity and requires more time for the dough to ferment.

Eggs and butter not only tenderize, but they also create a soft crust and a golden color. The percentage of eggs is important because too many eggs will result in heavy dough. The finished product should have a cakelike texture.

Enriched dough is used around the world to create some of the best-loved yeast breads, cakes, and rolls, including the following:

- **Cinnamon Buns.** Sugar and cinnamon are spread on sweet dough that is rolled and then sliced before baking to make cinnamon buns. Raisins are sometimes added to the dough. Drizzled with icing and served warm, these comforting confections have become an American standard.
- **Hot Cross Buns.** A signature cross made of icing tops a **hot cross bun**. These sweet yeast buns originated in England and were traditionally served on Good Friday. They are popular for Easter breakfast, too.
- **Braided Easter Egg Bread.** Sweet bread is braided around colored Easter eggs for this holiday bread.
- **Pan de Muertos.** A Mexican holiday bread, **pan de muertos** (PAHN de MOO-er-tohs, bread of the dead) is a sweet bread, flavored with orange zest, orange juice, and anise seeds, that is traditionally baked around the Day of the Dead. The bread is often decorated with bone-shaped pieces of dough.



FIGURE 17-15

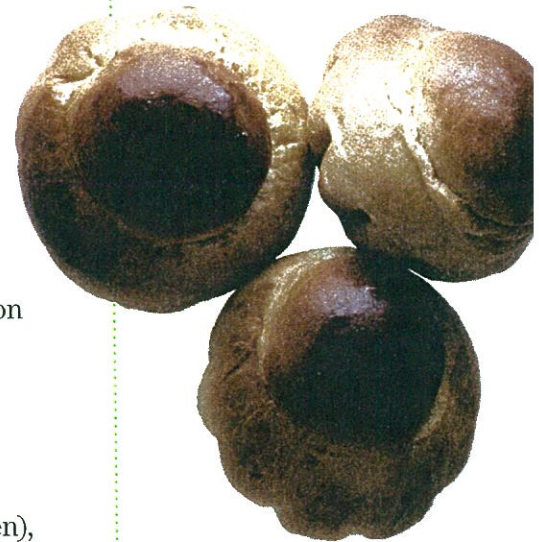
Uses of Enriched Dough

All of these baked goods were made using enriched dough.

APPLYING CONCEPTS How would you use these compared to breads made from lean dough?

Source: Jag_cz/Fotolia

- **Brioche.** A rich French bread, **brioche** (BREE-ohsh) often has a knotted top and is made in individual molds with a fluted base. It can also be made into round loaves or rolls. Brioche dough is used as a crust to wrap cheese, sausage, and other food.
- **Challah.** A sweet and airy bread made with lots of eggs, **challah** (HAL-la) is a Jewish bread that is usually braided. Traditionally served on the Sabbath and holidays, this bread is a treat on any occasion.
- **Stollen.** The traditional Christmas bread of Germany, **stollen** (STOH-len) is a sweet, loaf-shaped yeast bread that is filled with dried fruit and topped with icing and cherries.
- **Kuchen.** Another German original, the popular **kuchen** (KOO-ken), a sweet, yeast-raised cake filled with fruit or cheese, has spread throughout Europe and the United States. Kuchen can be served for breakfast, teatime, or dessert.
- **Kugelhopf.** A light yeast cake filled with candied fruit, nuts, and raisins, **kugelhopf** (KOO-guhl-hof) is usually baked in a fluted ring mold. A tradition of Austria, kugelhopf is also associated with Poland, Alsace, and Germany.



Brioche

Source: Neil Mersh/Dorling Kindersley



READING CHECKPOINT

What are the basic types of yeast dough?

Straight Dough-Mixing Method

The simplest and most common way of mixing yeast dough is called the **straight dough-mixing method**. In this method, you mix all the ingredients for the dough together at the same time. When the ingredients are

mixed, either by hand or in a mixer, the yeast starts to develop immediately. Although the process is not difficult, you must pay attention to the following details.

Scaling Ingredients The most accurate way to measure ingredients is to weigh them. When liquids and solids are weighed, it is called **scaling**. (Some recipes may instruct you to measure liquids, such as milk and water, with a volume measure.)

Precise measurement is important, because ingredients interact together. Inaccurate measurements in baking alter the balance of ingredients and affect the finished product. For example, the amount of yeast in a recipe is the exact amount needed to raise the dough. Adding too much egg, flour, or other ingredients to the dough interferes with the yeast development. Baker's formulas—in which basic ingredients are listed as percentages, or parts, based on the weight of the flour—are often used for yeast dough.

CULINARY SCIENCE

The 240 Factor

The temperature of the air can warm an icy beverage. The friction created by rubbing your knee on a rug can feel like a burn. In the same way, the temperature of the air around dough, as well as friction created by mixing it, affects the dough's temperature.

The temperature of ingredients used to make dough has a direct impact on the temperature of the dough. For example, if you drop a handful of room-temperature raspberries into a chilled glass of lemonade, they will warm the lemonade a bit. Likewise, if you use cold eggs or warm flour, it will affect the desired dough temperature (or DDT, for short). The DDT for yeast dough is typically around 80°F.

The faster you mix dough, the greater the friction created by the beaters and the warmer it makes the dough. It is difficult to control the heat generated by beating. It is also difficult to control the room temperature and the temperature of some of the ingredients. But you *can* control the temperature of the water you use.

There is a simple, three-step scientific formula, sometimes called *the 240 factor*, for producing the DDT of a yeast dough, based exclusively on

controlling the temperature of the water used in the dough:

1. Multiply the desired dough temperature by 3. (Remember, the DDT = 80°F.)

$$80 \times 3 = 240$$

2. Then, add together the current temperature of the flour, the room, and friction (with average friction = 30°F).

$$\begin{aligned} \text{Flour} &= 50^\circ\text{F}, \text{ room} = 68^\circ\text{F}, \text{ and friction} = 30^\circ\text{F} \\ \text{Total} &= 148^\circ\text{F} \end{aligned}$$

3. Subtract the total from 240. The answer is the ideal water temperature.

$$240 - 148 = 92$$

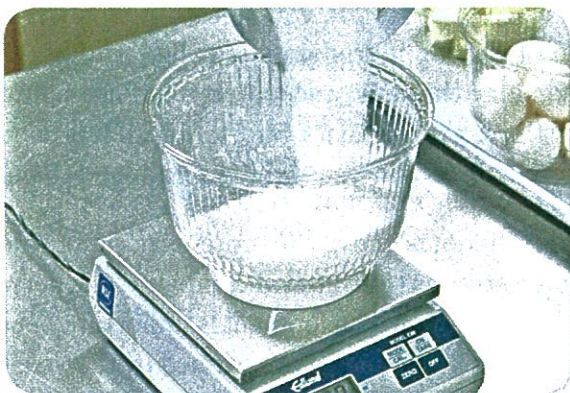
The ideal water temperature is 92°F.

Computation

Based on your kitchen's temperature and the temperature of flour in your kitchen, calculate the temperature of the water you should use in making a bread dough.

Straight Dough-Mixing Method

- 1 **Scaling the ingredients.** The ingredients are precisely weighed.



Source: Culinary Institute of America

- 2 **Hydrating the yeast.** The yeast is activated when combined with water.



Source: Culinary Institute of America

- 3 **Pickup stage.** All other ingredients are added at once with the mixer on a slow speed.



Source: Culinary Institute of America

- 4 **Gluten development and kneading.** Increase the mixer speed to medium until the dough begins to catch on the dough hook. Properly kneaded dough is satiny and

forms a ball in the mixing bowl. If a small piece is stretched thin, it holds together without breaking (gluten window test).



Source: Culinary Institute of America

- 5 **Bulk fermentation.** The dough will double or triple in size as the yeast ferments.



Source: Culinary Institute of America

- 6 **Folding the dough.** Folding and pushing down the dough releases its carbon dioxide.



Source: Culinary Institute of America

Yeast Hydration Yeast is an organic leavener, which means it is alive but resting or dormant until it is moistened. The soaking process that activates yeast is called **yeast hydration**. When mixed with a liquid, the cells start to work.

Pickup The first stage of mixing ingredients is called **pickup**. Set the mixer at a low speed to combine the yeast and water. Oil, if it is being used, is added next, followed by the dry ingredients. Shortening, if it is used, goes in last. After everything is combined, increase the mixer speed to medium.

Gluten Development Gluten is one of the proteins in flour. Kneading dough causes a web of gluten strands to stretch and expand. The network of elastic strands that form during gluten development is important because it enables dough to hold in the gas bubbles that are formed by the yeast without breaking through the dough. The gas bubbles cause the dough to rise.

Dough that has been properly kneaded is shiny and elastic. To test the strength of the gluten and be sure it is properly developed, you can pinch off a piece of the dough and pull it. It should be stretchy without tearing, and when you hold it up to the light, it should be thin enough for some light to come through. This is called the **gluten window test**.

Bulk Fermentation The organisms in hydrated yeast produce carbon dioxide and alcohol as a by-product when they have moisture and a food source and are at the right temperature. This is called **fermentation** and it makes the dough rise until double or triple in size. Bread made from underfermented dough that hasn't risen enough will be flat, while bread made from overfermented dough will have a yeasty, sour taste.

The surface of the dough should be oiled so it won't dry out during fermentation. The container should also be oiled so the dough won't stick to the sides. Cover the dough with plastic wrap or a clean cloth and leave it to rise in a warm area until the rising is completed.

Folding Dough After the rising is complete, the dough is folded over and turned onto a floured work surface. The dough is continuously folded over on itself to get rid of any more gases. Each piece is gently pushed down a few times to release the carbon dioxide that formed during fermentation. This process helps distribute the yeast evenly. In addition, folding helps create a uniform overall temperature by folding the cooler, outside dough into the warmer center.

The dough is then scaled into pieces for size consistency and baked.

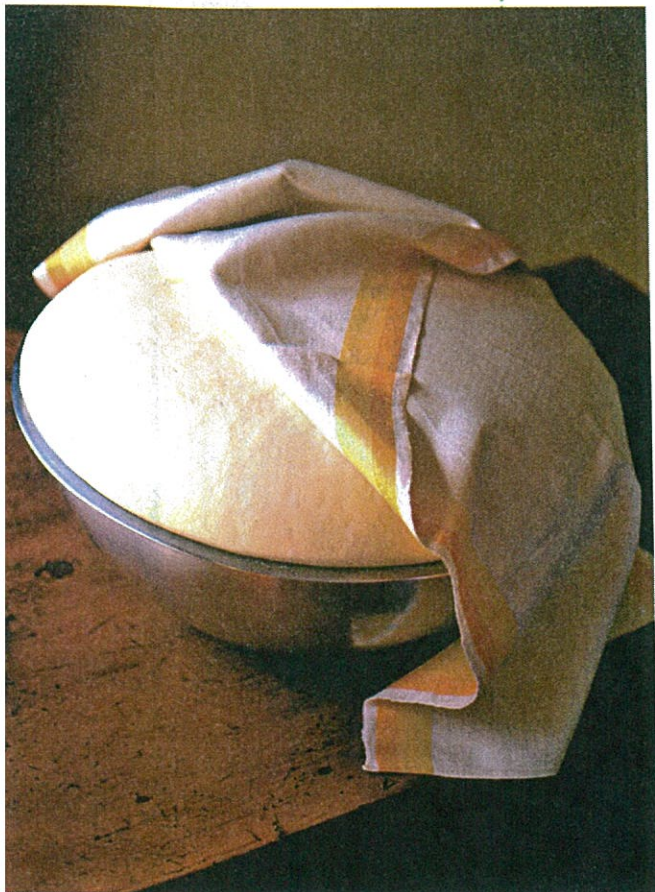
FIGURE 17-16

Bulk Fermentation

The dough doubles or triples in size during bulk fermentation.

APPLYING CONCEPTS *Would the dough rise as much if the temperature were lower?*

Source: Culinary Institute of America



READING CHECKPOINT

Describe the straight mixing method for yeast dough.

Pizza Dough

- 1 Hydrate the yeast in water.
- 2 Add the flour and salt and mix at a low speed until the dough is evenly moistened. (This is the pickup stage.)
- 3 Mix and knead the dough by hand on a floured surface or on medium speed in a mixer until the dough is very smooth and springy to the touch.
- 4 Make a gluten window to test the dough.
- 5 Transfer the dough to an oiled bowl, oil the surface lightly, and cover.
- 6 Bulk-ferment the dough until it doubles in size and the dough retains an imprint when pressed with a gloved fingertip.
- 7 Fold the dough over on itself in several places. The dough is ready to shape into pizza crust at this point.

Recipe Card

119. Pizza Dough

Modifying the Basic Method

Rather than adding all the ingredients at once, the **modified straight dough-mixing method** adds ingredients in steps. This method provides better distribution for fat and sugar and is particularly useful for enriched dough.

Enriched Yeast Dough Enriched yeast dough may call for modifications to the basic straight dough-mixing method. One simple change is to use milk in place of the water used in a lean dough. Once the dough is mixed, it may be softer and stickier than regular lean dough.

Very rich dough may need to be kept cool, even during bulk fermentation, so the extra butter stays in the dough rather than melting and separating out of the dough. This requires that ingredients are mixed in a specific order:

1. Hydrate the yeast and add the flour.
2. Add liquid ingredients (milk, cream, eggs, oils, or melted butter) and sweeteners (honey, sugar, or maple syrup).
3. Mix the dough until all the flour is evenly moistened.
4. Add additional butter (room temperature or softened) gradually (if the formula calls for it) until evenly blended.
5. Continue to mix and knead the dough until it is properly developed.

Sponge Mixing Method The sponge method combines one-third to one-half of the formula's total liquid with all the yeast and enough flour to make a very loose dough. This dough is called a **sponge**. A sponge is usually mixed in the same bowl you will use to prepare the entire batch of dough. When the sponge has doubled in size, the remaining ingredients are added to the sponge and mixed to make a dough. Breads made with a sponge have a richer, deeper flavor and an improved texture.



Pre-Ferments A **pre-ferment**, also called a **dough starter**, is similar to a sponge. Some or all the yeast is mixed with water and some flour to create the pre-ferment. This is allowed to ferment for a specific time and is then added to the dough before its final mixing. The pre-ferment increases the fermentation time, which increases the strength of the gluten in the dough. This adds depth and complexity to the flavor while also extending the shelf life of the bread.

If you want to make a pre-ferment for a dough that does not specify one in the formula, you need to subtract the amount of flour, water, and yeast in the pre-ferment from the total flour, water, and yeast in the formula.

There are several types of pre-ferments. Each has a different flavor and is used for different breads. The following are some common examples:

- **Poolish.** Combining equal parts of flour and water (by weight) with some yeast, a **poolish** (poo-LEESH) is then allowed to ferment. The actual amount of yeast varies, depending on how long the poolish will be allowed to ferment. Use less yeast for a long, slow fermentation. A poolish is fermented at room temperature until it doubles in volume and then begins to get smaller (anywhere from 3 to 15 hours). The poolish is added to the rest of the ingredients during mixing.
- **Biga.** The process for making a **biga** (BEE-gah), an Italian pre-ferment, is similar to that for making a poolish, but a biga is stiffer because it contains less water. A biga usually calls for about one-third to one-half the total amount of yeast called for in the formula. Bigas, like poolish, are allowed to ferment from 3 to 15 hours at room temperature. Before you can add the biga to the rest of the dough, however, you need to loosen it by adding the additional water required by the formula.
- **Sourdough.** With a tangy, slightly sour flavor, **sourdough** pre-ferment is made from wild yeast. The difference between sourdough and most other pre-ferments is that sourdough starter can be kept alive a long time, sometimes hundreds of years.
- **Pâte Fermentée.** A French term that literally means “old dough,” **pâte fermentée** (PAHT fer-mahn-TAY) is a piece of dough saved from one batch and added to a new batch along with the flour, yeast, and liquid. Wrap the *pâte fermentée* airtight and you can save it in the refrigerator for 48 hours or in the freezer up to 3 months.

FIGURE 17-17

Sponge

An overhead view of a developed sponge in the mixing bowl.

ANALYZING INFORMATION How can you tell when sponge dough is developed?

Source: Culinary Institute of America



Sourdough bread

Source: emf_images/Fotolia



Danish

Source: Miro/Fotolia

Rolled-In Dough Fat can be used to add flavor to any type of yeast dough. When fat is rolled in or folded into dough (as opposed to being mixed into the dough itself), it adds flakiness. Buttery yeast pastries, such as the classic Danish and croissants, get their feathery flakiness from folding the dough into many thin layers with butter layers in between. The process of rolling in and folding in fat creates layers of dough called **rolled-in yeast dough**. It is also known as **laminated yeast dough** because it is made up

of alternating layers of dough and fat (and under a microscope would look like plywood, with all its layers).

The fat layers produce steam in the oven, creating lightness by puffing up the thin dough layers. The dough is rolled into a rectangle, layered with chilled butter, and folded into thirds, like a letter. The process is then repeated. The added handling of rolling and folding means that you should not knead the dough as much as regular yeast dough. Overhandling a laminated yeast dough can ruin the finished product, making it tough and chewy.

The final rolled-in dough is then refrigerated to chill the fat again. This dough keeps well in the refrigerator for several days.

Yeast-Bread Garnishes Yeast-bread garnishes are ingredients that stay separate from the dough's structure while maintaining a distinctive flavor. Some garnishes are mixed into the dough before the dough rises. For example, black olives and cranberries are added to bread dough before it rises. Blueberries and chocolate chips are garnishes added to pastries before the dough rises. Other garnishes are added after the dough has risen, as with filled croissants. The dough is folded or rolled around the garnish.

Garnishes can add crunch and flavor to dough, but they can also add extra weight. More yeast may be required, depending on the quantity of filling that will be added. It is important to consult your recipe for the precise ratio of garnish to the flour in the recipe.



READING
CHECKPOINT

What is a pre-ferment?

17.2 ASSESSMENT

Reviewing Concepts

1. What are the basic types of yeast dough?
2. What are the basic steps in the straight dough-mixing method?
3. What is a pre-ferment?

Critical Thinking

4. **Comparing/Contrasting** What do both soft dough and enriched dough have that lean dough doesn't?
5. **Predicting** Why is the final product of enriched dough often yellow, whereas lean dough is never yellow?
6. **Comparing/Contrasting** What is the difference between the modified straight dough-mixing method and the basic straight dough-mixing method?

Test Kitchen

Divide into two teams. One team will prepare a bread recipe, using active dry yeast. The other team will prepare the same recipe, using instant yeast. All other ingredients should be identical and the measured amounts should be identical. Compare the results.

CULINARY MATH

Substituting Yeast

To substitute instant yeast for active dry yeast, use $\frac{2}{3}$ the weight of the active dry yeast for the instant yeast. For example, 1 teaspoon of active dry yeast = $\frac{2}{3}$ teaspoon of instant yeast. If a recipe calls for 3 teaspoons of active dry yeast, how much instant yeast would you substitute for it?

Recipe Card

120. Focaccia

Chef's Tip

Sweet Something

When fruit is added to yeast dough, it releases some sugar into the dough. This could slow the bread's rise. The finer the fruit is chopped, the more likely it is to release sugar, altering the dough's sugar ratio.

