– Chapter 5 –
Dough Management

Due to fermentation, yeast dough has a life cycle. Dough is born in the mixer and enters childhood or early development as it comes from the mixer. At which time it's undeveloped and shouldn't be used. If allowed to undergo fermentation it eventually rises to peak development, at which time it should be used. If not made into a pizza it proceeds past middle age and into over-development. And if never used, it eventually collapses and dies. To have dough at peak condition, or optimal rise, you must manage the rate of fermentation. This chapter describes how to do that.

> Lengths, weights, temperatures, and volume measurements are given in inches, pounds and ounces, degrees Fahrenheit, and quarts and cups (U.S. version). The following abbreviations are used: **lb** = pounds, **oz** = ounces, **F** = Fahrenheit, and **qt** = quarts. For conversion to other measurement systems, refer to the chapter on Measurements and Conversions.

Proper Dough Rise

Proper rise is a key ingredient to quality pizza. PROPERLY RISEN DOUGH produces a crust of maximum volume, even grain, white crumb, golden-brown surface, and full-bodied yeast bread flavor. UNDER-RISEN DOUGH makes a crust that's flat with a tight, dense grain and bland, biscuity flavor. During baking it tends to split like pita bread, creating large, flat bubbles. OVER-RISEN DOUGH, which often has a beer-like odor, makes a flat crust with an irregular grain, a gummy-grayish crumb, a white (non-browned) surface that tends to blister, and bland flavor. If the dough hasn't collapsed before baking it often produces small bubbles that burn and turn black in the oven.

Dough rising results from *fermentation* — a process whereby yeast digests sugar and produces CO_2 (carbon dioxide) gas in the dough. The gas collects in minute air cells and, as fermentation progresses, expands the cells, which causes the dough to rise or increase in volume. For more details on fermentation, see the section on Yeast in the Dough Ingredients chapter.

The period during which dough is allowed to rise is called the proofing period, or, simply, *proofing*. Dough that has undergone this period is said to be *proofed*. Dough that is lacking in proofing time will be under-risen — and, as such, is called under-proofed. Dough that has had too much proofing time will be over-risen — and is called over-proofed.

In a pizzeria, dough can be proofed in two forms: (1) as a dough ball and (2) rolled-out. Hearth-baked pizzas and most screen pizzas are proofed as a dough ball. Pan pizza dough is usually proofed after it's rolled-out and has been placed in the pan.

Dough is properly risen or proofed when it's about double the volume of when it came from the mixer. For a dough ball in a tray, that amounts to about a 50 percent increase in diameter. In terms of rolled dough, it is a doubling of height (although some pizzerias allow it to almost triple in height). *Under-risen* dough is tight and springy, and when gently poked the indentation tends to spring back. *Over-risen* dough is loose and has a ripply surface caused by large air cells. If not exposed to air it will be wet or tacky, too. When poked it loses gas and collapses. If it has already collapsed or smells like beer, it's severely over-risen and should not be used. *Properly risen dough* will hold an indentation when gently poked but won't lose gas and collapse.

To achieve proper rise the rate of fermentation must be controlled by the pizza-maker. If not, either under-risen or over-risen dough will likely result.

Managing Dough Temperature

The section on Yeast in the Dough Ingredients chapter details the factors affecting dough's fermentation rate. It might be worth reviewing. Most of the factors involve the composition of the dough. However, one factor — namely, temperature — affects fermentation after mixing. The higher the dough's temperature, the faster the rise (up to 100 degrees F). The rule is: For every 18 degrees F (or 10 degrees C) increase in dough temperature (up to 100 degrees F), yeast activity doubles, or increases by 100 percent. So, for example, 88 degree F dough will have double the fermentation rate of 70 degree F dough; and 70 degree dough will rise twice as fast as 52 degree dough.

The process of managing dough temperature during proofing and, in the case of retarded dough, during refrigerated storage, is called *dough management*. The main principle of dough management is: *The less time the dough is at 40 degrees F or above, the slower the rising process will be.* Basically, dough management involves either cooling or warming the dough so that fermentation is either slowed down (retarded) or speeded-up. The manager must decide what is needed. We will describe the various options.

How to Retard Dough Rising

Fermentation, or rate of rise, is slowest at 33 degrees F. As temperature increases, fermentation accelerates, up to 100 degrees F, after which it begins to slow down until it reaches 140 degrees, when the yeast dies. So to retard dough rising we must decrease the time at which dough is above 40 degrees F.

We must point out that dough continues to rise at any temperature above 32 degrees F. So, eventually even refrigerated dough, if not used, will become over-risen. The only way to stop dough from rising is to freeze it. Unfortunately the freezing technology employed in most pizzerias often results in poor quality dough. Plus, proper freezer equipment is costly.

If you find it necessary to slow down your dough's rate of rising, here's some things to try.

A basic way to retard dough rising is to bring dough from the mixer at a colder temperature. The colder the dough, the slower the rate of fermentation. The fastest fermentation rate occurs in 90 to 100 degrees F dough. To lower dough temperature use colder dough water — say, 55 degrees or lower. To get very cold water, use ice; but remove the ice before adding the water to the mixer. Just a 10 degree drop in dough temperature will slow down fermentation substantially.

Refrigerate the dough sooner after mixing. The longer that dough sits at room temperature after mixing, the faster it undergoes fermentation. To reduce the rate of fermentation, move the dough into the cooler sooner.

With bulk dough, divide it into smaller pieces. The larger a piece of dough is, the longer it takes to cool down (and warm up). If you're using the bulk dough method, try storing the dough in smaller pieces if you need to cool it faster.

Lower the refrigerator temperature. Place a separate thermometer in your refrigerator and check the temperature. If it's above 38 degrees F, you might try lowering the temperature to about 34 degrees.

Keep the walk-in refrigerator door closed as much as possible. In some cases the walk-in's temperature is set low enough, but the door is left open so often the temperature hovers at 50 to 60 degrees F. In this case it takes an hour or more for the cooler temp to drop back to normal. A plastic freezer curtain can help retain the cold. However, you must still manage the situation because the same people who prop open the door will often tie up the curtain to one side.

Allow full air flow around dough trays. To ensure a rapid drop in dough temperature the cold air in a cooler must be able to circulate completely around the trays. Keep at least a 3-inch gap between the stacks of trays and also between the trays and cooler wall. After the dough has dropped to 40 degrees F the stacks can be moved closer together. Don't set dough trays on the floor — a dolly or pallet allows better air flow.

Cross-stack dough trays in the cooler for about an hour before nesting them together. If they're nested immediately after going into the cooler it takes a long time for dough temperature to drop. After 1 to 1-1/2 hours the trays must be nested to prevent crusting.

The potential drawback to cross-stacking is that a slight crust forms on the dough balls. The degree of crusting depends on the humidity and altitude. The lower the humidity and higher the altitude, the greater the crusting. Normally, if the trays are nested in 60 to 90 minutes the crust will disappear in about eight hours as the dough undergoes slow fermentation.

How to Speed-up Dough Rising

If your dough isn't rising fast enough you need to keep it at warmer temperature for a longer time. Here's some things to try for speeding up fermentation.

Use warmer water for dough mixing. To create the quickest rate of fermentation, bring dough from the mixer at about 90 to 100 degrees F.

Let the dough bench rest for a longer time before putting it into the cooler. The longer dough is at room temperature, the faster is fermentation. You can let bulk

dough or dough balls sit at room temperature before chilling them — if, indeed, you chill them at all.

Remove dough balls from the cooler and let them sit at room temperature before using them. If you use retarded dough, bring the dough balls from the cooler several hours before using them. The exact amount of time will depend on the air temperature and how much they've already risen.

Put dough balls or rolled dough into a proof box, or at a warmer spot in the store. Faster fermentation can be achieved by putting dough balls or rolled (panned) dough at a warm spot in the store, such as in the sunlight, next to an oven, or under a heat vent. To speed up warming of dough balls in trays, criss-cross the dough trays at room temperature for 10 to 20 minutes.

For many pizzerias one or more of these methods is good enough. However, for more uniform temperature control, try a proof box. This has the advantage of high humidity, which prevents dough crusting. A proof box can be set for optimum conditions, or 100 to 110 degrees F and 80 to 85 percent humidity, which will produce a full rise in 30 to 60 minutes.

There are other ways to quick-proof a tray or two of dough in an emergency. One way is to put it on top of a pizza box on top of a hot oven. Another way is to fill a tray with warm (120 to 130 degree) water and set the tray of dough on top of it. If you must speed-proof a number of trays, criss-cross a stack of trays with a tray of hot water inserted every two trays (see diagram below).