

## GETTING A *Rise*

The original pound cake recipe tested in last issue produces a cake that is a little too dense and tastes a bit flat. **Eileen Gray** explores how the addition of salt and chemical leavening can improve the results.



## CAP

The previous Sweet Science column began the process of taking apart and examining the original pound cake recipe. The first step, before altering the formula, was to consider the mixing method for the pound cake; traditional creaming versus reverse creaming. In order to focus solely on mixing technique, the testing for the first article adhered strictly to the traditional “quatre-quarts” recipe of equal parts butter, sugar, flour and eggs. After extensive testing, the reverse creaming method produced a noticeably softer and more tender cake.

Neither salt nor leavening are part of the basic pound cake formula, but even when used in very small measure, these two ingredients will have a major impact on both the flavor and the texture of the cake.

### Elemental Salt

Virtually every dish that comes out of the kitchen has salt added. Since it’s so commonplace, do we even need to examine salt as an ingredient? Can’t we just take for granted that we should add a little salt to every recipe without considering the effect? Well, no.

Before going any further, we need to consider the kinds of salt available. Table salt, sea salt and kosher salt can all be used for baking. But the volume varies between types and

brands of salt. For example, 1 teaspoon of table salt is equal by weight to 1-1/2 to 2 teaspoons of kosher salt, depending on the brand. A 1/2 teaspoon less or more of salt may not make much difference in a pot of soup, but it does make a great deal of difference in a cake batter. If you swap out the type of salt listed in a recipe you’ll need to weigh your ingredients to be sure you’re adding the same amount of salt. My testing proved that, for our pound cake recipe, a little salt goes a long way.

Whichever type of salt is used, it directly influences flavor in a surprisingly complex way. Adding a hint of salt to the batter won’t give the cake a salty flavor; rather, salt reduces bitterness and allows sweetness to come forward, producing a more well-rounded flavor.

Salt is not only a flavor enhancer. It also affects the tenderness of a baked good. Salt molecules form strong bonds with flour proteins, causing the gluten molecules to become less mobile, which, in turn, makes the batter tighter and more elastic. This is a desirable trait in a bread dough, but is definitely not desirable in a cake batter.

I baked several cakes to test how salt changes the pound cake’s flavor and texture. All the cakes were made with room temperature ingredients and were baked in identical 9x5 loaf pans at 325°F in a convection oven.



Want to know more about salt and some of the variations Eileen tried not included in this article? Go to [ACD+ at AmericanCakeDecorating.com](http://ACD+atAmericanCakeDecorating.com).

As a control, I first baked a pound cake using only the four original ingredients and the reverse creaming method. Consistent with previous tests, the cake was fairly dense with a soft tender crumb and a slightly flat taste.

The cake on the left was made with no salt and the cake on the right was made with 1/2 teaspoon of salt. You can see how the addition of just a little salt changed the height of the cake and the texture of the crumb.



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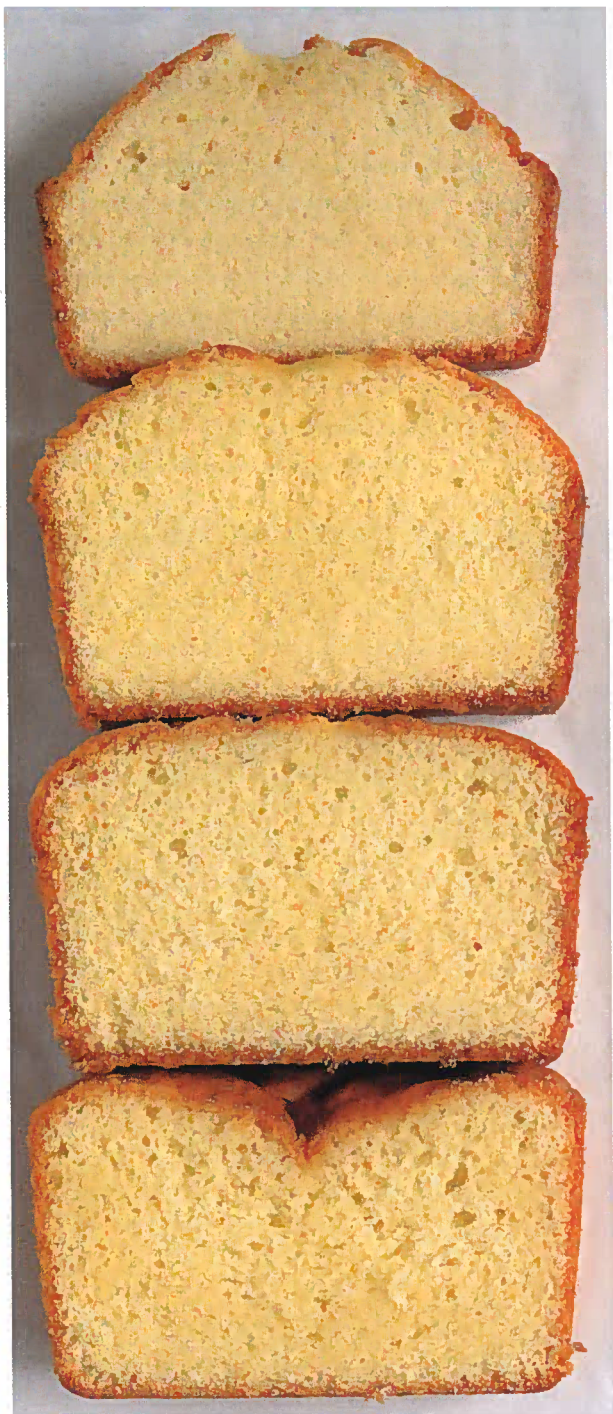
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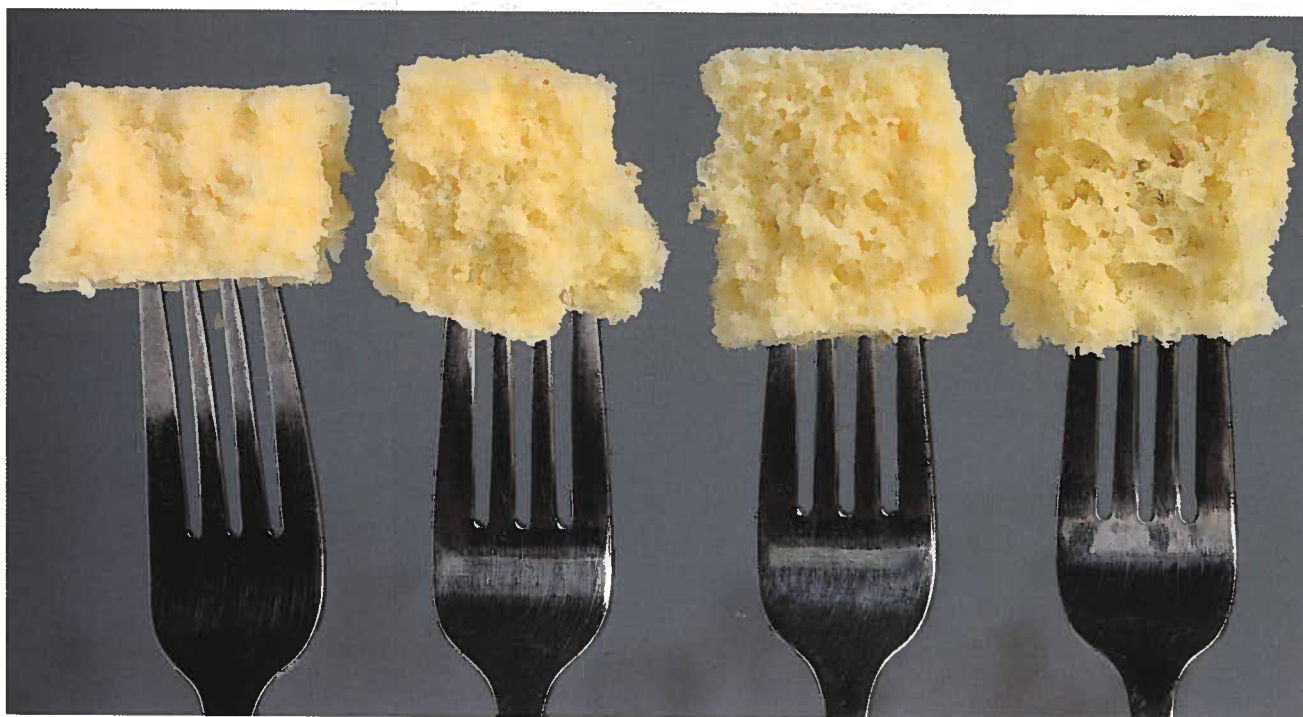


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Four cakes made with different amounts of baking powder. Cake 1 has no baking powder, cake 2 has 1 tsp, cake 3 has 2 tsp and cake 4 has 3 tsp. The crumb becomes progressively more open. Cake 4 is over-leavened and has collapsed.

For the next test I added a 1/2 teaspoon of table salt to the batter. The difference between the first and second cakes was quite surprising. The cake with the added salt baked up higher due to the stronger gluten in the batter, and had a noticeably more chewy bite. The flavor was better than the first cake, less flat and more well-rounded, but the loss of tenderness was not good. I reduced the amount of salt to 1/4 teaspoon for the third test. I found that was just enough salt to improve the flavor, yet keep the tenderness of crumb.



Four bites of pound cake made with different amounts of baking powder.

### Chemical Leaveners

Chemical leaveners use the reaction between acidic and alkaline compounds that produces carbon dioxide gas to lighten and aerate the cake. The gas is trapped in the batter, allowing bubbles in the batter to expand. The alkaline component is usually sodium bicarbonate, aka baking soda. The alkaline baking soda needs an acidic counterpart to create carbon dioxide gas. If there is an acidic ingredient in the recipe, such as buttermilk or yogurt, the baking soda will react with that ingredient to create carbon dioxide. If baking soda is present in a recipe that has little or no acidic ingredients, it will break down into carbon dioxide and sodium carbonate, an alkaline compound. If you've ever eaten a baked good that left a soapy taste in your mouth there was either too much baking soda or not enough acid in the recipe.

If there is very little or no acidic component in your recipe, as is the case with our pound cake recipe, the leavening of choice is baking powder.

### The Basics of Baking Powder

Baking powder is composed of alkaline baking soda, acidic salt crystals and a little starch to absorb moisture. Most commercial baking powders are labeled as "double-acting". Double-acting baking powders contain two types of acid; one acid, such as cream of tartar, which will dissolve quickly in cold water and a second acid which is slower to dissolve.

The fast dissolving acid releases carbon dioxide as soon as it comes in contact with the liquid in the recipe, causing an initial lightening of the batter as it is mixed. The slower dissolving acid releases a second burst of carbon dioxide when the batter hits the heat of the oven. The first reaction is smaller and just begins the process of forming the gas cells in the batter. The second reaction in the oven is larger and expands the cells even further. With a properly leavened recipe, the batter surrounding the air bubbles will have time to set in the oven before the final burst of carbon dioxide expands. Too much leavening will cause the baked good to rise too fast. The unbaked batter can not hold in the bubbles and the cake will collapse.

How much leavening is the proper amount? It takes about 1/4 teaspoon of baking soda or about 1 teaspoon baking powder to lift a cup of flour in a recipe, and a 1/2 teaspoon of baking soda will neutralize 1 cup of an acidic ingredient. Of course this is just a guideline and the amounts can be manipulated based on the baker's preference.

Recipes often employ a combination of baking powder and baking soda, using just enough baking soda to neutralize the acid in the recipe, but also enough total leavener to lift the flour in the recipe. For example, if we add a 1/2 cup of yogurt or sour cream to our basic pound cake recipe we would need a 1/4 teaspoon of baking soda to neutralize the acidic ingredient. That 1/4 teaspoon of baking soda releases enough carbon dioxide to lift 1 cup of flour. Since our recipe has a



Shows 8 pound cakes baked to test salt and chemical leavening amounts.

total of 1-3/4 cups of flour (8 ounces of cake flour measures 1-3/4 cups), we need to add enough baking powder to lift the remaining 3/4 cup of flour. The recipe would need 1/4 teaspoon baking soda plus 3/4 teaspoon baking powder to leaven the cake.

Baking powder can be made at home by mixing 1 part baking soda with 2 parts cream of tartar and 1-1/2 parts corn starch. Since cream of tartar is a fast dissolving acid, a batter made with this home made baking powder should be put in the oven as soon as it's mixed to get the most volume. There will not be a second release of carbon dioxide in the oven. It's also important to know that chemical leaveners are perishable. If you're having trouble with your cakes and it seems they are not rising as they should, check the expiration date on the leavener.

### Testing the Baking Soda

Based on the rule that 1 teaspoon of baking powder creates enough lift for each cup of flour in the batter, the correct amount of baking powder for our pound cake recipe should be about 1-3/4 teaspoons baking powder. To test the ideal amount of leavening for our pound cake, I baked 3 successive cakes, using 1 teaspoon, 2 teaspoons and 3 teaspoons of baking powder.

The difference between the three cakes was quite striking. The cake made with 1 teaspoon of baking powder was nicely domed with a slightly open crumb. The cake made with 2 teaspoons of baking powder had a lighter, more open crumb and started to flatten a bit at the top, but it was still acceptable. The cake made with 3 teaspoons of baking powder collapsed down the middle because the batter could not hold the excess carbon dioxide. The crumb on cake 3 was rough and spongy. Of the three cakes, I preferred the one made with 1 teaspoon of baking powder. It had a

little lightness from the leavener, but retained much of the traditional pound cake texture.

It may be hard to believe, but there is yet another factor to consider regarding chemical leavening. Leavening that is not thoroughly and evenly distributed through the batter will result in a cake with an uneven crumb and scattered tunnels and holes. You may even get an unpleasant bite of raw baking powder. How the leavening is mixed into the batter can make a great deal of difference in the final product.

For the final round of tests I mixed 1 teaspoon of baking powder into the batter in 3 different ways. For the first cake I sifted the baking powder with the flour and then mixed the sifted ingredients together on low speed for a full 20-30 seconds before adding the butter. For the second test I sifted, but did not take the time to pre-mix the dry ingredients before adding the butter. For the third cake I did not sift or pre-mix the dry ingredients. Once again, the difference between the baked cakes was clearly visible even before tasting. The first cake had a nice even crumb, the second cake had a slightly rougher crumb with some holes and the third cake had a rough open crumb with tunnels and holes throughout the cake. Sifting and pre-mixing the leaveners is definitely worth the few extra minutes it takes. | ACD



If you'd like to experiment yourself, you can get Eileen's current version of this pound cake recipe online at ACD+ at [AmericanCakeDecorating.com](http://AmericanCakeDecorating.com).

**Eileen Gray** earned a degree in pastry arts from The Restaurant School at Walnut Hill College in Philadelphia. Chef Gray worked with Gunther Heiland, a master pastry chef at Desserts International, was assistant pastry chef at the Bellevue Hotel and was the pastry chef at a British tea shop where she specialized in creating traditional British wedding cakes.



Since 2007 Eileen has been the owner and pastry chef of Cake Art Studio, an award-winning custom cake bakery. In 2015 Eileen launched her blog, Baking Sense, to share her love for baking and her years of pastry experience with the home baker.

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