



Some years ago, my dear friend Ellen Arian, www.ellensfoodandsoul.com, taught me the art of making sourdough bread. Ever since, I regularly feed starter, mix dough, and bake bread. It is part of my regular rhythm, second nature, and a richly satisfying, rewarding habit. Sourdough bread made with heirloom flour is a mainstay in my diet and anchors most every meal. I like to make several loaves at a time and give some to friends. Sharing bread has led to requests for this newsletter, an effort to outline some of the steps to using sourdough starter (see instructions, Spring 2015) to make sourdough bread. The ideas and instructions below derive from Ellen's wisdom and my own reading, research, and baking experience.

A Well-Bred Loaf: Putting Culture, Complexity, and Nutrition Back into Bread

- Keeping Sourdough Starter, "Day 1" (see Spring 2015 newsletter)
- Making Dough, "Day 2"
- Baking, "Day 3"

Developing complexity, nutrition, and taste both in a sourdough culture and sourdough bread require *time*, not so much *our* time, but rather time for yeast and bacteria to wake from their dormancy and go to work on the sugars in flour to create carbon dioxide bubbles and a vast array of flavor compounds. If your goal is taste and nutrition, it is best to allow three days for the entire process of feeding a sourdough culture, making dough, and baking bread. Yes, you can rush these steps if time is short, so feel free to experiment, but you will meet with the best success in terms of taste and nutrition if you allow enough time for fermentation to work its magic.

These instructions may at first seem daunting, but with practice, as with music, before long you will be playing without a script. Soon, working with starter, preparing dough, and baking bread will feel effortless. With practice...

You will learn to "read" starter and know just when to feed it more flour and water in order to maintain a balance of healthy yeast and bacteria to sustain a vibrant culture for your own baking needs.

You will develop your own "feel" for dough so that you can adjust the amount of water, flour, folding, and fermenting time to create bread dough with just the right consistency, pliability, and strength.

And, you will know how to blend flour in a mix that suits your family's preference for texture and taste.

Tapping into the invisible world of yeast and bacteria. In keeping sourdough starter and making dough, we are really putting to work the ever-present, invisible world of wild yeast and bacteria that circulate about in our home environment—this magical, mysterious world of the Universe that slips our daily notice. It is in mixing together flour and water that these wild invisibles are first captured. Then, once they establish a stable, symbiotic ecosystem of yeast and bacteria (a sourdough culture) we can put these wild microorganisms visibly to work. Whenever we feed a healthy sourdough culture flour and water, the yeast and bacteria begin to feed on the starch in the flour and multiply exponentially. We do this in Day 1, creating a pre-ferment of flavor compounds to create dough in Day 2. On Day 2, the starter and water helps transform heirloom flour into a yeasty, light, easy-to-work mass of dough.

Science explains what is happening: Bacteria and yeasts eat sugars in flour and throw off helpful by-products—Bacteria create ethanol and acids to give flavor and reduce the blood sugar impact of flour; meanwhile, yeasts produce carbon dioxide to give lift to dough and eliminate the need for commercial baker’s yeast.

Developing Taste—Water, Time, Sourdough Culture, Heirloom Flour, and Salt

Water, time, temperature, sourdough starter (a “pre-ferment” that adds an extra day of flavor and fermentation), and *heirloom flour* are all factors that contribute nutrition and taste.

- *Water (chlorine-free)* sets chemical reactions in motion, allowing yeast and bacteria to freely move about to set fermentation in motion. The more water, the faster the reactions.
- Time is key to developing flavor: The longer dough ferments, the greater the flavor.
- Temperature—both kitchen temperature and the temperature of the ingredients when mixed—also influence the rising time and hence the flavor. Colder temperatures slow fermentation to create more flavor, but too long a fermentation can weaken dough and make it “wobbly” and hard to handle.
- Sourdough starter is a “preferment” cultivated the day before making dough that adds both leavening and a whole day of extra fermentation time and flavor.
- Heirloom wheat and rye flour provide nutrition not found in commercial flours that are milled for a long shelf life. *Heirloom Grains=Taste=Nutrition*
- Salt adds taste and strengthens the gluten matrix to support the structure of dough when it is kneaded and when it expands. Salt also slows fermentation, which is why it is added as a later step after ingredients have been mixed and left to ferment. Salt also retards mold and spoilage to prolong shelf life.

Pre-Measuring and Blending Heirloom Flour, a First Step to Creating Dough:

The amount of whole wheat, rye, and other flour you choose will affect the taste, rise, and pliability of bread. So, it is good to understand how different flours influence a loaf in order that you can blend flour to suit your own personal preferences.

I purchase heirloom whole wheat and rye bread flour from Anson Mills in 20 or 25 pound bags. Ordering in bulk is an economical and efficient way to have flour on hand if you bake frequently as I do, but lugging heavy bags of flour from a chest freezer to the kitchen each time you make bread can be tedious and cumbersome. For this reason, I like to keep in reserve in my refrigerator or freezer several wide-mouth Ball jars (or re-sealable plastic bags) filled with blended flour—in my own case, a combination of Anson Mills Abruzzi Rye; Einkorn; and Red Fife Whole Wheat. If you keep several jars filled for future baking, you will always have some mixed and ready for use.

To suit your family, you can choose any combination of rye, whole wheat and artisan white. Dough made with some white flour will require less water and the bread will have a lighter taste and texture.

Because flour packs down, a more accurate way than using measuring cups is to measure flour with a kitchen scale. If you do not have a kitchen scale or find weighing flour tedious, you can use measuring cups, but the ratio of water and sourdough to flour will be less accurate and the result less predicable. For those of you who may not have a kitchen scale, the tables below give measurements both by weight and by cup measure.

One Loaf Bread (1 Qt Jar):

Two Loaves Bread (2 Qt Jar):

Abruzzi Rye	125 g	1 cup		250 g	2 cups	
Einkorn	63 g	½ cup		125 g	1 cup	
Red Fife	310 g	2 cups		620 g	4 cups	
Total	490-500 g	3 ½ cups		980-1000 g	7 cups	

Creating your own blend: Here are a few principles to keep in mind if you want to experiment using a different blend of flour than what is given above...

- Wheat: Wheat is higher in protein and gluten (for dough strength) than rye, so bakers choose it as the primary flour when making bread. When dough is kneaded, two of wheat’s four proteins, gliandin and glutenin, form a gluten matrix to make dough strong and pliable. Whole wheat: Whole wheat flour, while more nutritious and delicious than white, results in a denser loaf because particles of bran, a portion of the whole-wheat kernel, interfere with the formation of the gluten network. Also, heirloom whole wheat and rye have less gluten than modern wheat varieties and they contain oils that, like bran, also disrupt the gluten network. Therefore, a dough made with 100% heirloom whole grain flour, while more nutritious and delicious, will be denser than if you mix in some white flour. It is also good to note that commercial whole wheat

that sits on a grocery store shelf may not be what the label suggests: The USDA does not regulate the “whole wheat” label—flour can be labeled “whole wheat” as long as it contains 51% whole wheat flour. Artisan white: Adding some white flour to a blend will give a more open crumb and a loaf lighter.

- Rye: Rye imparts its own rich flavor. Rye is also high in lysine, one of the deficient amino acids in grains. So, the more rye you use and the longer you allow fermentation to enhance lysine, the more you boost the complete protein content of your bread. Rye, however, has less gluten and more sugars than wheat so it is dense, gummy, and tears easily. The more rye you use, the stickier your dough will be and the more challenging.

If you want to speed the fermenting time on Day 2, remove your jar of blended flour from the refrigerator the night before making dough so that it is at room temperature when you begin the mixing steps given below.

Day 2: To make dough for one loaf of bread (double amounts for 2 loaves):

1. In a large mixing bowl combine the Starter, Water, and Maple Syrup. The table below gives amounts measured one of three ways, grams; ml, or cups; and for one or two loaves:

1 Loaf of Bread (1-Qt Jar):

2 Loaves of Bread (2- Qt. Jar):

Starter	230 g	250 ml	~ 1 cup	250 g	500 ml	~2 cups
Water	280 g	300 ml	~1+ cup	560 g	600 ml	~2+ cups
Maple Syrup	20 g	20 ml	1/16+ cup	40 g	40 ml	1/8+ cup

2. Add Flour Mixture (~490 grams for one loaf) to the wet ingredients above, and stir well to combine.

1 Loaf of Bread (1-Qt Jar):

2 Loaves of Bread (2- Qt. Jar):

Starter	230 g	250 ml	~ 1 cup	250 g	500 ml	~2 cups
Water	280 g	300 ml	~1+ cup	560 g	600 ml	~2+ cups
Maple Syrup	20 g	20 ml	1/16+ cup	40 g	40 ml	1/8+ cup
Add Flour:	490-500 g	815 ml	3 ½ cups	980-1000 g	1630 ml	7 cups

3. When the flour is combined with the wet ingredients, make note of the time. This time defines the “Start Time” used in the steps that follow.

Once the flour is mixed in well, cover the bowl and let it rest on the counter about 20-30 minutes in a warm kitchen. [Alternatively, and especially in a cold winter kitchen, you might want to use a proofer set at 80 degrees. A proofer will help you control the temperature for more accurate timing of the following steps.]

It is easiest to keep track of the next steps in forming your dough by jotting down the “Start Time” and then the times when you will do subsequent steps. If your day is busy, having these written on a scrap of paper will prevent confusion.

As an example, let’s use 9:00 a.m. as a start time. The next steps (as explained below) would be...

9:00 Start Time

9:30 Add Salt and Knead

10:15 First Fold

11:00 Second Fold

11:45 Third Fold and 15 Minute “Bench Rest” (optional)

Noon Place Dough in Refrigerator to be Baked the Following Day

9:00 (Start Time):

After mixing in flour, let dough rest for 20-30 minutes. Meanwhile, lightly oil a rectangular baking pan with olive oil. Also, measure 20 grams (~ 1 generous tablespoon) of fine Celtic sea salt into a small cup and add just enough water to moisten. Stir the salt mixture and have it ready.

9:30:

Uncover the dough, add the sea salt and hand-knead the dough for five minutes until dough becomes sticky. You may want to use a pan of water and a dough scraper to scrape sticky dough from your hands and the sides of the mixing bowl. [Alternatively, dough can be kneaded with an electric mixer on the lowest speed using a dough hook. Knead until dough gathers around the hook and clears the bowl.]

Transfer dough to the lightly oiled rectangular pan and let the dough rest for 45 minutes, either on the counter, cover, or in a proofer.

1 Loaf of Bread (1-Qt Jar):

2 Loaves of Bread (2- Qt. Jar):

Starter	230 g	250 ml	~ 1 cup	250 g	500 ml	~2 cups
Water	280 g	300 ml	~1+ cup	560 g	600 ml	~2+ cups
Maple Syrup	20 g	20 ml	1/16+ cup	40 g	40 ml	1/8+ cup
Flour	490-500 g	815 ml	3 ½ cups	980-1000 g	1630 ml	7 cups
Add Salt/H₂O:	20 g	20+ ml	1+ Tablespoons	40 g	40+ ml	2+ Tablespoons

10:15:

First fold (folding strengthens dough): Using water to wet your hands and a scraper for scooping and folding, leave the dough in the oiled pan and gently fold it by doubling it over itself. Rotate the pan 90 degrees and continue folding the dough from the middle over itself again until you have completed a full circle, folding the dough a total of 4 times. [Folding helps redistribute remaining sugars and adds strength to the dough.] Gently smooth the dough into a ball. Let the dough rest another 45 minutes on the counter or in a proofer.

11:00:

Second fold: Repeat as in first fold, folding dough from all 4 directions, rotating the pan each time to make a full circle. Gently shape the dough into a smooth ball. Let dough rest and proof for 45 minutes.

11:45:

Third fold/shape boule: If making two loaves, cut dough in equal halves and place each on a lightly oiled counter top. Gently fold from 4 sides as before, once around. Then shape boule: gently smooth dough and tuck under to form a smooth ball of dough. Cover dough and allow to rest ~5 minutes.

Meanwhile, using ~1/8 cup rye flour generously dust a brotform bread mold (or a smooth dish towel that you have stretched out on a counter). Gently invert and transfer the dough to the brotform (or the center of the pastry cloth and use the cloth to lift the dough into a 10" round bowl). (The surface of the dough at the top of the bowl will be the *bottom* of the loaf that you will bake on Day 3; and the floured surface at the bottom of the bowl will be the *top* of the finished loaf of bread.) Dust the exposed surface of dough lightly with rolled oats and cover (I use beeswax cloth).

Noon: Place the brotform or bowl filled with dough in the refrigerator to proof until the next day.

Day 3: Baking Sourdough Bread

1. Preheat a 3-quart flat-topped Lodge Pot in the oven heated to 500°. Remove dough from refrigerator and let it warm to room temperature.
2. Assemble the equipment you will need: razor blades, a misting bottle filled with water, oven mitts, additional rolled oats if needed, a baking rack, and parchment paper cut in a ~11"-12" square.
3. When the Lodge Pot is warmed and the dough is at room temperature, uncover the dough and sprinkle surface with more oats, if needed (rolled oats prevent the dough from burning on the bottom. Place the parchment paper on a counter. Carefully invert the brotform or bowl over the parchment paper so that the dough falls into the center of the parchment paper (bottom side down). [If you used pastry cloth and a bowl rather than a brotform, gently peel off the floured cloth. It can be washed, dried, and used again.]
4. Score the dough in a tic-tac-toe pattern: From one direction using a razor blade held at a 45-degree angle, carefully score the dough off its center in two parallel lines. Flip the blade to its clean side and score the dough from the other direction twice again to form a "tic-tac-toe" design. Scoring the bread allows it to rise and expand from within and prevents the surface crust from tearing when the dough bakes.
5. Transfer the dough and parchment to the flat 10" bottom portion of the Lodge Pot.
6. Mist the dough, cover Lodge Pot with the dome, and place the Lodge Pot in the oven. Set a timer for 15 minutes. Allow the bread to bake.
7. After 15 minutes, turn down the oven to 450° and allow the dough to bake an additional 15 minutes.
8. Carefully remove the dome cover and allow the dough to bake 3-5 minutes more to brown the crust.
9. Remove Lodge Pot bottom and bread from oven.
10. With heat-resistant spatulas, transfer the bread from the Lodge Pot to a cooling rack. A thermometer inserted into the loaf should read ~200-207°.
11. Allow bread to rest for about 2 hours before cutting.

Equipment you will need:

- 2 quart Ball jar; wooden spoon and spatula...for starter (see separate instructions)
- Large mixing bowl; 1-2 brotforms or 1-2 ~10" diameter bowls, material to cover
- Dough scraper
- Rectangular baking pan and olive oil for oiling surfaces
- 3 Quart Cast Iron Combo-Cooker Lodge Pot for baking, hot pads or oven mitts
- Parchment paper; razor blades; misting bottle, rolled oats
- Kitchen timer
- Brod & Taylor folding proofer, kitchen scale and baking thermometer (all are optional)

Reading Resources:

Ellen Arian, www.ellensfoodandsoul.com

Emily Buehler, *Bread Science*

Lisa Raynor, *Wild Bread*

www.Pathways4Health.org,: *Spring 2015: Keeping a Sourdough Culture to Meet Your Baking Needs;*

Sourdough Recipes and How to Add Starter to Your Favorite Recipes

Copyright 2015, Pathways4Health.org