

Introduction: Pure Bread

With bread and wine, you can walk your road.

— SPANISH PROVERB

When my second book, *Craft Distilling*, was published in January 2016, I was asked, “How did you go from writing a book about poultry (*Pure Poultry*, New Society Publishers, 2013) to writing a book about distilling?” I responded with the first thing that came to my mind: “When you read my third book, you’ll see the connection.”

I didn’t even know, at the time, what my third book would be.

Now that I do know what my book is, the connection is clear: It’s all about my love of traditional homesteading skills. Raising poultry for meat and eggs; brewing and distilling; using a hand-built, wood-fired oven for baking, cooking, and other homestead chores...to me these are all symbolic of the kind of life my pioneer predecessors lived and the kind of life I myself have dreamed of living.

My husband’s grandparents bought this off-grid homestead back in the 1930s. There is a lot of family history here, and, long before I met him, David had daydreams of his own about living here someday. When we moved to the homestead in 2006, we were making a huge transition from big-city life to something very different. I was amazed at how quickly I got past my initial apprehensions and began to see how my love of learning, mechanical skills, and problem-solver personality fit perfectly with the more physical, outdoorsy, hands-on kind of life we had chosen to pursue.

So how do these relate to each other? I am continually fascinated by the way seemingly dissimilar activities actually tie together in a

natural, pleasing way. For example, hand-kneading bread dough mimics the process of blending clay and sand into cob to build my outdoor oven. Our chickens, turkeys, and ducks love to eat the mashed grains left over from brewing and distilling processes, and their manure strengthens the natural plaster that I used to finish my oven and give it some weather resistance. That oven is used not only to cook and bake; as it cools, it becomes the perfect place to dry the wood that will fuel the next day's fire. And the sourdough bread baked in that oven is the product of natural fermentation processes exactly like those involved in making beer and wine, yogurt and cheese, pickles, sauerkraut, and kombucha.

From No-knead to Sourdough is a tangible manifestation of one of the true passions of my life: baking bread. Like most people, I started out making simple yeast breads. Years later, I discovered an interest in naturally leavened, or sourdough, bread. This is *pure* bread, bread at its most basic, bread that relies on native wild yeast to raise it and to create its unique flavor, through the magic of fermentation.

Like the craft of distilling, creating bread involves various scientific processes. For more experienced bakers, or bakers interested in the science of fermentation and baking, I include those details in sidebars; for those who simply prefer to learn to make a variety of yeast or sourdough breads without learning all of the whys and wherefores, the text provides clear, user-friendly guidance. My main goal is to minimize the intimidation factor that seems inherent in the process of bread baking. In addition, I aim to challenge the notion that all bread is somehow bad for us.

You don't need to do things the way I do. In fact, I encourage you to pick a place to start, get comfortable with the basics, and then let your imagination and creativity take over as you push the boundaries of your initial comfort zone. Bread baking allows an enormous amount of flexibility to experiment—what I like to think of as the art and craft of baking. Not everyone has the opportunity, the space, or the inclination to build a wood-fired oven, but everyone *can* find ways to move

toward self-reliance, energy independence, and a simpler, more meaningful life. Isn't that what we all want?

We all have to eat, and there is no more historically important, elementally satisfying, easily accessible food to make than bread. So many of our memories are connected with food; it makes me incredibly happy to think of you—yes, *you*—beginning to create your own memories as you learn to make your own handcrafted bread.

Daydream. Dream *big*. Be fearless in taking that first step, and believe you can do it. You *can*, you know. Enjoy the journey—and the bread.

A black and white photograph of various breads and wheat stalks on a wooden surface. The breads include a long baguette, a round loaf, a slice of dark bread, a slice of light bread, and several slices of ciabatta. Wheat stalks are scattered around the breads. A knife is visible in the lower right. The text is overlaid on the left side of the image.

PART ONE


FINDING YOUR COMFORT ZONE

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Handmade Bread: It's No Wonder

*How can a nation be called great
when its bread tastes like Kleenex?*

— JULIA CHILD



I WAS FORTUNATE ENOUGH to grow up with a mother who cooked nearly everything from scratch. In addition to cooking meals and packing lunches for our large family, she began baking bread when I was young. She typically made four loaves at a time, three times a week, to meet the toast, garlic bread, and sandwich needs of the ten of us. One of my favorite memories of those years was Mum timing the bread so it was coming out of the oven just when we were getting home from school—a particularly wonderful, welcoming, warming smell on those cold, wet Northwest winter days.

My mother mixed up her bread dough in a contraption I remember as simply “the bread-maker.” It was a heavy dough hook with a wooden handle, connected to a lid that clamped onto the rim of a large, deep pot. The pot sat in a simple base with suction cups that held it securely in place on the counter. She put the ingredients in the pot, clamped on the lid, and cranked the handle. The dough hook sat just above the bottom of the pot, so it mixed the ingredients quite thoroughly and efficiently without scraping the sides or bottom of the pot. I don’t remember how long she had to crank, but once the mixing was done, she simply left the dough in the covered pan to rise. Later, she removed it,





FIGURE 1.1. Mum's "bread-maker."

shaped it, and put it into bread pans to rise a second time before baking.

Nowadays, bread bakers are advised to let loaves cool for at least an hour before cutting; cutting bread while it's hot, we are told, releases moisture from the bread as steam, resulting in bread with a shorter shelf life. But on baking day, trudging home hungrily from school and opening the front door to that familiar-yet-indescribable aroma, who could wait for it to cool? Of course, when bread is hot, you really can't slice it thinly. So, crowding around the kitchen island and the cooling racks full of golden-brown loaves, we would wait impatiently for Mum to carve off thick slabs for each of us. We slathered the hot, moist bread with butter and homemade raspberry jam, oh boy!

Clearly, shelf life was not much of an issue when it came to Mum's homemade bread.

From Hand-cranked to Sourdough

I began cooking at a fairly young age; my first memory of cooking is of making beef stew when I was about six years old. Mum always encouraged my siblings and me in whatever hobbies we took an interest in, and at the time, other than music and reading, cooking was my main extra-curricular source of enjoyment. I'm not sure exactly when my interest in bread was first sparked, but it was likely around the time Mum was learning to bake bread. I remember hovering nearby, waiting my turn to take a few cranks at the dough, and probably I was asking endless questions at the time. I'm sure I was baking things like cookies long before ever trying my hand at bread, which at the time seemed complicated and rather mysterious.

Remember all those wonderful Time-Life books that were popular back in the 1970s and 1980s? You would sign up for the series; they would send one book about every other month, which you just paid for as you went along. In junior high, I wanted to be a marine biologist, and

one Time-Life series we had was *The Undersea World of Jacques Cousteau*. Oh how I would devour each volume as it arrived, and how I looked forward with junior-high impatience to the arrival of the next! I got certified as a scuba diver when I was in 9th grade, and I have no doubt I was inspired by reading about Cousteau and his adventures in those books.

One of my very favorite Time-Life book sets was *The Family Creative Workshop* (FCW), about 24 volumes, organized alphabetically like an encyclopedia. It was mainly article after article about an enormous variety of handicrafts: We learned crafts like quilling, macramé, soft sculpture, candle-making... I even learned to do calligraphy, a skill that remains to this day. (My twin sister and I were always trying new things we learned from these books, to the point where the family joke was “Vicki and Lindy and their Craft-of-the-Week.”) The FCW series also had many articles about food, and I’m sure my initial interest in making cheese and beer came from those volumes. Because the subjects were listed alphabetically, I had read through quite a few volumes before discovering the topic of...*sourdough bread*.

At that point, I had never made bread myself, although I had an idea of the process from all those hours looking over Mum’s shoulder as she mixed, kneaded, punched down, shaped, proofed, and baked loaves. I do remember being absolutely fascinated reading about sourdough. How the Forty-Niners would carry a small amount of starter with them, to enable them to make flapjacks and bannock out in the northern wilderness, sustaining them when their search for gold took them far from the nearest trading posts. How sourdough bread developed a unique flavor, and even the crust was somehow different. The method relied entirely on wild yeast, supplied by a culture that you could



FIGURE 1.2. The beloved *Family Creative Workshop* book series.



FIGURE 1.3. The bread article in the *Family Creative Workshop* book that ignited my interest in bread.

easily make yourself if you planned ahead. The photo of a crusty, beautiful sourdough baguette just out of the oven fascinated me.

(Incidentally, I still have the entire set of *The Family Creative Workshop* books. I liberated it from the Goodwill pile when my parents were downsizing, moving from their home of 31 years in 2003. I still use it, too!)

In 1999, my father retired from his job as a computer programmer and systems analyst at Boeing. That same year, he was diagnosed with Type 2 diabetes. My father, as was typical for him, asked lots of questions, wanted to understand what was happening, and was quite disciplined about the inevitable changes to his diet. I remember him saying that his doctor told him he could eat sourdough but not other bread. Why, I wondered, was sourdough so different that a diabetic was allowed to eat it? I don't remember asking questions about it at the time, but I'm quite sure that this was the first time I began to be seriously interested in sourdough. I didn't actively pursue it then. But the seed was planted somewhere in the back of my mind.

Over the years, I grew to love baking of all kinds, but for as far back as I can remember, I have particularly loved to bake bread. Is it the soothing rhythm of hand-kneading, feeling the loose, wet ingredients come together in a smooth, supple, springy dough? The apparently magical influence of unseen yet very active tiny yeast cells in contact with grain and water? The yeasty, tangy smell and the way fully developed dough feels in my hands as I coax it into its final shape? Or is it merely that tantalizing, comforting aroma that fills the house as bread bakes and elicits the same comment every time from my husband when he walks into the house: "Wow, something sure smells great in here!"

Whatever the reasons, I simply love baking bread. I *love* it.

My husband, David, an avid bread baker himself for many years, had had an outdoor bread oven on his wish list since long before I met him. Several years after we moved to our off-grid homestead in 2006, David was buying locally made "artisan" bread at a nearby store. Even back then, it generally cost \$5 to \$6 per loaf. It was good bread, but the problem was it didn't stay fresh for long, and David has strong feelings about bread being fresh. With just the two of us at home, we would

usually be barely halfway through the loaf before it was stale enough that he wouldn't eat it. Not wanting to waste it, I would usually keep eating it until it was basically too hard to cut, and even then, some usually went uneaten. That was about the time I decided, after a few years of not baking much at all, to go back to making bread. This time, I took the plunge and determined to try my hand at "real" sourdough bread.

Thinking Outside the Breadbox

I must say, I was a bit intimidated by the process. I like to research thoroughly before I try something new, and sourdough bread was no exception. I soon found that there is a lot of conflicting and confusing information about sourdough. A book I recently read described the idea of relying on wild yeasts as unpredictable at best, complicated, best left to the professionals, and more likely to fail than to succeed. Some sources said you must measure ingredients for the starter precisely, monitor it closely for days and "feed" it up to four times a day. Other sources said to "refresh" or "feed" the starter at least once a week. One book suggested fermenting the dough (whatever that meant) at a relatively cool temperature, while another recommended warmer temperatures. Eventually, about the time my eyes were glazing over for the umpteenth time, I followed my usual course of action when learning a new skill: I put the books down, picked a day and time to start, and began the process of cultivating my first sourdough starter.

At the time, I had very little idea of where that decision would lead me. I had only minimal understanding, when I began, of what sourdough was, how to work with it, and why making bread with it makes such a difference compared to baking with commercial yeast. When I was growing up, we didn't watch a lot of television, but I can remember commercials for Wonder Bread: "Helps build strong bodies 12 ways!" the voice-over trumpeted. The language impressed me as a youngster; who didn't want a strong body? When I began seriously studying bread in general and sourdough in particular, I learned that the "12" in those ads referred to vitamins and minerals that were put back *into* the bread, because it was made with flour so highly processed as to retain very little of the original nutrients of the grain.

In 1850, most of the United States was still rural, a land of pioneers and homesteads. Back then, at least 90% of all bread consumed in America was homemade. Wonder Bread was introduced by Continental Baking in 1927, during an era of huge transition for homemakers. Vacuum cleaners, washing machines, electric cookers—all kinds of labor-saving devices flooded the market, a dazzling vista for frazzled wives and mothers. The prospect of being able to buy soft, cheap white bread that kids loved must have been irresistible. Then, in 1930, the vista became even rosier with the introduction of pre-sliced bread.

From Big City to off the Grid


For reasons I've never quite understood (having lived the first 45 years of my life in Seattle), I have, since I was young, always felt more at home in small towns. I was always drawn to traditional skills and crafts, always loved the idea of learning a trade or skill by means of an apprenticeship to a master and passing that on to someone else. Always leaned toward "old-fashioned" values, a simple life of hard work, outdoor chores, and hands-on learning, building, repairing, and restoring. So I suppose it's no big surprise that in a world of kitchen machines and gadgets, I am so enamored of the process of making bread with a few simple ingredients, mixing and kneading dough by hand, fermenting it in a cool corner of my kitchen, then baking it in the high heat of a hand-built, wood-fired oven.

For me, making any kind of bread, in any kind of oven, is a deeply satisfying experience that never wears thin. My baking life continues to include simple no-knead yeast breads, as well as those made with a pre-ferment like the Italian ciabatta. Still, having eventually pushed my way through my initial comfort zone, I discovered the seemingly unlimited variety of sourdough breads. Using the same starter culture I have maintained since 2010, kneading the dough by hand, and baking it the same way my pioneer ancestors did...well, let's put it this way: If I were a cat, I would be purring with contentment. It is absolutely a labor of love. And it's no Wonder.

Getting in the Zone: How to Use This Book

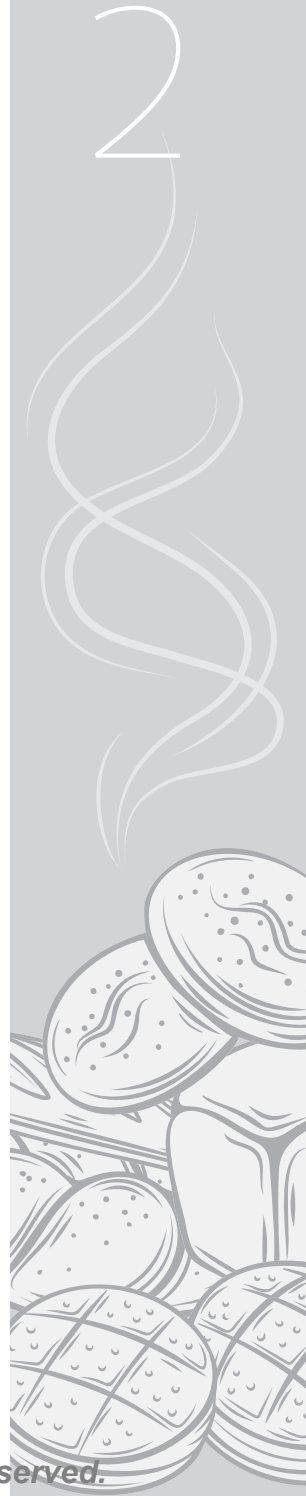
*I'd rather teach you how to make bread
than give you a slice of my bread.*

— GENEUEUX PHILIP



ORIGINALLY THIS BOOK was going to be all about sourdough breads. In recent months, having done quite a few presentations on this subject at events like the Mother Earth News Fair, I realized I had been using too narrow a lens to view this project. I discussed it with my editor, reworked the table of contents, and this is the result: a book that allows, no, *encourages* you to find your own comfort zone with bread, as opposed to a book that tries to convince you that sourdough is for everyone.

Participants ask a lot of questions at these presentations, and I pay attention to them. About the fourth time around, I noticed some questions were being asked over and over: Can I make sourdough using the no-knead method? Is it possible to make a gluten-free sourdough starter? Isn't sourdough starter complicated and time-consuming to maintain? The light-bulb moment for me was hearing that people really are interested in making their own bread, but they are often intimidated by conflicting information and concerns about fitting it into their schedules. That's when I first realized that my original concept didn't consider the needs of new or relatively inexperienced bakers.



I am so grateful for the opportunity to have had this kind of feedback long before this book was written. I'm convinced that this incarnation is a much better book, and I'm confident that regardless of your current level of baking experience, you will find something here to dive into quite fearlessly. Making your own bread isn't difficult, and it should be fun!

So, how do you use this book? Well, first there are a few chapters covering the basics: equipment, ingredients, how to mix, knead, ferment, shape, and bake bread; there's even a whole chapter on the subject of gluten! From there, it's organized into several different comfort zones, beginning with no-knead breads. If you've never baked bread before, I suggest you start here. When you feel ready, I encourage you to move on to the next comfort zone. At any point, if you're happy with the results and are having fun, there's no need to leave that comfort zone. It's always up to you. I do think you'll find, though, that once you have been thoroughly bitten by the baking bug, you're likely to have the confidence, and the interest, to try something new.

Whatever your comfort zone, I highly recommend that you read the chapters leading up to Comfort Zone 1 (Chapter 8). If you're a more experienced baker and prefer to go straight to the recipes, see the recipe index at the back of the book. Or, if you've made yeast bread before but want to try your hand at sourdough, skip ahead to that comfort zone. There are interesting recipes to try in every section, though, so I hope you'll read through the whole thing; you might be surprised at what you can learn!

Sexy Science Talk

There is a lot of science to the art of bread-baking, and it's helpful to understand at least a little to give some context to what I'll be teaching you to do. I find it all quite fascinating, and I spent hours on interesting but fairly frivolous tangents while researching, and learned a heck of a lot. But don't worry, I'm not going to whack you over the head with all those fascinating details. In trying to make this book user friendly, I decided to include a certain amount of the science, but separately in

sidebars. This way, those of you who care about such issues can read all about it, and others who only want to get on with making bread can stay with the main text and get thoroughly grounded in just what you need to know to get started.

When texting with my novelist friend J. Lauryl (Jenn) Jennings one day, I was expounding on the riveting subject of yeast hydrolysis (I know, I know), and Jenn, being the angelically patient and supportive friend that she is, texted back: “Ooh, sexy science talk!” Naturally I latched right onto that phrase, and the science-y sidebars are headed Sexy Science Talk. I have tried to make even the science stuff clear, relevant, and even a little fun, so don’t be surprised if you find yourself reading them unintentionally.

Handmade Bread Ain’t Perfect

The photos in this book are all of bread I have made myself, either in my kitchen oven or my outdoor wood-fired oven. Any time you make something by hand, such as bread, there will be variations in the results. I’ve seen too many cookbooks that have beautiful studio photography; unfortunately when I follow a recipe and my results don’t resemble the one in the cookbook photo, I feel like I’ve messed up somehow. The truth is, even with all my experience, I can make the same bread recipe ten times in a row and get slightly different results each time. Why? Maybe the fermenting temperature was a little cooler or warmer, possibly I got distracted and the dough proofed a little longer than usual, or I was sloppy with my shaping technique; whatever the reason, it just won’t always look “perfect.” I prefer to give you a realistic idea of what to expect, so you’re not going to see a lot of perfect bread here.

Take Your Time and Have Fun!

I know how fortunate I am to have learned to bake from my mother. If you have a friend, neighbor, mother, or grandma who’s willing to share advice and experience, it can be a big help. If you are new to baking bread, it will seem like a steep learning curve at first. Do try to give yourself plenty of time, be easy on yourself, and keep at it. Before long

you'll notice that you aren't referring to the book as often, movements like kneading and shaping are becoming almost automatic, and the results will be more consistent. I promise you, the joy of taking a few simple ingredients and turning them into something delicious, beautiful, and nutritious is something you can be very proud to accomplish. When you find yourself looking forward with anticipation to baking day, you'll know you've found your comfort zone. Way to go, you!

Flour, Salt, Yeast, Water

What makes good bread?

It is a question of good flour and slow fermentation.

— JOHN HILLABY



THERE ARE MANY good sources of information on different flours. There are also many choices; just selecting a plain old wheat bread flour can be positively mind-boggling. I've kept track of the questions I get most often at presentations and on my website, and compiled all my research and experience into a fairly compact discussion below. It includes a few notes on the differences between American flour and European flour, the subject of frequent conversations these days.

This chapter covers gluten grains and a few basic bread-baking ingredients; non-gluten grains will be discussed in Chapter 4.

Flours

I don't specifically recommend one brand of flour over another. I do suggest you buy the freshest flour you can find, locally milled if possible, from a vendor whose inventory turns over regularly.

If it's available in your area, I recommend using stone-ground or stone-milled flour. The advantage of stone milling is the cooler temperature generated in the process, resulting in less nutrient loss. When I can find stone-ground white flour, I buy it, albeit in smaller than usual quantities; it is more perishable because a little of the germ oil remains

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FIGURE 3.1. A few of the many choices in bread flours.

in the flour. However, stone-ground white flour is more nutritious because it absorbs some of the nutrients from the bran and the germ before they are sifted out. Roller-milled flour loses more of these nutrients because the bran and the germ are removed so early in the milling process.

When buying whole wheat flour, especially, try to avoid the bags on grocery store shelves; if possible, find whole wheat flour that has been refrigerated. This recommendation applies to *all* whole-grain flour, including whole-grain gluten-free flours.

Here are a few other factors to consider when buying flour, especially wheat flours.

Organic or Non-organic?

There is no definitive evidence that organic flour performs better in baking. To me, the advantage of using organic grains is avoiding ingredients like bromates and other bleaching agents. I'm not convinced there is any discernible difference in taste or baking performance between organic and non-organic flours. However, I do recommend using organic grains when you're activating a new sourdough starter (see Chapter 16); otherwise, the choice is largely a matter of preference or availability.

Bleached or Unbleached?

Bleaching is a method of oxidizing wheat proteins. Passive oxidation occurs during storage; commercially, flours are stored 3 to 8 weeks before being sold. Why is flour bleached? Aging or oxidizing agents can increase the end-to-end linking of glutenin molecules and thus increase dough strength.

Bleaching and bromate are *not* allowed in Europe; other differences between American flours and European flours are discussed below.

High-production commercial mills speed up the oxidation process by bleaching the flour; chlorine gas, and then potassium bromate, are used to artificially oxidize flour. In the late 1980s, American millers, concerned about the reported toxicity of bromate, began replacing it with ascorbic acid. (Ascorbic acid, or vitamin C, is actually an *anti*-oxidant, but it becomes oxidized to dehydroascorbic acid, which in turn oxidizes gluten proteins.)

As with so many foods these days, you need to read the labels. Be aware that white flour labeled “unchlorinated” may have other bleaching or oxidizing agents; to be on the safe side, look for certified organic flour, or unbleached, unbromated flour.

I would definitely avoid using bleached flour for making sourdough starters and bread, because bleaching chemicals may affect the growth and balance of yeast and bacterial populations. You’re trying to feed your yeast and lactobacilli, not starve them into submission.

What About Grinding Your Own Flour?

Here’s what you need to know: Fresh flour is harder to work with than aged flour. Freshly ground flour tends to produce a dough that is too springy and elastic to knead and shape easily. It forms a weak gluten network and a slack dough, so it is also reluctant to rise, resulting in a dense baked loaf.

Oxidation of the flour helps because oxygen in the air gradually frees the glutenin proteins’ end sulfur groups to react with each other and form the longer gluten chains that increase the elasticity of the dough.

This disadvantage is most apparent when working with wheat, since wheat has by far the most gluten of all the grains. If you want to grind your own wheat, you should do that. I simply suggest you don't use that flour right away, if you're using it to make bread, especially fast-rising yeast bread.

Decisions, Decisions...

There's a lot to think about when choosing flour. Ultimately, of course, the choice is up to you. Let's take a look at the most common types of flour you're likely to buy for baking, starting with the gluten grains: wheat, rye, and barley. (Non-gluten grains are discussed in Chapter 4.)

Wheat

American wheat varieties fall into these categories: hard or soft; winter or spring; and red or white.

- * **Hard wheat** has high protein and more gluten, making it ideal for bread.
- * **Hard wheat** has more gluten than soft wheat.
- * **Soft wheat** tends to have richer flavor than hard wheat.
- * **Winter wheat** is generally higher in minerals.
- * **Spring wheat** has more gluten than winter wheat, even if it's the same variety.
- * **Hard red winter wheat** has moderate protein content, good for bread, rolls, and all-purpose flour.
- * **Hard red spring wheat** has the highest protein of all the bread wheats.
- * **Soft red winter wheat** has low protein, good for cakes, pastries, crackers.
- * **Hard white winter wheat** is similar to hard red winter wheat but lacks the pigmentation of red wheat.
- * **Durum wheat** is very hard, high-protein wheat, used to make semolina flour for pasta.
- * **All-purpose flour** is a blend of soft and hard wheats; the actual

content varies widely. In most of the US and Canada, all-purpose flour has more protein than all-purpose flour in southern states and the northwest.

- * **Flour** labeled “bread flour” is usually 12% to 13% protein and is either hard winter or hard spring wheat.

Other types of wheat

- * **Emmer**, also known as farro in Italy, is a tetraploid wheat (see Sexy Science Talk) used mainly for bread and, in Italy, as a whole grain in soup. It is higher in fiber than other wheats.
- * **Kamut** (Egyptian for wheat) is a registered trademark for an ancient relative of durum wheat. Kamut has high protein, but its gluten is better suited for making pasta than bread.
- * **Spelt** is a high-protein (up to 17%) wheat. Some people who are sensitive to gluten can tolerate the lower levels of gluten in spelt.
- * **Triticale**, a cross between wheat and rye, is mostly grown for use as animal feed. The bread-making qualities of most types are not as good as wheat.

Rye

Rye is a gluten grain, but compared with wheat, it has very little gluten, and rye’s ratio of soluble to insoluble proteins is not optimal for gluten formation. Its gas-trapping ability mainly comes from the presence of pentosans, chains of sugars structurally similar to starches and cellulose. Rye also has about 50% more fat than wheat.

Pentosans are hygroscopic (water-loving), so they help rye breads stay moist and fresh longer. Rye pentosans also help control appetite. Rye absorbs 8 times its weight in water, compared with wheat, which

SEXY SCIENCE TALK

The Genetics of Wheat

The three groups of wheat varieties according to number of chromosomes: Einkorn is diploid (2 sets of 7); emmer (i.e., durum) is tetraploid (4 sets of 7); bread wheat, spelt, and club wheat are hexaploid (6 sets of 7); this group accounts for 90% of US wheat production. Most of the remainder is durum wheat. Club wheat is used for pastry and cake flour.

Einkorn reportedly has less sugar-spiking amylopectin starch and more slow-releasing amylase than other types of wheat.



absorbs twice its weight in water. If you've ever wondered why you feel so full after eating rye crackers, now you know: dried carbohydrates in rye crackers absorb liquid and swell in the stomach, giving a sensation of fullness, and are slowly and only partially digested.

The labeling of rye flour is often confusing and inconsistent. Most commercial rye is roller milled and is generally not a whole-grain product. *White rye* is from the center of the endosperm. *Cream* or *light rye* includes the next layer of endosperm; *dark rye* includes the outside of the endosperm. *Rye meal* is coarser, ground from the whole kernel. An even coarser grade of rye meal is often called *pumpernickel*.

Barley contains significant quantities (about 5% each of the grain weight) of two carbohydrates other than starch: pentosans (which make rye flour sticky) and glucans (which also give oats its gelatinous and cholesterol-lowering qualities). Along with their water-insoluble proteins, these carbohydrates contribute to the springy texture of cooked grains. Barley absorbs twice as much water as wheat.

Although barley is not usually thought of as a good grain for making bread, lacking significant gluten proteins, its carbohydrate profile makes it an interesting choice for low-gluten baking. We'll talk about this more in Chapter 19.

US versus European Flours

I've heard many stories recently from people who are sensitive to gluten but were able to eat wheat bread in Europe without suffering the usual reactions. What's the explanation for this? I suspect there's more than one layer to the story. One possibility is the lack of bromate (see Bleached or Unbleached? above) and other bleaching chemicals. There are also several differences in the way flours are processed in Europe, as well as variables in the wheat itself.

Processing

The "extraction rate" of flour is the degree to which a flour has been refined, that is, the percentage of whole grain left in the flour after

milling. Whole wheat flour has a 90% extraction rate; most white flour in the US has an extraction rate of 70% to 72%. French bread flour has an extraction rate of 72% to +78%, meaning that it retains a higher percentage of the bran. Home bakers can make an equivalent of French flour by adding a little sifted whole wheat flour to white bread flour.

You may have heard of another French flour called Type 55. Dough made with Type 55 flour, which has less gluten than American bread flour, is able to stretch without springing back; American bread flour's gluten is generally too strong for this kind of extensibility. A good equivalent of Type 55 is a blend of half unbleached bread flour and half unbleached all-purpose flour.

Protein Content and Other Differences in the Wheat

As craft bakers know well, the maximum rising potential of the highest-protein wheat is possible only with mechanical mixing, commercial yeast, and hearth baking. However, strong gluten, high protein, and high water absorption don't work well for European-style open-crumb, crusty breads. The Type 55 French bread flour is typically 11.5% protein, compared with American spring wheat at nearly 14% protein.

The glutenin to gliadin ratio is often different as well. For example, some French flours have a ratio that results in good "thin-film extensibility," allowing stretching without rupture.

European flours have higher ash (mineral) content. Ash significantly stimulates the growth of natural leaven cultures and can be recreated by adding some whole wheat flour to white-flour leavens.

American flours have more damaged starch than European flours due to different milling techniques. This provides food for fermentation but makes it difficult to achieve a really thin crisp crust.

SEXY SCIENCE TALK

A Few More Tips

- * Self-rising flour contains baking powder at a rate of 5 to 7 grams per 100 grams flour (1 to 1½ teaspoons per cup). It is good for things like biscuits, but don't use it for making bread.
- * I don't recommend adding vital wheat gluten or high-gluten flour to your bread dough, *except* with rye bread.
- * In general, it is best to use the softest wheat that will give you the results you want.



Other Ingredients for Making Bread

Salt

Salt tightens the gluten network and improves bread volume as well as providing flavor. In sourdough breads, salt also helps limit the protein-digesting activity of the lactic bacteria, which can otherwise damage the gluten.

I prefer using sea salt. Be sure to weigh salt, as different types, such as kosher salt, vary in weight relative to volume. When you find a salt you like, stick with that one; it's easiest, especially when you're first learning, to keep things simple.

Yeast

Yeast is a single-cell living organism, the smallest member of the fungus family. Fast-acting yeast allows no time for microbes to do their job, a significant part of which is to disarm gluten molecules while preserving their elasticity.

There are many strains of yeast, one being commercial yeast. By contrast, there are thousands of strains of wild yeast, and the local yeast population varies from region to region. San Francisco is justly famous for its wild yeast, which is responsible for the area's unique sourdough bread. To utilize these wild yeasts, a sourdough culture, or starter, must be cultivated (see Chapters 14 and 15).

The alternative to wild yeast is commercial yeast, usually found in dried form. It can be bought in individual packets or in bulk. It's best to store unused yeast in the freezer; it goes dormant in the cold and will last a good long time.

Active dry yeast, introduced in the 1920s, is dried into granules with a protective coating of yeast debris. These yeast cells are dormant, and must be reactivated by soaking in warm water (105°F to 110°F/41°C to 43°C) before mixing the dough. At cooler soaking temperatures, yeast cells recover poorly and release glutathione, known to interfere with gluten production.

Instant yeast, available since the 1970s, is dried more quickly than active dry yeast, in the form of small porous rods that take up water

more rapidly than granules. Instant yeast does not require prehydration before use. It also produces CO₂ more vigorously than other types of yeast. This is definitely my choice among the dry yeasts.

Water

Distinctly acidic water weakens the gluten network in bread dough, while a slightly alkaline water strengthens it. Hard water produces a firmer dough due to the cross-linking effects of calcium and magnesium.

Most tap water from municipal water supplies are slightly alkaline; the chlorine in tap water, though, tends to inhibit yeast growth, so avoid it if you can. If you must use chlorinated water, dechlorinate it first: Run some tap water into a pan or large bowl, and let it sit, uncovered, for at least a few hours or overnight. Most of the chlorine will dissipate. Bringing the water to a boil before letting it sit helps speed up this dissipation.

Bottled spring water is fine. I don't recommend using distilled water; it lacks minerals that benefit the yeast and bacteria during fermentation.

Other Ingredients Often Found in Bread Recipes

Fats, sugar, eggs, and milk products are all common ingredients in bread recipes. None of these are essential in the basic process of making bread, although a few recipes in this book use them. Here is a brief summary of the effect these ingredients have on bread dough:

- * Fats and sugar weaken the gluten network.
- * Egg proteins coagulate during cooking, but the fat in eggs weakens gluten. Emulsifiers in eggs stabilize bubbles and starch.
- * Milk's protein, fat, and acidity all weaken gluten. Milk weakens gluten in bread dough, apparently because of a whey protein, which can be inactivated by scalding (then cooling) the milk before use.

There is obviously much to think about when choosing ingredients for making bread. I have tried many types of wheat and rye flours, played

around a bit with barley (although I more often use barley for making beer and whiskey), and am still experimenting a lot with gluten-free grains. I highly recommend starting out with a good unbleached white bread flour and stone-ground whole wheat flour, and getting used to using that before you fill your kitchen with dozens of grains.

When you find a flour that you like to work with and gives you good results, stick with that at least for a while, just to get really comfortable with it. There's a whole world of grains out there, especially if you live in a grain-growing area, but you'll have to trust me that it's better to start small with your ingredient collection. I want this to be fun, even while you're learning, and it won't be so much fun if it seems overwhelming. There's plenty of time. Be easy on yourself and enjoy the process.