

BREAKING BREAD

WHAT IS IT ABOUT BREAD THAT'S SO SATISFYING? IT'S THE FLAVOR AND THE AROMA.

••••• BY MICHAEL KALANTY •••••

Bread is having a moment. A new generation of bakers has picked up the reins from artisan bakers such as Chad Robertson, Tartine Bakery, San Francisco, Peter Reinhart, author, *The Bread Baker's Apprentice: Mastering the Art of Extraordinary Bread* (Ten Speed Press, 2001), and Jeffrey Hamelman, author, *Bread: A Baker's Book of Techniques and Recipes* (Wiley, 2012).

Today, craft bakers can work directly with farmers and millers to source hyper-local strains of wheat. It's not only possible to have a heritage grain naturally crossbred for a geographic region, but a particular wheat strain can be developed for a specific restaurant.

Wheat pioneers, including Stephen Jones, director, Research and Extension Center, Washington State University (WSU), Mount Vernon, Washington, have revitalized millennium-old farming practices such as natural seed selection and crossbreeding. An easy walk from Jones' wheat fields, graduate students grind wheat berries into whole-grain flours and test them for functionality and flavor in the university's Bread Lab. "At last count, there are over 40,000 lines of wheat grown at WSU," says wheat breeder Steve Lyon, senior scientific assistant at the Research and Extension Center.

Strains of wheat display lots of aromas and flavors when ground and baked into bread. The flavor comes from the unique combination of a wheat strain and its terroir. The choices made by the baker during the fermentation process enhance these flavors and develop new ones in the bread.

As these new wheats enter restaurants and bakeries, customers look to chefs for guidance. They want help understanding why they enjoy the breads.

CRUMB

- 1 SWEET/DAIRY
- 2 SOUR/FRUITY
- 3 SOUR/DAIRY

TASTING THE CRUMB

First, you'll need a few slices of bread. Separate the crust from the crumb and set the crust aside.

When tasting bread, start at the inside, what bakers call the "mie." From a technical perspective, the mie reveals the baker's skill in evoking the grain's natural flavors. Chew the sample 10-12 times and spread the flavors over your palate. Chew with your mouth open, aerating the flavors as you chew. The more air in your mouth, the more flavor you get from the food.

Start by tasting for the sourness in the crumb, then try to identify the character of that sourness. Does it have a smooth, dairy character, like yogurt, or does it have a sharp, tangy character, like

AROMA AND FLAVOR NOTES FOR BREAD

©MICHAEL KALANTY, 2015

CRUMB

- 1 SWEET/DAIRY
- 2 SOUR/FRUITY
- 3 SOUR/DAIRY



CRUST

- 4 ROASTED
- 5 FRUITY
- 6 RESINOUS
- 7 TOASTY
- 8 SWEET

GRAIN CHARACTER

- 1 SIMPLE
- 2 MODERATE
- 3 COMPLEX
- 4 OVER-FERMENTED

KEY

1 MILK, BUTTER, DIACETYL (POPCORN BUTTER)

2 GREEN APPLE, GRAPEFRUIT, LEMON, VINEGAR

3 FRESH CHEESE, BUTTERMILK, PLAIN YOGURT, AGED CHEESE

4 BAKED ONIONS, DARK BEER, BAKED CHESTNUT, CHEESE GRATIN

5 FIG, RAISIN, STEWED FRUIT

6 FRENCH ROAST COFFEE BEANS, VANILLA BEAN, AGED BALSAMIC VINEGAR

7 MALTY, POPPED GRAINS, NUTTY

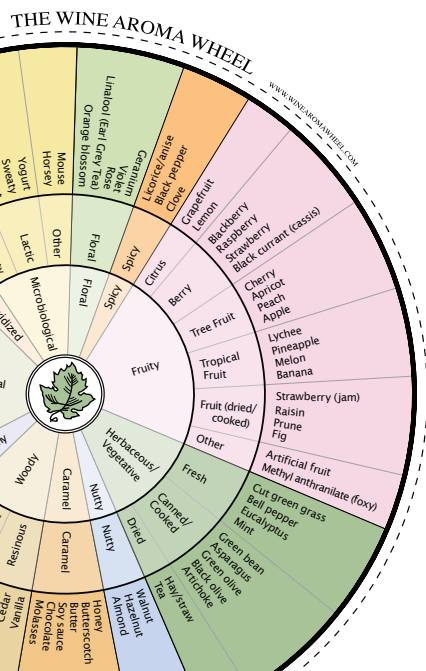
8 BUTTERSCOTCH, TOFFEE, CHOCOLATE, MOLASSES

1 RAW STARCH, RAW GREEN BEANS, PEASHOOTS, STRAW, DRY YEAST

2 COOKED SPAGHETTI, STEAMED POTATOES, COOKED OATMEAL, YEASTY CHAMPAGNE

3 COOKED WHOLE GRAINS, COOKED DRIED BEANS, GREEN OLIVE, FLINT, SLATE, MINERAL

4 BEER, GRAPEFRUIT PITH, "TURNED" RED WINE, SHERRY



DON'T REINVENT THE WHEEL

If the bread infographic's design from general to specific looks familiar, it's likely you've seen and even used the Wine Aroma Wheel®. The wine wheel was created in 1984 by Dr. Ann C. Noble at the University of California at Davis where she taught wine sensory evaluation in the Department of Viticulture and Enology. The wheel is based on principles of categorization developed by cognitive psychologists. Aromas/flavors are grouped according to their perceived similarities.

How does the system work? In the tangible world, think of the broad category furniture, which includes subcategories such as tables, chairs, dressers. The table category includes more precise subcategories: dining table, bar table, coffee table.

The Wine Aroma Wheel laid the groundwork for enhancing the customer's appreciation of food and drink. Starbucks leveraged the concept to enrich the coffee drinker's experience. Words such as "fruity," "earthy" and "bright" describe coffee flavor profiles. These terms help the barista select the type of coffee beans you'll appreciate.

grapefruit? As you chew, look at the key at the bottom of the Aroma and Flavor Notes for Bread® infographic. For example, the sour/fruity family includes flavor notes such as green apple, grapefruit and lemon that produce a tangy sensation on the palate.

Complete your tasting of the crumb by focusing on its dairy sweetness. When baking lean doughs such as baguettes (with low amounts of fat or sweeteners in the dough), it's not unusual to perceive an aroma of cow's milk or butter. A well-fermented baguette dough can smell, taste and sometimes even feel as if butter has been added to it.

Depending on the flour and other ingredients in the dough, the aroma can sometimes seem like diacetyl, the butter-like flavor on some theater popcorn. Diacetyl is a natural product of fermentation and is found in many white wines. It's the buttery, chewy characteristic of certain chardonnays.

TASTING THE CRUST

The crust is a different sensory experience altogether. It's dark, toasty and chewy. It's a study of contrasts when you sample the crust separately from the crumb.

Caramelization of the sugar/amino acid compounds on the dough's surface brings notes of caramel, nut and brown butter. Many of those notes you associate with the Maillard reaction—the bitter/sweet richness of a grilled steak, for example. Oven temperatures aside, two things contribute to the flavors of the crust: the amount of whole-grain flour in the bread and the total fermentation time of the dough.

The crust of white-flour bread, such as a baguette, has the simple character of toasted grain. Sometimes there's a warm dairy note, too, like the one associated with condensed milk or toffee. When a dough contains whole-grain flour, there's a malted character to the crust. Take the classic French sourdough, *pain au levain*. The crust reveals notes of stout or dark beer with a sour undertone.

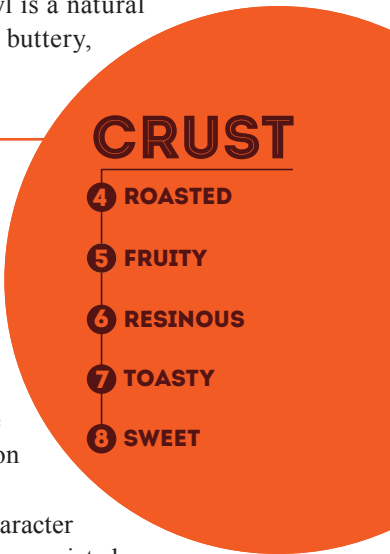
The other factor contributing to crust flavor is the total fermentation time of the dough. Short-fermented, same-day breads have a toasted nut character, like almonds. Long fermentation encourages sugars to accumulate in the dough. As these caramelize, they display the meaty character of grilled steak or roasted mushrooms.

Words such as "chocolate" and "balsamic" aren't traditional descriptors for crusty bread, but many heritage grains are delivering notes like these and more. As our grain economy becomes more localized and these flours find their way into the kitchen, there's opportunity for greater sensory experience.

GRAIN CHARACTER

Within minutes of blending yeast, water and flour, the fermentation process begins. It continues relentlessly until the dough is baked and its internal temperature reaches 122°F or so—the thermal death point for yeast. As long as the dough is active, it continues to ferment.

It is both the art and the science of the baker to guide this fermentation. Done well, the finished bread yields aromas of whole grains—earthy and nutty with a soft mineral note like flint. Uncontrolled,



the results can be pithy grapefruit bitterness, alcohol, oxidized red wine or sherry.

A separate component of bread tasting is the fermentation character of the grain itself. There are four phases of grain fermentation, each corresponding to different sets of flavor and aroma compounds in bread.

Non-yeasted doughs need no fermentation. Chapati and tortilla doughs are mixed and receive only a brief rest before shaping and baking, mainly to relax their elasticity. Some yeasted flatbreads, such as naan and pita, receive a short fermentation. The toasty, nutty and sometimes charred notes of their flavor profile come from the cooking method. The dough itself in this category can display notes of straw, raw starch or a dry yeast aroma.

As yeast enzymes break down carbohydrates in the flour, simple sugars are released into the dough. As it eats these sugars, the yeast burps out CO₂, in turn making the dough rise. During this stage, the raw, starchy flavors of the grain decrease. Aroma and flavor notes associated with other cooked or processed starches take their place. Midway through the first rise, the dough displays notes of al dente pasta or steamed potatoes. A yeasty character appears, like that found in certain champagnes.

At a certain point, the yeast activity levels off. More of the carbohydrates have been broken down and the aromas and flavors of the digested starch evolve. The dough delivers the earthy character found in cooked whole-cereal grains or dried beans that have been pre-soaked and cooked. When the baker chooses to use a cool fermentation process, especially if it involves retarding (or refrigerating) a dough overnight, the yeasty flavor is replaced with notes of green olive and a flint-like mineral note.

Left unchecked, it's possible for the grain to over-ferment. Even under refrigeration, a lean dough shows aromas of over-fermentation somewhere around 72 hours. The aroma and flavor notes displayed in an over-fermented dough include beer, a grapefruit bitterness and the aroma of turned red wine. ■

MICHAEL KALANTY, CEPC, CCE, LIVES AND BAKES IN SAN FRANCISCO.

The **Aroma and Flavor Notes for Bread®** infographic is available for your bakery or classroom. Visit www.MichaelKalanty.com to download the free file. For a large-scale mounted poster, purchase the high-resolution .pdf file and take it to a graphic service provider.

UNDERSTANDING ACID CHARACTER

Set aside a stainless canister of unpasteurized goat's milk, a vat of zinfandel grapes or a paste of water and flour, and the natural process of fermentation begins. The wild yeast and lactic acid bacteria (LABs) found on all these foods work together to produce flavor compounds. These compounds are acids, bringing sourness to fermented products such as cheese, wine and bread.

The acids deliver two styles of sour flavors in fermented foods, categorized as either lactic or acetic. The difference between the sour character of yogurt (lactic) and that of vinegar (acetic) demonstrates this.

Lactic acid lacks aroma. The flavor notes created by LABs are only recognized when you eat the fermented product. Greek yogurt smells like dairy. It doesn't smell sour. You've got to wait until the yogurt is on your palate to know that it's sour.

Acetic acids are volatile, meaning they have an aroma, too. You can smell and taste the sourness of vinegar. You also feel acetic acid when you smell it. Because it's volatile, it activates what's known as trigeminal nerve endings. Acetic acid—such as the acetone aroma note in vinegar—can cause a degree of pain, just like smelling nail polish or paint remover.

Instead of using the terms “lactic” or “acetic,” it's becoming common to describe the sour character of bread in terms of dairy or fruity sourness. It's more accurate and helpful to use other culinary references, such as “apple” or “cheese.” The ability to characterize a sour flavor as dairy or fruity is a big help in the menu design process. It helps flavor-pairing decisions with individual dishes and creates variety across the menu as a whole.

The smooth character of dairy sour pairs well with mild foods, especially vegetables: a base of cream cheese or sour cream for a vegetable dip; Mornay sauce baked over cauliflower with a crunchy layer of breadcrumbs; the cheese-covered crouton floating on the French onion soup. There's sensory science behind these classic flavor pairs.

The lean character of fruity sour notes cuts through rich, heavy foods. Duck breast with its vinegar reduction, or gastrique, the mustard coating on lamb chops, and the tomato/vinegar combination in many barbecue sauces are examples of this flavor-pairing strategy.

This brings the potential for producing specialty breads in-house. A creamy, dairy-flavored bread is a natural pairing for a vegetarian entree; a tangy hearth bread with hints of cider vinegar pairs with grilled pork or game dishes. Customized breads increase your customers' perception of value.

ANALYTICAL WORDS VERSUS JUDGMENTAL WORDS

Use words that are specific and analytical when tasting. Avoid judging the bread sample as “good” or “bad.”

“Fruity” is a general term that calls to mind specific words such as “citrus,” “berry” and “tropical.” These words are useful when tasting because they aren't related to the appreciation of a wine's quality. They are merely descriptors of aroma and flavor notes.

Preferences, our likes and dislikes, make for vague tasting words. “Fragrant,” “harmonious” and “elegant” are not specific. They're unclear and also judgmental, so they aren't useful descriptors when tasting.