Food Focus

The Fundamentals of FLAVOR

Take your cooking to the next level by mastering the concepts of salt, fat, acid and heat.

BY KELSEY CASSELBURY

A school meal can be lovingly prepared while following the strictest of nutrition regulations, but none of that matters if it ends up in the trash because the food just didn't taste very good. When that occurs, it's unlikely that the meal itself actually tasted *bad*, but rather that it didn't taste much like anything at all. It lacked flavor.

In 2017, chef and writer Samin Nosrat released a compendium of culinary counsel on this exact topic titled *Salt, Fat, Acid, Heat: Mastering the Elements of Good Cooking,* which was swiftly adapted into a four-episode Netflix show. Although the concept of building flavors using these four elements certainly isn't new to chefs and other trained culinarians, the book and the show brought these lessons to the forefront for those without a formal culinary education.

When it comes to the liberal application of these four elements in school meals, professionals often run into a formidable obstacle: federal nutrition standards, which limit how much salt they can use, as well as certain types of fat. But expert school chefs understand that proper, mindful use of these elements is the key to working within the nutrition regulations to develop flavorful meals. After 12 years in school nutrition, chef/consultant Brenda Wattles, RDN, **BLT Food and Nutrition**, sees "a huge shift" in schools wanting to do more speed-scratch and more scratch-cooking. Salt, fat, acid and heat "are extremely important when it comes to cooking from scratch because they add so much flavor," she notes. "Because we are very conscious about lowering sodium and decreasing saturated fat, I think these four elements become even more important in ensuring we are adding flavor to our food and making it taste delicious."

Types of Salt

Salt is salt, chemically speaking—all varieties are practically 100% sodium chloride, along with a few trace elements. The difference between salt varieties refers to the size of the crystals, but when you're measuring by volume (such as a teaspoon, a tablespoon or a cup), this size variation means salt products are *not* interchangeable.

Table salt: The crystals of common table salt are small and dense, which means it has more salting power than larger-crystal varieties. It's best used in situations where you want the salt to dissolve quickly and/or evenly in a liquid, such as when making a brine or a soup. Table salt often has anti-caking agents and iodine added in, the latter of which can give off a slightly metallic taste. Still, Wattles says that she prefers to use iodized salt in school meals because of the health benefits it provides for children. "For child nutrition, it's always at the back of my mind because I am a dietitian," she states.

Kosher salt: Kosher salt isn't named such because it's certified kosher, but rather it's used in the koshering process. It has larger, coarser grains, which makes it easy to sprinkle when you're salting by intuition and taste rather than by measurement. (In other words, when you're cooking at home!) One teaspoon of kosher salt weighs less than a teaspoon of regular salt, so keep that in mind when cooking.

Sea salt: Like the name indicates, sea salt is made by evaporating seawater and harvesting the crystals. It may contain more minerals, such as zinc, potassium and iron, than other types of salt, conveying a more complex flavor profile. Sea salt can also come in a range of colors, depending on where it was harvested. It's best used to finish dishes, such as sprinkling over meat or seafood right before serving.

Specialty salts: What about those other colorful salts that you may find in a specialty grocery store—for example, pink Himalayan salt or black Hawaiian salt? They're still mostly sodium chloride, but they pick up those gorgeous hues from the minerals found where harvested. While they may be more interesting to look at, these salts aren't significantly different in use from more common salt varieties.

What is it about these elements that make them so fundamental to flavor? Are all fats created equal? Does heat mean temperature or spice or both? What do chefs mean by using "acid"? If consumers use the table shaker to salt foods to their preference, should cooks hold back? Let's take a closer look at each element to understand how they work to contribute the "mmmmm" factor in meals.

SALT

Some 2,100 years ago, Roman philosopher Pliny the Elder allegedly stated, "Heaven knows a civilized life is impossible without salt." One could debate the attribution of that quote, but presuming he *did* write those words, dear Pliny knew then what so many foodies know now: Salt is a crucial—perhaps the *most* crucial—component in creating flavorful food.

Scientifically speaking, humans crave salt because it's made from an essential element (sodium) that the human body needs to survive (it helps to regulate fluids and blood volume). Culinarily speaking, many foods need salt to deliver flavor. Without it, "your food becomes bland," shares James Jabbarr, chef/trainer for **Clayton County (Ga.) Public Schools.** "If that salt is missing, the first thing we say is that the food is not seasoned, even if you have herbs and spices in there."

There's a reason for this: When used properly, salt doesn't merely add flavor; it brings out the desirable flavors in the food you're cooking. Rich foods taste richer; meaty foods taste meatier. Salt also diminishes negative flavors, such as bitterness. (Salt has some very practical purposes, too, such as preserving foods like meat and fish and strengthening gluten when baking bread, but the

5 Effects of Fat on Texture

Fat is vital to creating several different textures, which are, of course, siblings to flavor. One such texture is crispy—for food to crisp up, the water trapped in the ingredient's cells must evaporate, which occurs at 212°F. The Maillard reaction—which causes browning—begins to take place at 300°F. Fat can withstand temperatures of 400°F to 500°F or higher, enabling the Maillard reaction to occur without the food burning. (*Read more about the Maillard reaction and the smoke points of various types of fats in "Turn Up the Heat," November/December 2020.*)

Nosrat's book identifies four other types of texture that credit fat with their perfection: creamy, flaky, tender and light. Fat creates creaminess through emulsions, which occur when two liquids that would normally refuse to combine are forced, through beating, into joining together. A vinaigrette composed of oil and vinegar, then held together by the great unifier, mustard, is the perfect example of an emulsion. Other creamy emulsions you're likely familiar with include butter, cream and mayonnaise.

In baking, fat creates a flaky and tender texture by inhibiting gluten formation. When gluten develops in dough, the resulting bread becomes chewier—and that's often preferred. But when you're making a pastry, you want flaky tenderness. Fat coats the individual gluten strands and prevents them from sticking together and lengthening. In fact, that's where the name "shortening" comes from—it causes the gluten strands to remain short. Finally, fat can create a light texture when whipped—just think about what happens when you whip cream: Solid fat droplets break open, air bubbles get trapped and the cream becomes light and fluffy.

focus here is on flavor.) Keep in mind that salt doesn't necessarily have to come from a shaker; you can also add salt via use of ingredients such as soy sauce, olives and certain cheeses, like Parmesan.

While salt is perhaps the most controversial ingredient in school meals, this doesn't mean it shouldn't be used at all. Luckily, to build flavor in your recipes, you don't need to use more salt, you just need to use it *better.* In many cases, that means salting during the cooking process, rather than at the end. According to *Cook's Illustrated*, salt penetrates food slowly because it has to cross the cell walls. If you add the salt at the beginning of the cooking process, it has enough time to migrate into the food and season it evenly. If you salt items toward the end, the salt has only a superficial coating that strikes the tongue immediately—making the food taste salty, rather than legitimately seasoned.

Wattles understands that salting food is a tricky task in school kitchens, but she has two pieces of advice: First, salt raw meat the day before you cook it, if possible, as this essentially creates a dry brine. Second, "Salt is extremely important in roasting vegetables," she shares, adding that the two vegetables that need salt the most to taste delicious are potatoes and beans.

FAT

Like salt, fat plays an essential biological role in the human body by serving as an energy source, aiding in nutrient absorption and supporting metabolic functions, such as brain growth, which goes to explain why it's also often craved. In cooking, fat can serve as a main ingredient, such as olive oil in pesto; as a cooking medium, like butter for sauteing; or as seasoning, such as sesame oil in a stir-fry.

"Oh my gosh, fats are wonderful," Wattles enthuses. "We are biologically driven to enjoy that mouthfeel of fat. It gives a nice creamy flavor." When it comes to the taste of food specifically, fat carries flavor by coating the tongue, which allows the various aromatic compounds to stay in contact with your taste buds for a longer period of time.

Types of fat range from olive oil to vegetable oils (such as canola oil) to oils from seeds and nuts (peanut, sesame, coconut, etc.) and, of course, butter. "We need to stop being so afraid of using real butter," Wattles declares. "Obviously, we can't use a whole lot, but a teaspoon of butter on a piece of toast? You're not using a lot of saturated fat, but you're providing that nice mouthfeel."

Wattles is referring to the limits of fat in school meals: no more than 10% of calories can come from saturated fat. This type of fat, which is considered to be less healthy than unsaturated fats, typically comes from animal sources. Unsaturated fats, such as vegetable oils, olive oils, avocado and nuts, come from plant sources.

Understanding pH and Balance

Any trained chef knows that there's all sorts of chemistry going on in cooking. To truly master the use of acid in your recipes, you first have to go back to one of the fundamentals learned in chemistry class: the pH scale. The term pH stands for "the power of hydrogen," and the scale measures the level of ***acidity*** or ***alkalinity*** of virtually everything, including foods. Water is considered pH neutral and is a designated "7" at the middle of the 14-point scale. Anything that measures zero to 6.9 is acidic; anything between 7.1 to 14 is alkaline. Vinegar and lemons, for example, both have a pH of 2, while buttermilk's pH is 4.5.

To the human tongue, anything below a 7 on the pH scale simply tastes sour. But, of course, your goal in using acid isn't to make your food taste sour nor is it an effort to affect the final pH of the full dish. Acid is used for balance—it balances sugar, it balances salt, and it balances fat, bitterness and starch. Nosrat recommends layering acids in the culinary process, starting by incorporating certain acids during cooking, like when you add wine to arborio rice when making risotto, and then using a garnishing acid at the end of the process, like squeezing a slice of lemon over the same risotto just before service.

In Clayton County school kitchens, Jabbarr says that the cooks like to use a butter spray, which gives food flavor without overdoing it on saturated fat. However, he's also a fan of olive oil. "The fat gives menu items flavors. It stops a food from being dry," he explains.

ACID

Let's talk about a flavor fundamental that has no risk of running afoul of nutrition standards for reimbursable school meals: acid. A category that includes vinegar and citrus juices, tomatoes and buttermilk, acid can often make up for a minimal amount of salt in a dish. "If there is no salt, but you have an acid, whether it's lemon juice or vinegar, the acid hits the tongue and gives you that bite that you're looking for," says Jabbarr. "You're kind of fooled into thinking that it's seasoned well." Also like salt, acid can minimize the bitterness in food and highlight the flavors of other ingredients in the dish.

This is precisely why acid is such a key tool in the arsenal of a school chef trying to make tasty food without overdoing it with sodium. "Acids are my favorite. They add so much flavor," Wattles exclaims, noting that using acid in a vegetable dish can really brighten up the flavor. Unlike salt, however, you want to add acid to the dish at the end of the cooking process; otherwise, its effects will become muted. Structurally, acid will have an effect on other ingredients in a dish; for example, an acid is often used to tenderize meat as part of a marinade.

Acid is a good complement to fat. That delicious mouthfeel winds up coating the tongue, eventually dulling flavor receptors. The presence of an acid in the same bite can wash the fats away. In fact, acid is all about adding the balance of an often-sour contrast to salt, sugar, starch and bitterness.

Some types of acid can be hard on the budget for a school meal operation—a ultra-high-quality balsamic vinegar can cost up to $200 an ounce! Jabbarr's acidic staple, distilled white vinegar, is much easier on the budget. "When it comes to the school lunch program, we're financially strapped," he says. "Even though balsamic vinegar sounds great, I'll go with white vinegar instead because it also tastes great and it helps with our finances." Citrus juices, such as orange, lemon and grapefruit, are also budget-friendly acid options.

HEAT

In Nosrat's book, *Salt, Fat, Acid, Heat,* the final element of good cooking is flavorless and intangible—her reference to heat is the energy that cooks food. However, we're going to stray from Nosrat's version of this element and look at heat as it pertains to spice. Use of spices, whether or not they're *actually* "spicy," can transform your cooking—like acid, they add flavor without requiring salt or fat.

When we think of the heat delivered by spices, typically those

are some form of chili pepper. They contain capsaicin, a chemical compound that causes a burning sensation in the mucous membranes of the mouth. The more capsaicin, the higher the pepper is in Scoville heat units (SHUs), a measurement system—albeit a somewhat subject one, given people's varying spice tolerance—that ranks peppers for their spicy heat. Sweet bell peppers have zero SHUs, as they don't contain capsaicin. Carolina Reaper chili peppers, named the hottest pepper in the world by Guinness World Records, have 1.5 *million* SHUs. Jalapeños and habaneros, both commonly used in spicy cooking, have 5,000 and 150,000 SHUs, respectively.

Peppers aren't the only spicy spices, though. Paprika, ginger, cinnamon and black pepper offer a flavor kick to meals. These, and other spices, are often referred to as "warming spices," and they provide a deep aroma and powerful taste.

Whether children embrace, tolerate or reject spicy foods depends on their exposure to this heat element in foods consumed at home. And with more processed snack foods carrying a spicy flavor profile, students may be getting an earlier introduction. "This is where I really say bravo! At one time, we couldn't use any type of spices, but now there's been a trend that the students want spicy," Jabbarr shares, adding that he likes to use crushed red pepper flakes and cayenne pepper in his cooking. "Most people just want that bite."

A tried-and-true way to get the most flavor from spices in your cooking is to toast or "bloom" the spice before adding it to a dish. To *toast* a spice, you heat a dry frying pan on the stove, then sprinkle the spice(s) in an even layer and heat it, gently shaking the pan to ensure the spices don't burn. *Blooming* spices means doing pretty much the same thing, except you heat oil in the pan before adding the spice, then use that infused oil in your recipe.

TICKLE YOUR TASTE BUDS

School nutrition professionals are more than just cooks, Wattles insists—they're "recipe scientists," given how many different factors they must take into consideration when putting together a reimbursable meal. "These four elements are a big part of the science behind cooking," she notes. Make sure you're giving as much attention to these flavor-builders as you do to calorie minimums, portion sizes, prep efficiencies and ingredient cost. "Sometimes, I think we forget about the cooking techniques that add so much flavor," Wattles laments. "We need to be thinking about creating a culinary culture in our school kitchens, where we can have so much fun." SN

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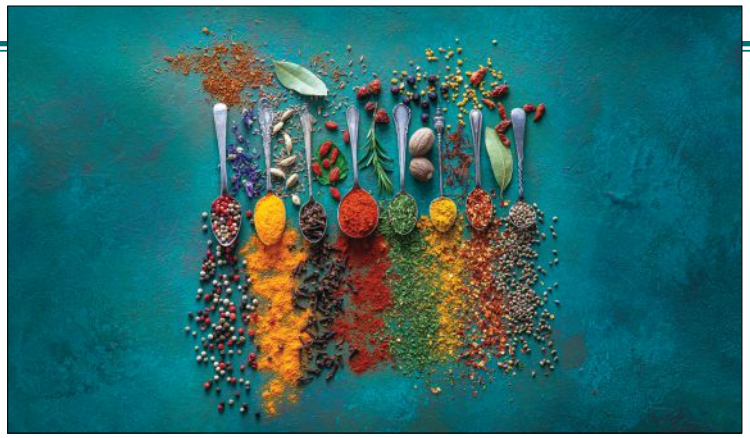

Sizzle, Crack, Pop: The Impact of Heat

As flavorless and intangible as it may be, heat no doubt plays one of the most transformative roles with food. Understanding how different foods—or, more specifically, the molecules within them—respond to varying levels of heat will make you a better cook.

Food is composed of four types of molecules: water, fat, carbohydrates and protein, and each of these responds to heat differently. When you cook the water out of food, it becomes crisp or dry. When you add water, like when making rice or pasta, the item becomes tender. The lack of heat can make a big difference on the water in food, too, such as when you freeze food without packaging it properly. As the water inside the food expands, the cell walls burst and that water crystallizes on the surface of the food. When you thaw and cook the food, the texture of the end result will be different than if you had cooked it fresh.

Fat reacts differently to heat than water because it has a higher smoke point (*see "5 Effects of Fat on Texture" on page 51*). Carbohydrates generally absorb water and break down when heated, although sugar reacts differently and melts until the water evaporates and caramelization occurs. Proteins "denature," meaning the molecules unfold or break apart, and then coagulate, or join together more tightly, when they are subject to heat. The effect, however, differs from one type of protein to another. The proteins in lean beef, for example, coagulate and become tough, dry and chewy at 140°F, while that same reaction doesn't occur in chicken or turkey until the temperature hits 160°F. Tougher cuts of beef, such as brisket or chuck roasts, perform better when cooked "low and slow," giving the heat time to break down the chewy proteins found in the animal's connective tissue, turning them to gelatin and allowing the beef to become tender and soft.