

Executive Summary

- A look inside the perpetually hot pizza market—from foodservice to retail.
- Building in performance characteristics, such as moisture control.
- How to create perfectly balanced frozen pizzas.



Photo: Mushroom Council

Thinking Outside the Pizza Box

By Kimberly J. Decker
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Chefs and product developers embrace pizza as an outlet for culinary expression. “Pizza is a palette—a carrier for anything,” says Dianna Fricke, C.R.C., C.W.P.C., executive chef, research and development, J.R. Simplot Co., Boise, ID. “It’s perfect for me as a chef because it allows me to take familiar items and put a twist on them. If you take something that everybody’s familiar with and put it back on a pizza, you’re making it hand-held, portable and easy to eat.”

Such easy adaptability has let pizza evolve with the American public, passing through a healthy phase, and an exploration of multicultural influences. “You’re still seeing a lot of cross-cultural ingredients,” says Fricke. For example to give pizzas a Mexican angle, she uses “chipotle pesto as

the base, then the bean (and corn) blend, and some fresh cilantro sprinkled on top.”

Liz Hertz, marketing director, Burke Corporation, Nevada, IA, says a chorizo crumble or slice can “create a little more interest with a little more heat. Taco pizza has been around for a while on the foodservice side, but Mexican flavors seem to be making an appearance on the frozen side, as well.”

A global thrust can only propel pizza so far, suggests Joseph O’Connor, corporate executive chef, Great Kitchens, Inc., Romeoville, IL. He thinks it may have more traction in foodservice, where a menu might make room for a bean-burrito pie. In retail, he believes, the mood remains old-school. “You have to fit that pizza concept—literally and figuratively—into a box,” he says. “You have to go after

a certain customer, and Asian-inspired would only appeal to a very small niche.”

O’Connor sees pizza’s future as rooted in its past. Pizza, he contends, follows the 80-20 rule: 80% of sales come from 20% of the selection—and that 20% draws from the Mediterranean pantry where pizza was born. That means “cured meats, tomato sauce, anchovies, olives, the classic cheeses, a crust that’s crisp and rises on its own,” he says.

As he diversifies his company’s lineup, he strives to fit a core Italian-Mediterranean theme, such as white pizza with ricotta, spinach, feta and tomatoes. “It’s different, but it fits the pizza moniker conceptually.”

A balancing act

When building the perfect pizza pie, each piece of the puzzle requires both technical and culinary analysis.

Moisture might be “our biggest enemy, in terms of how you build your pizza,” O’Connor says. Thin, glassy crusts in artisan pies are particularly vulnerable to becoming waterlogged, and product developers must keep moisture in mind with every topping choice.

“The crust is a huge sponge for extra moisture,” says Charlie Baggs, president and executive chef, Charlie Baggs, Inc., Chicago, “so controlling moisture with topping choice or cooking technique helps control crust texture and freeze/thaw properties.”

The first hedge against a soggy crust is the ideal crust-to-topping ratio. “On those cracker-like artisan crusts,” Fricke says, “you don’t see a lot of ingredients. Usually, those aren’t your layered, Chicago-style pizzas. They just have a few smattered ingredients on top—cheese, some fresh vegetables—that just get warmed in the timeframe, and not necessarily fully cooked.”

Heat treatment is another moisture-mitigation tool. “Precooking sausage and draining the fat helps,” Baggs says. “Sautéing or roasting vegetables also reduces the moisture and maximizes the flavor.”

But again, balance is critical. As O’Connor points out: “You don’t want to burn your crust to a crisp just to get all your toppings hot. So you’ve got to manage the dynamic of how thick the crust is to how thick the toppings are.”

Adding specialized systems to develop oven-browned color on pizza toppings and crusts is another option “so that the desired color can be obtained without long

cook times,” says Mark Purpura, technical service manager, Advanced Food Systems, Inc., Somerset, NJ. Some versions go directly into the dough, while others are sprayed or brushed on, or used as a dip for the toppings. “It works under several cooking conditions, the best being the oven,” he says. “Some browning can occur in the microwave, but it depends on the cook time.”

Formulators can tackle moisture management from the crust up or the topping down. “A moisture barrier can be created by applying a gum solution onto the crust,” says Aida Prenzno, laboratory director, Gum Technology Corporation, Tucson, AZ. “The key is to choose a product that will create a film that is flexible and has great adhesion properties.” Carrageenan and cellulose gum are common choices, she says, while adding gums like konjac, guar and xanthan to the dough itself can bind moisture and reduce unwanted texture changes over time, especially in frozen pizza.

One moisture-barrier system “serves as an interface between the crust and the sauce” while also slowing crust staling, according to Purpura. The blend of starches, gums and emulsifiers forms an emulsion when hydrated and combined with oil that processors can spray or brush on. “Only a very small amount needs to be applied,” he

suggests, to prevent moisture migration from the sauce to the crust, as well as freezer burn on the crust.

Working from the toppings down, Prenzno says any stabilizing system should protect emulsions, reduce syneresis and maintain sauce viscosity during baking and storage. “Synergistic combinations of xanthan gum, gum arabic, carrageenan, or xanthan gum and propylene glycol alginate are good options to stabilize an emulsion,” she says. “A methycellulose-xanthan-carrageenan combination is great for heat-stable sauces.”

Getting sauced

As a fluid system with sometimes considerable chemical and physical complexity, sauces pose a particular challenge to moisture control and stability. At its simplest, a pizza sauce “is basically just tomato paste, water and sometimes diced tomatoes for a chunkier texture,” says Rachel Zemser, CCS, a San Francisco-area food technologist who writes “The Intrepid Culinologist” blog on the CULINOLOGY® magazine website. “In general, the goal is to have a sauce that’s thick enough to stick on the pizza, and is easily spreadable but not too runny.” A good benchmark is between 15% and 30% total solids.

O’Connor aims for a viscosity “in the 4 to 6 Bostwick range.” This level of viscosity aids the sauce’s performance in the facility, he notes. Beyond any potential moisture interactions with the crust and eating quality, a sauce that’s too thick or too thin reduces its ability to spread quickly and accurately when applied to the crust in the plant.

Tomato paste can help achieve thickness, Zemser adds, but at a price that suits it mainly to high-end, “natural” sauces.

Gums and hydrocolloids can economically maintain sauce viscosity. “Xanthan is definitely one of the most-popular gums in this type of application,” Prenzno says. “Other gums, like konjac, fenugreek gum, carrageenan, gum arabic, tara and tragacanth, will work well. In some applications, adding cellulose gel or oat fiber can create a more-uniform, pulpy mouthfeel.”

When including tomato chunks in a sauce, “it’s important to remember that the chunks will contribute water to the formula, so you have to back off on the added water,” says Zemser. Same goes for mushrooms: “Sometimes, formulators will reduce the water in a sauce if they know that the mushrooms on the pizza will add water to the mix. It’s all a balancing act of moisture and viscosity,” she says.

Back to the garden

Mushrooms are notorious for introducing unwanted moisture to a pie. “All the mushrooms seem to behave fairly similarly,” says Peter Leonavicius, chef, Toasted Pheasant, Tampa, FL. “Especially the ones with the large caps. If you keep cooking them, first they draw in moisture, and then afterward they expel it.”

But mushrooms aren't alone. An irony of pizza, O'Connor says, “is that most pizza vegetables are the highest-moisture vegetables: mushrooms, peppers, onions, spinach, fresh tomatoes. It's all about the supply chain. Ideally, vegetables are IQF and they're not temperature-abused, so you don't get that water crystallization that breaks down the cell structure and lets all that moisture weep out.”

Cheese, please

The range of cheeses that consumers find appealing is expanding. Still, “low-moisture, part-skim mozzarella and whole-milk mozzarella lead the way on pizzas,” says Dean Sommer, cheese and food technologist, Wisconsin Center for Dairy Research, Madison. “They're going to give you much more stretch and stringiness. They're also very meltable. And they are somewhat reduced in fat from whole-milk cheese, so they don't oil-off so much. They have a nice, tender chew and bite, and they tend to be mild-flavored, so they give you nice, buttery notes. All those things together make mozzarella king on pizzas.”

These perfect attributes are built into the cheese itself. As a *pasta filata*, or stretched-curd, cheese, mozzarella's curds are melted and worked in 160°F water. “It's almost like making saltwater taffy,” Sommer says. “You just mix and mix. And what that does is aligns the protein fibers in the cheese so that it gives the cheese stringiness as a pizza cheese and much better stretch when melted on the pizza.”

There's also a pH factor involved. Sommer says that cheese stretches best at a pH range of 5.2 to 5.3—right about where mozzarella is made. Cheddars settle out much lower, whereas a Brie has a much-higher pH. So they wouldn't stretch or melt right, he says. Also in mozzarella's favor is that it's made with thermophilic cultures. “One of the unique qualities of those is that they generate galactose sugar in the cheese,” he says, “which interacts with the proteins and gives it those nice Maillard browning colors on the blisters when you bake it.”

So if mozzarella is the perfect pizza cheese, what can

be done to improve it? “Emulsified salts can be used with some higher-moisture pizza cheeses for pizzas that are subsequently frozen,” Sommer says. “This can improve the bake performance of these cheeses.” Shredding the cheese adds convenience, saves labor and eases portion control, but “the downside is that if it's pre-shredded, most likely they've added anti-caking cellulose powder so it doesn't clump,” he says. “That is typically a slight negative for performance on a pizza, because it inhibits melt a little.” Processors might add 1.5% to 2.0% to keep shreds separate, improve flow, and tie up free oil and water in the melted cheese.

If a processor goes with pre-shredded, Sommer suggests choosing a feather shred, which is “wide, long and thin. It melts better, stretches better, and gives better coverage on the pizza. It tends to coalesce really nicely so the red sauce doesn't seep through.” A dice may be easier to portion and handle, but “the sauce tends to bleed through because of the way the dice melts on the pizza,” he says. And if you shred the cheese yourself, the soft texture of higher-moisture options makes them difficult to shred. The ideal moisture level for a low-moisture part-skim mozzarella, he says, “would be 48% to 50%. Above that, shredding becomes very problematic.”

Of course, pizza welcomes cheese choices beyond mozzarella. But with those, “what you're really adding is the flavor,” Sommer says.

O'Connor likes to work with smoked Gouda and fontina, as well as a mozzarella-Provolone blend. “Provolone adds that lipase flavor that gives a kind of aged-cheese note,” he says. He also praises his “cheese sprinkle,” a topical blend that, in its premium manifestation, contains Asiago, Parmesan, Romano, garlic, oregano, parsley and basil. “When the dry heat hits, the smell of the cheese and garlic and herbs really comes out,” he says. The cheeses' high salt content helps spike the flavor, too.

Pleasures of the flesh

Pizza manufacturers also expect functionality from meat toppings. Tradition and practicality steer them toward cured options like pepperoni, salami and ham, with little in the way of excess moisture. But more meats, from chicken strips to beef crumbles to fresh sausage, are available for pizza applications.

Precooked products eliminate a lot of uncertainty. “Consistency and staying within spec are key reasons that

pizza manufacturers look to a precooked meats supplier,” says Hertz. “Standardizing physical attributes such as size helps ensure that production runs smoothly. Ease of use comes from making sure that the product works well in production equipment. And consistency of flavor, appearance and mouthfeel are also important to ensuring that the consumer is satisfied.”


With nutritional labeling now the law of the land, “processors want to minimize changes in their ingredients statements,” Hertz says, noting safety is another draw. “When working with raw meat, cross-contamination is a huge concern.”

Although meats can suffer from freeze/thaw cycling en route to the manufacturer or foodservice unit, many operators prefer IQF meat whose quick freezing “helps lock in freshness and flavor,” Hertz says. “One of the advantages of using an IQF precooked meat is that it can go onto the pizza in the frozen state at the production site. This helps maximize shelf life. Then rethermalizing the pizza at home simply enhances the flavor.”

With microwave reheating, the meat tends to toughen. However, some products are formulated to withstand this. “Adding gums to the meat toppings during their processing will help the texture and the stability of the product overall,” says Prenzno. “For example, adding a carrageenan-xanthan blend to a sausage or adding a guar-xanthan to a ground-beef mixture will help stabilize the emulsion and reduce the oil migration during the cooking.”

Hertz adds, higher-fat meats “hold up better under warming lights,” whereas reduced-fat varieties “are more likely to taste dry.” Inherently lower-fat meats, such as chicken strips or Canadian bacon, can still succeed on pizzas, she says, “but here again, product development needs to address this with sauces, or by ensuring that the meat is under the cheese to protect it from heat during baking.”

Which meats get heaviest rotation on pizzas? No surprise: “Pepperoni continues to be the most-popular meat topping for pizza, followed by pork sausage,” Hertz says. “These are traditional favorites, probably due to the flavor, spiciness and succulence they lend.” No matter which meat you choose, “the flavor profile must fit the overall recipe concept,” she adds. “Sometimes, a less-intense meat is desired so as not to compete with subtle flavors, such as artichokes. More often, the flavor is selected to provide a specific component of the overall taste experience, as in the garlic in a garlic-flavored chicken strip, a sausage that features fennel, the characteristic beefiness of a beef crumble or strip, the spiciness of pepperoni and some Italian sausages, or the typical pepper and sage of a breakfast sausage.”

And even though some more-adventurous flavor combinations might seem like tough sells at first, any inspiration is worth keeping in mind. They may not be the pizzas of today, but they’re probably not totally pie-in-the-sky. 

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For a look inside “The Artisan Pizza Revolution”—where pies take on a decidedly gourmet edge—visit foodproductdesign.com.

EXCLUSIVE

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