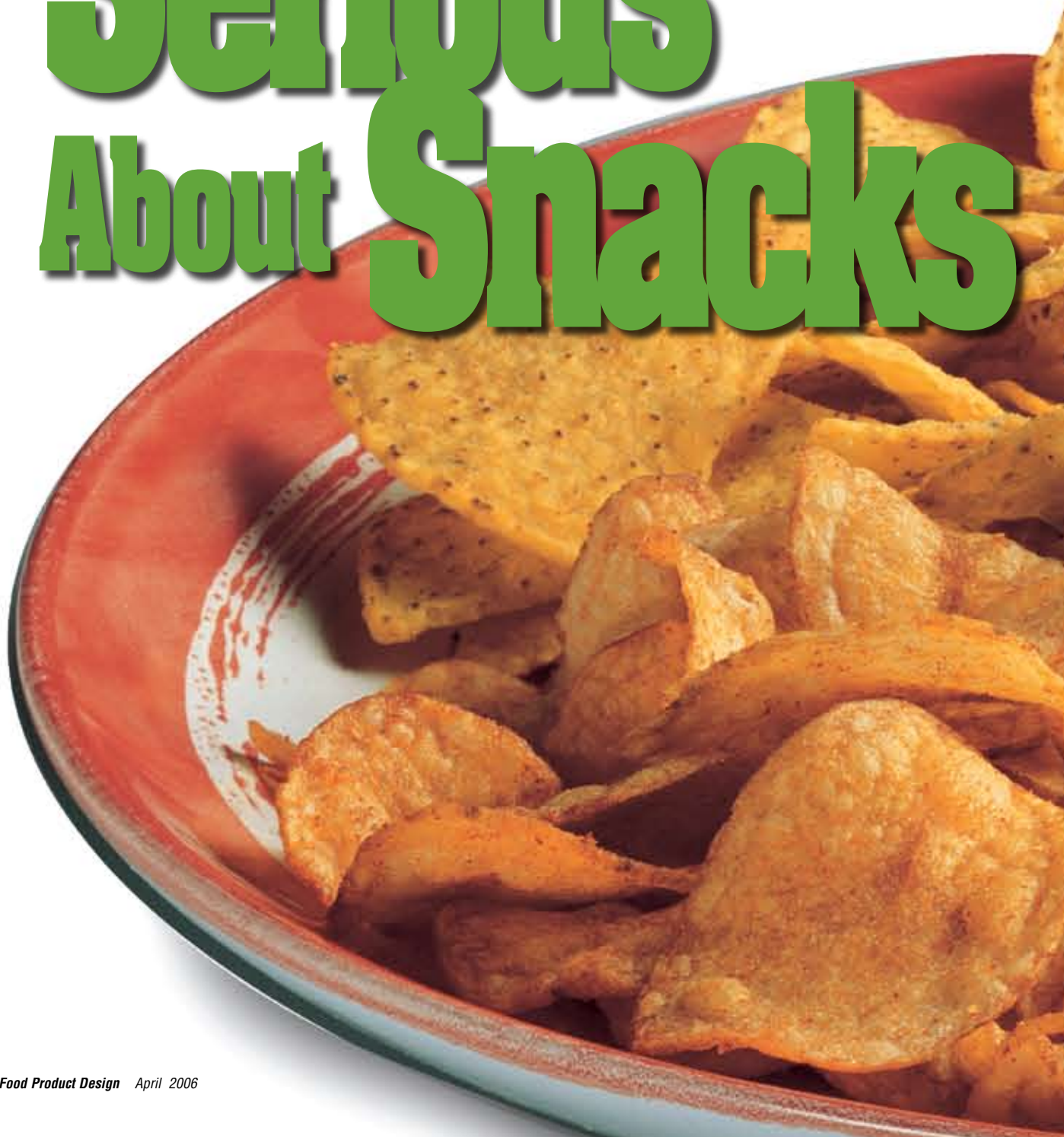


Getting Serious About Snacks

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Don't say she didn't warn you. Remember all those times your mother told you to lay off the snacks because they'd ruin your dinner? And remember how you never listened? Well, she was right. And now look what's happened. Dinner—not just the meal, but the entire institution—is ruined, a casualty of our collective refusal to do as Mom said. Instead, we kept snacking, giving in so heedlessly to our growling stomachs and thirst for instant gratification that actually having to wait for dinner felt like an injustice. And sitting down to a proper breakfast or lunch? How quaint.



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Adding extruded whey protein in a crisped form into snack bars adds valuable protein with greater health appeal.

Attack of the snack

Never before have the “three squares” seemed so square. And although it’s by now cliché, it bears repeating: We are a nation of snackers, modern-day hunter-gatherers stitching together sustenance from scattered snacks. Slow food feasts and leisurely sit-down dinners have their time and place, but for day-to-day feeding, we just can’t be bothered with actual meals. No wonder “Nearly half of Americans now consume most of their meals away from home or on the go,” according to an article in the Feb. 12, 2006, issue of *The New York Times Magazine*.

Of course, that’s not news to Christopher Clark, vice president, operations and membership, Snack Food Association, Alexandria, VA. “It’s the convenience factor and people eating on the go, in the car,” he says. “I was meeting with our computer consultant the other day and he said that he almost exclusively has lunch in the car. He told me, ‘The best time to have lunch is when I’m planning to meet with one client over here and I’ve got a 45-minute drive to my next client over there, and so I eat while I’m on the road.’” What is this motorist’s menu? “Pringles and a handful of other things,” he reports. “And I’m sure there are probably a thousand other people doing the same thing every day.”

There are. Thanks to their impatient appetites, the snack food market now represents an \$80 billion chunk of the American economy. That’s some seri-



Photo: Dairy Management, Inc.™

ous snacking. But the irony of treating snacking as a serious pursuit is that snacks were never meant to be taken seriously. They were the carefree, sweet-or-salty “fun” foods we snuck between “real” meals of good-for-you meat and vegetables. It’s for good reason that snacks acquired a dubious reputation among moms who equated them with “junk” food.

As Americans consume more of their calories as snacks, these whimsical between-meal treats will have to shoulder more of the responsibility previously assigned the three squares—namely, satisfying our hunger, our senses, our schedules and our nutritional needs. “The snack is the new small meal,” says Michelle Peterman, vice president of marketing at Kettle

Foods, Inc., Salem, OR. “And as such, consumers have higher expectations for snacks to fill.” If the food industry is to fuel a nation of serious snackers, manufacturers will have to get serious about formulating snacks.

Sussing out the snackscape

The conventional wisdom that snacks are supplanting meals raises the question of just what distinguishes a snack from a meal in the first place. That, in turn, hinges on the definition of a snack, which is itself a matter of some debate.

Some would argue that if we consider a food a snack, then it is. Such big-tent inclusiveness describes the scene at the Snack Food Association,

whose membership, according to its website, “includes, but is not limited to, manufacturers of potato chips, tortilla chips, cereal snacks, pretzels, popcorn, cheese snacks, snack crackers, meat snacks, pork rinds, snack nuts, party mix, corn snacks, pellet snacks, fruit snacks, snack bars, granola, snack cakes, cookies and various other snacks.” That hardly narrows things down.

Defining a snack in terms of what it’s made of misses the point anyway. A snack is less a function of its ingredients than of when, where and how we eat it. In that sense, a snack is anything eaten outside normal mealtime boundaries. Granted, in today’s post-meal era, that still includes nearly everything. But if you consider that a food eaten away from the table must necessarily meet several criteria—it’s got to be ready-to-eat, portable, compact, consumable without cutlery and convenient, for starters—you begin to develop a feel for the terrain of the American snackscape.

Perhaps even more pertinent than what makes something a snack is what draws us to snacking. The answers there speak to the very societal and psychological forces that characterize the modern condition. Just peek at your coworker’s desk, your child’s backpack or your own automobile cup holder. No matter the time of day, odds are you’ll find a bag, box or bar of something just waiting to be munched. With their round-the-clock ubiquity, snacks no longer confine themselves to isolated occasions such as the mid-morning coffee break, the afternoon nibble or the notorious midnight nosh. The message is that with no time to tackle a legitimate meal, we’ll take whatever nourishment we can get, whenever we can get it.

And, given that our willingness to cook has fallen in direct proportion to our rising infatuation with gourmet cooking and celebrity chefdom, we’d just as soon let Jamie and Rachael fuss with the slicing and dicing while we settle back to watch, snack in hand. What’s more, all that TV-viewing has truncated our attention spans to the vanishing point, so our snacks had better reflect our wired environment: pixelated and digitized into cookie “bits,” brownie “bites” and pretzel “nuggets.” Even a

Mature consumers can appreciate the depth and subtlety of an aged Cabernet, and they expect comparable refinement from their snacks.

whole apple, let alone a whole meal, is just too much commitment. And mini snacks take less time to chew.

This ascendancy of the snack has implicated it as a symbol, symptom and, perhaps, even a source of the fractured family meal. The accusation isn’t baseless. With kids and parents keeping different schedules and cultivating different tastes, heaven forbid anyone should have to inconvenience himself by compromising on when and what to eat. And don’t forget that ours is a fiercely individualistic society that venerates the consumer. The Internet, iPods and the BlackBerry have spoiled us rotten, conditioning us to demand and receive what we want, when we want it. Single-serve snack packs with formulations and flavors personalized “just for us” are merely one feature of what is shaping up to be a repeat of the Me Generation, geared to the 21st century.

The catch is that the Me Generation, Part 2, transcends gen-

erations. Boomers, Xers, ’tweens—we all want it our way, right away. Notes Joanne Ferrara, senior director, research and development, Spicetec, Cranbury, NJ, “Snacking is part of the way people of all ages eat today.” Thus, demographic groups up and down the age scale, as well as across ethnicities and cultures, share a weighty stake in their snacks—and snack manufacturers had better pay heed.

Snacks get sophisticated

Take the boomers, for instance. It may well be this generation’s overscheduled existence that has given the biggest boost to snacking as a way of life. With money to spare, frequent-flier miles under their belts, and the cultivated palates to prove it, they’ve also given rise to what we might call “lifestyle snacking.”

Well-schooled in the niceties of cuisine, mature consumers can appreciate the depth and subtlety of an aged Cabernet, and they expect comparable refinement from their snacks. Their connoisseurship has inspired a category of upscale snacks targeted to well-heeled consumers. “We’re definitely seeing that, especially in items for the boomers, the people who want to spend a little bit more,” says Jean Bosenbecker, R&D manager for snacks, Kerry Ingredients—Kerry Savory Ingredients, Waukesha, WI. The expansion of organic and “artisanal”

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snacks exemplifies the grab for high-end snacking dollars. “Typically, in those niche items, they use raw materials that are different than in the standard products that you see,” Bosenbecker explains. “The chip manufacturers may be buying, perhaps, a better-quality potato or a different blend of corn, or they might combine corn and beans to make a nice corn-and-bean type of tortilla chip.”

Such discrimination is the animating philosophy at Kettle Foods. “We don’t call the people on our line ‘craftsmen’ for nothing,” says Peterman. “They really do craft our chips,” hand-cooking them in vats of expeller-pressed, high-oleic safflower and sunflower oils that, Peterman says, have “always been *trans*-fat free.” The

company also prefers the stronger-tasting, “high-maintenance” Russet over standard chipping potatoes, leaving the skin on and letting the natural sugars caramelize to produce a more rustic-looking chip that, ironically, commands a premium for its very rusticity. Notes Peterman, “If you look inside our bags, there are all different shapes and sizes. We call it lovely imperfection.”

Flavors on the edge

It’s a forward-thinking—some might say risky—approach. But thinking ahead and taking chances increasingly signals “upscale” to consumers, who are taking their own chances when it comes to snack-food flavors. According to Bosenbecker, “You’re

seeing interesting profiles: roasted-peppercorn cheese or habañero mango, combinations of flavors that adults are looking for.”

Ferrara agrees: “There’s no doubt about the fact that America’s palate is more sophisticated than ever before.”

The evolution of the “hot-and-spicy” trend illustrates this microcosm. Not long ago, consumers sought out the novelty of “going for the burn,” and the spicier the snack, the better. But lately, notes Michael Sigmundsson, senior research scientist at Kerry’s Kent, WA, location, “I think people want more complexity in their snacks than they did before.”

Stephanie Doan, senior food technologist, McCormick & Company, Inc., Hunt Valley, MD, has witnessed the same shift. While the yen for spice persists, she says: “The definition of hot and spicy has evolved from the ‘so-hot-you’ll-wish-you-were-dead’ phenomenon to a much more complex layering of heat and flavor. It includes not only red-pepper heat but specific heat types like wasabi or black pepper, blends of multiple peppercorns, and region-specific chile peppers—each with nuances in flavor profile, from smoky to green.”

Anticipating which flavor nuances will head down the pike often means calling on research chefs to translate culinary trends into the snacking vernacular. On that point, Cynthia Sasaki, Kerry’s senior research manager in Kent, says, “We’re very fortunate



To serve today’s health-conscious consumer, replacing unhealthy high-trans hydrogenated fats with functional alternatives in snacks is one of the industry’s highest priorities.

within our division to have a chef on staff. He is continually looking at flavor profiles and developments that are coming through the Research Chefs Association and providing information to developers.”

The key to capitalizing on such predictions, however, is identifying the flavors that can actually make the transition from concept to cracker, and when. “Our chef is seeing a lot of mango chutney-type products, where they’re combining fruit and savory, and I can see something like that eventually transferring to snacks,” Bosenbecker says. “But what I’ve seen in the past is that it needs to be presented in restaurants first, and that there’s a certain timing to when consumers and snackers are ready for something like mango chutney to become mainstream. Once it hits and becomes readily available and people decide that it’s a profile they like, that’s when I think it becomes great pickings for a snack flavor profile.”

In the end, Ferrara believes that culinary crossover “is a natural” in driving new snack profiles. “It’s fascinating to see how flavors jump from the kitchens and grills of ethnic restaurants to mainstream snacks,” she says. Jalapeño-flavored potato chips, wasabi-spiced crackers and pizza-flavored everything are just a few of the success stories she’s seen. “Wasabi is a great example of an ethnic spice that has gained mainstream popularity and is being used in all different kinds of snacks,” she notes. “Chipotle is another with even more widespread appeal.”

Around the world in 80 snacks

While timing can make or break an internationally inspired flavor, America’s diversifying population, as well as the demographic climate in

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which our nation’s snackers now mature, has drastically shortened the time it takes to put a global flavor on the local radar.

In the summer of 2005, Kettle Foods launched two new potato chip flavors: spicy Thai and Cheddar beer. “Without a doubt, the two have been our two most successful product launches in our history,” Peterman says. But, in a twist that defied expectations, “it’s spicy Thai that’s getting the most attention,” she says. “It’s already exceeding some of what we call our ‘legacy’ flavors that have been in the house for more than five to 10 years.”

When spicy Thai bests an old chestnut like Cheddar beer, you know that tastes have turned a corner. “That’s the canary in the coalmine,” Peterman declares. “Maybe five years ago it might have been too early. But Thai food is the new Chinese.” Making spicy Thai’s triumph even more impressive is that the flavor stemmed from a people’s choice contest held on the company’s website. “We put both flavors out there, and we expected that Cheddar beer would be the hands-down favorite,” Peterman recalls. “Then spicy Thai came out from nowhere and just surprised all of us. So we said, ‘The fans voted. Let’s make it.’”

As for this year’s contest—a “Happy Hour” edition, in case you’re curious—the competitors haven’t eased up on the palate-pushing pace. As of this writing, Buffalo blue cheese, spicy

Mary, creamy Caesar, Tuscan three-cheese and “dirty martini” all remain in contention.

The demographic snack

While a “dirty martini” potato chip might raise sober snackers’ eyebrows, twenty-somethings and GenXers have just the “hip” quotient to “get” Kettle Foods’ point—and to like what they taste. This is the cohort, after all, that opened its arms to tamari-seasoned *edamame*, crispy yam and taro chips, wasabi-flavored rice crackers, Indonesian shrimp puffs, and other “alternative” snacks. Their younger siblings are no less daring. “The younger generations grew up eating out,” Ferrara says, “so ethnic flavors and foods are part of their normal menu mix.”

“The interesting thing I’m noticing about kids,” Bosenbecker adds, “is that you go to an Asian restaurant and they’re ordering the spring rolls. They aren’t just ordering hot dogs or pizza anymore. They’re trying everything the adults are trying. Kids have all the confidence in the world to sit down with a Chinese menu, a Thai menu, an Indian menu and order things. So their palates are becoming, perhaps, even more discriminating in terms of flavor profiles. And I’m talking about children in their young teens. So I’m wondering, in five years when they’re 18, what kinds of snack profiles will we be doing then?”

It stands to reason that if for-

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Photo: Kerry Americas

eign flavors can put their stamp on America's snacks, then American snacks might also shape the snacking habits of new immigrants. While many immigrants, eager to assimilate, do enjoy mainstream American snack seasonings—salt is a cross-cultural common denominator—"the difference today is that the market is being further segmented to reach additional niches, and marketers are more open to targeting new flavors to specific locations with a high concentration of a particular ethnic group," says Tom Rieman, senior business marketing manager, cheese powders, Kraft Food Ingredients (KFI), Memphis, TN.

"What's interesting," Ferrara also notes, "is that the authentic ethnic snacks that manufacturers are introduc-

ing to target Hispanic and Asian consumers are quickly finding their way into mainstream markets."

For his part, Rieman maintains caution when predicting the widespread acceptance of "truly authentic" flavors. "Often, these highly specialized profiles are not made available to the mass market due to limited appeal to a wider audience," he says. Nevertheless, "the impact of the immigrant is that it gives the marketer a position to step outside the box a bit and offer new, more daring snack flavors."

Seasoning essentials

None of this suggests that we've lost interest in the classic profiles that pleased us in the past. "Our best-selling flavor continues to be—and I think

The type and grind of corn, frying techniques and incorporation of seasonings all impact final flavor delivery of tortilla chips.

this is true for any brand of potato chip—the lightly salted original flavor," Peterman says.

So while we're open to new options, "the favorite snack seasonings really have not changed much," Rieman says. When new flavors do emerge, he adds, they usually serve as "volume builders that provide product news around which to build product promotions. Consumers will often buy these flavor line extensions to try at least once, yet at the same time, they still buy what they had planned to purchase when they started down the snack aisle—the flavors they already love," including salted, barbecue, sour cream and onion, and, especially, cheese.

"In traditional salty snacks, cheese still rules the landscape," Rieman says. With annual per capita consumption topping 31 pounds, he appears to have a point. The cheese flavor we're most likely to encounter in a snack is Cheddar, he says, which remains the standard in chips, puffs, popcorn and crackers. But in the sandwich cracker category, "cheese and peanut butter are the primary flavors."

While Cheddar is better, snack designers may not want to start by grabbing a chunk of New York's finest. For example, Rieman notes, the sandwich-cracker application "points to the versatility of powdered cheese seasonings, in that they function well topically, but can also be blended with a fat system to mimic the texture of refrigerated cheeses with the added value of nonrefrigerated distribution, microbial stability and extended shelf life."

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The traditional approach to seasoning cheese crackers has been to blend a refrigerated cheese into the cracker dough; but, internally seasoning a snack this way subjects flavors to flashing off, heat degradation and changes that arise during baking, and it often exacts a higher cost because

best seasoned topically from a cost and flavor perspective. It allows you to put the flavor where it will be tasted and doesn't subject it to harsh processing and high heat."

Doan also advocates seasoning topically, claiming, "in general, the less heat a flavoring sees, the more it will

when a seasoning is applied in an oil slurry, a large particle size may clog the nozzles." Also, in baking applications, which offer more flexibility, "a larger particle size could be added to the dough, although it may affect the dough's machineability."

Another question formulators might ask is whether a seasoning designed for one snack—a rice cake, for instance—will function on a different medium, such as, say, a fabricated potato chip. From a sensory standpoint, the answer depends on both the seasoning and the nature of the snack base. "With creative product development," Doan says, "most flavor profiles can be translated across the board to the most-common snacking mediums: potato chips, tortilla chips, nuts, pretzels, crackers and snack mixes." Jerky may court a narrower range of flavors, mainly in the meaty-spicy-soy-sauce vein, and a few flavor combinations haven't proven themselves across multiple applications quite yet, such as sweet notes like chocolate on potato chips. But, she says, "as developers, we are always trying new combinations."

In terms of processing, translating a seasoning across snack media involves a different set of considerations. "If you just look at tortilla chips," Bosenbecker says, "it depends upon how the manufacturer is making the tortilla: How much do they rinse the corn after it's been cooked and before it's ground? How fine are they grinding it? Do they use white corn or yellow corn? How thin do they sheet the tortilla? What kind of oil are they using to fry it? How long is it in the oven before it goes into the fryer? You can go into the grocery store and buy three different varieties of tortilla chip and you will have three different types of products that can affect a flavor choice when you season the chip."

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manufacturers will use more seasoning to compensate for what processing destroys. Doan notes: "As developers, it is critical to understand the process the snack will undergo to best develop a seasoning that will result in the desired finished flavor profile. Many flavorings can volatilize, caramelize or even burn under high-heat conditions, and snack flavorings that witness frying and baking temperatures use completely different technologies than those that are applied topically in less-extreme heat conditions."

Thus, Adalgiza Salais, research scientist at KFI, advises that, in high-heat processes like frying or baking, manufacturers "should use heat-stable flavors and ingredients low in sugar. The use of an intensified flavor component helps to retain some of the volatile flavors that are lost during the high-heat process, and ingredients with large amounts of sugar may cause browning in the finished product after being exposed to high temperatures."

The best way to head off these problems, however, might be to sidestep internal seasoning altogether. Says Rieman, "In my opinion, all snacks are

hold its flavor." But achieving thorough topical adhesion is as important as avoiding heat-degradation of internal seasonings. "Most snacks rely on oil to adhere seasonings to their snack base," she says, "either after frying or by spraying oil on after processing. Since oil will pick up the flavor of the seasoning, items with a little more oil usually taste better." With luck—or savvy planning—that oil might also carry some of the flavor into the base itself as it migrates from the surface.

Manufacturers who take advantage of residual frying oil while it's still hot improve adhesion yet further. However, Bosenbecker notes, if a manufacturer is "just coating the chips coming out of the fryer with seasoning," rather than applying a separate oil spray in a tumbler, "particle size will play a big part in getting good adhesion. Larger pieces of herbs historically don't adhere well, which is why you don't see a lot of large particulates out there."

Salais agrees, adding: "The particle size would affect the adhesion to the surface of the substrate. Fine particles will adhere better to a tortilla or potato chip, or to an extruded item. Also,

Adds Sasaki: “Even with a potato chip, we have what we call a flat chip versus a crinkle-cut. Typically, you’d think it would be easy to translate seasonings to the two because the bases are essentially the same. But the flavor impact is different between a crinkle and flat chip.” The base’s size and thickness and the ability of seasonings to stick to smooth surfaces or pool into nooks and crannies all come into play.

Salubrious snacking?

Seasoning manufacturers have also found themselves thinking more about what many agree is the defining feature of today’s snackscape: the health-and-wellness trend. Notes Doan: “Labeling has become a big part of the way the snack-seasoning business has changed. Companies are removing partially hydrogenated oils, monosodium glutamate, and similar ingredients from their labels.”

The seasoning suppliers aren’t alone. No one escapes the scrutiny of a health-focused populace. As Lisa Katic, R.D., nutrition consultant to the Snack Food Association, says, “All across the food industry, and not just in the snacking segment, health is the number-one driver of new product development.” Convenience also scores points, she says, and taste “is always a given. But if you can develop convenient, portable snacks with good taste and health, you’ve created a triple benefit.”

The healthful snack might cause some cognitive dissonance among those whose concept of snacks doesn’t extend beyond the chip, cracker and cookie aisles. For them, snacks are the *sine qua non* of “empty” calories. But, notes Katic, there can be

more to a calorie than meets the eye. “Let’s just use potato chips as an example,” she says. “They contain a fair amount of vitamin C because, after all, they are potatoes. They’re not as high in sodium as people think, either. They’re pretty high in potassium, which our bodies need. And if you eat an ounce-bag of potato chips, which is generally your single-serving size, it’s 150 calories.”

All the same, a conflation of factors—from the updated USDA Dietary Guidelines for Americans and recent FDA labeling decisions, to fad diets and relentless (if not always accurate) media reporting—has trained the spotlight on snacks, putting pressure on manufacturers to shape up or risk revolt.

Lost in translation

No issue captures the zeitgeist better than the case of *trans* fats. Responding to evidence that consumption of *trans* fatty acids increases levels of LDL, or “bad,” cholesterol and, thus, heart disease risk, the FDA required in Jan. 2006 that the per-serving amount of *trans* fat in a food be listed separately, below the saturated fat declaration on a product’s Nutrition Facts panel. While the ruling makes no recommendation to remove the *trans* fats that arise when we hydrogenate liquid oils for stability and textural purposes, so dismal is their current reputation that many manufacturers have chalked up the labeling law to a de facto ban. Even the prospect of the ruling goaded fat suppliers and their customers into a small-scale Manhattan project to develop viable, *trans*-free alternatives to partially hydrogenated oils.

The ball really got rolling when Frito-Lay, Plano, TX, announced that

it would eliminate *trans* fats from its snacks, while also reducing the total amount of saturated fat in all its products, according to Willie Loh, Ph.D., director, sales and marketing, Cargill Specialty Canola Oils, Minneapolis. “And with Frito-Lay being a leader in its particular segment,” he says, “it really demonstrated that this is where the consumer was going. As a result, it very much led the way. There were companies talking about it before, but when you have a giant like that, that meant dramatic change.”

And how. With processed snacks among the most reliable hiding places for *trans* fats, smoking them out would take a concerted effort. “Prior to the past couple of years,” says Brent Zacharias, marketing manager, oil and traits, Dow AgroSciences Canada Inc., Calgary, Alberta, “partially hydrogenated oils containing *trans* fats have been used in most all applications, such as for frying, internally as a shortening for baked goods, topically as a spray oil, and in coating and filling applications.” So “almost all snack foods, from deep-fried chips to baked snacks to iced or coated bakery cookies and crackers,” are candidates for reduction.

And in the foodservice industry, Loh adds, “most of the par-fried foods were cooked in hydrogenated soybean oil and most of the oil in the stores, where the finished frying took place, was hydrogenated soybean oil.”

Of course, snack manufacturers weren’t willfully disregarding consumer health in turning so consistently to hydrogenated oils. The technology was developed in the 1930s to increase unsaturated oils’ stability. By saturating the double bonds in a liquid oil with hy-

drogen, it left the oils less susceptible to oxidation. Adds Loh, "There are different levels of stability. There's resistance to heat, resistance to oxygen, resistance to light, to hydrolysis. And in general, the more you hydrogenate, the more stable the product."

Hydrogenation also conferred other properties that industry came to appreciate. The more we hydrogenate, the more we solidify oils, allowing for their use as hard shortenings. Which for snacks, by the way, helped with some practical benefits—among them, better topical seasoning adherence and a less oily surface. Ironically, this groomed partially hydrogenated vegetable oils as "healthful" alternatives to saturated animal fats such as butter and lard, and to the tropical coconut, palm and palm kernel oils that also came in for nutritional criticism due to saturates.

How times have changed. Now that science has incriminated *trans* fats, tropical oils and even butter look almost innocent by comparison. But those aren't the only choices for replacing partially hydrogenated oils in pursuit of a lower-*trans* standard. Stan Andrews, bakery ingredient applications, ADM, Decatur, IL, lists interesterified shortenings as his top choice for replacing a snack's partially hydrogenated oils. Interesterification subjects a blend of fully hydrogenated solid and liquid oils—both of which contain negligible amounts of *trans* fats—to an enzymatic process that strips the polyunsaturates from the liquid oil and the saturated fatty acids from the solid. Yet another set of enzymes then reanneals both species to the glycerin backbone in a mix of saturates and unsaturates. "The finished

interesterified shortenings will be low in *trans* fatty acids and simulate partially hydrogenated shortening," he says. Another advantage, he says, is that interesterified shortenings can replace partially hydrogenated ones on a one-to-one basis with very little, if any, adjustment of the rest of the formula or processing.

But, notes Loh, while interesterification may address the *trans*-fat issue, it still leaves open the question of saturates. "You end up with a zero-*trans* shortening that has some intermediate melting characteristics," he says, "but the problem is that the saturates go up." Several years ago, he explains, his company launched an interesterified shortening. "A typical all-purpose shortening runs between 25% and 28% saturated fat, and it also has about 25% *trans*. Well, we got the *trans* down to about 2%, but we drove the saturated fat up to somewhere between 33% and 37%. And you know what the market reaction was? 'Well, you really didn't solve anything. You shifted the problem.' And it was a reasonable response. It was a tactical solution, but we didn't think that it was an overall solution."

Better that the overall solution offer an oil low in *trans* and saturates that also displays the processing and convenience characteristics of the oils we're trying to replace. According to Zacharias, using high-stability canola oil, high-oleic sunflower oil, and low-linolenic soybean oil permits "significant reductions in saturated and *trans* fats," while also achieving "equivalent performance in preparation of the snack—fry life and shelf life is the same or better, sensory characteristics are preferred, and a positive impact on nutrition occurs."

But Loh still advises caution when approaching actual reformulation. "We work with all the major companies and nobody has just taken one oil and dropped it in," he says. "You have to put R&D into it." Among the issues he urges manufacturers to consider: "You may change your product's shelf stability. You may change its shape, and that can have a huge effect. And even supposing you're only changing a few of your products, you've now got different oils, and over the last 40 years you've become very efficient at only having a single hydrogenated oil coming into the plant. So where are you going to put the second oil?" Or the third, or the fourth, or whatever is required to maintain key product characteristics and quality.

As for actual ingredient modifications, "You may have to adjust texture by working with the flour or the sugar, or working with texturizers," Loh continues. "And let's say that your product comes out more brittle than before; you might have more cracking. Then you may have to go to a less-flexible packaging type, or to a better packaging in terms of excluding oxygen or UV light. And when you get to manufacturing, you may have to change your line somewhat. You might have to put in different tanks. You may have associated piping with those tanks. Now we're talking about capital investment."

Yikes. No wonder that when customers ask Loh which alternatives are best for frying, fillings or coating, his answer is a big "It depends." "When I say that to people," he adds, "they usually think that I just don't want to tell them. But you can't make those statements." He's found that he's best been able to see companies to success when those companies have "decided very

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Cheese remains the top flavor profile among snack consumers, and a popular choice to incorporate within doughs or blend into fat systems in production.



Photo: Dairy Management, Inc.™

clearly that they need to switch and that they want to work with you, rather than just have you throw something over the wall for them to try.”

Gumming up the works

Maureen Akins, applications food science, TIC Gums, Inc., Belcamp, MD, understands. “We have had many people call for help with *trans* fat removal from every type of application,” she says. “Right now we’re working with a company that’s trying to replace shortening from a *crème* filling that was based on hydrogenated fat. And they switched it out for palm oil and now they don’t get as much set. So now we have to provide them with a little more structure, a little more ability to hold air cells.” She chose

cellulose derivatives, such as methyl cellulose or hydroxypropyl methyl cellulose, for the purpose because, as she says, “they’re excellent at stabilizing air cells.”

Gums have long had a place in the product designer’s fat-sparing arsenal, and they’re coming in handy in the latest *trans*-shedding campaign, particularly in their ability to replace hydrogenated oils in snack-seasoning coatings. “So if I want sprinkles to stick to my cookie or salt to my cracker,” Akins says, a syrup of gum arabic blended with a sugar alcohol such as glycerin or maltitol “is an excellent adhesive.” Gum arabic is itself highly tacky—one of its original uses was as a glue—and, as a syrup, it also adds an attractive sheen to a snack. “So, if you’re looking for the beauti-

ful shine of an egg wash, gum arabic will give you the same thing,” she says. “You will need a drying step if you are using gum arabic for sheen. Generally, you would make up a stock solution of arabic—maybe 50%—and spray or coat on to the product. You would either need to rebake to drive off additional water or let it air dry before packaging.”

Gum arabic syrups may particularly earn their keep in the fight to eliminate yet another unwelcome ingredient from snacks: sugar. “Instead of just going for low-carb, everyone now is going for a low glycemic index,” Akins says. “So everyone is trying to remove sugars from their products, especially people who are making granola- or energy-bar type applications.” To replace the rice or corn syrups that normally hold such bars together, she says, “We’ve run into a lot of customers who are looking to find a substitute binding agent.” Again, a syrup of gum arabic in combination with a sugar alcohol, she says, is “beautiful as a binding agent for those types of applications—either extruded bars or bars that are more granola-like.”

The sugar alcohol not only replaces the usual sweetener syrups but is “synergistic” with the gum arabic, Akins says, “in that they produce an extremely high-viscosity product. So if I’m trying to mimic a 42 DE corn syrup, which is very viscous, I can use a combination of gum arabic and glycerin that can easily mimic the exact rheology of that product. And then I can portion it out exactly as I would if I were using a standard corn

syrup—make up a batch, have it set and meter it as necessary. Basically, it's a one-for-one replacement."

Gums typically require considerable water for hydration, but because the glycerin in the gum arabic syrup assumes that responsibility, its low water activity means that "there's hardly any water in the syrup at all," Akins explains. While they contain enough moisture to achieve the viscosities mentioned above, a bar made with them will still maintain its low water activity, "which is important in snacks, particularly bars." As an added benefit in certain applications, like an extruded energy bar, she says: "You can use the syrup in areas where you're not going to have additional bake-off of product. So now I don't have to waste extra energy baking off additional water."

Sodium shakedown

While sugar and *trans* fat have stolen the spotlight so far, excess dietary sodium remains something of a sleeper among Americans' nutritional concerns. But it may be about to wake up. "A big health-related issue is the high level of sodium in many snacks," Ferrara says. "It's a particular concern for those who suffer from high blood pressure. People are looking for lower-sodium options, but they still want their favorite flavors and textures." The main strategy for reducing sodium in snacks and other products has been simply to replace the salt with substitutes such as potassium chloride. Unfortunately, its bitter aftertaste makes it difficult for consumers not to notice.

Now that "the scientific community is just beginning to understand the physiological mysteries behind our reactions to flavor and sensory

experiences," Ferrara says, her company has attempted to parlay that insight into an "advanced salt-flavor enhancement technology"—not a salt-replacement ingredient—"that increases salty taste perception." It draws on amino-acid and peptide technology to help manufacturers cut up to 50% of the sodium in a snack application without changing the flavor. It does so not by replacing salt removed from a formula, but by enhancing the salt that's already there.

So don't expect a powder that you batch right into production. By taking into account the snack base, processing conditions, targeted sodium reduction and other factors, Ferrara says, "we work with our customers' existing formulations or help them develop new ones" to incorporate the technology, which, she says, "is a customized solution, not a one-size-fits-all product." One size may not fit all, but this technology does fit the full range of snacks. "Most applications that could use a sodium cutback can benefit, including all salty snacks, flavored crackers and microwave popcorn. Even hand-held meal-type snacks like pizza pockets and soups-on-the-go are great candidates," she says.

Snacking smartly

All this anxiety over sodium, sugar, fat and so-on troubles Katic. "It gets back to my point that we really have to get away from this demonization of one ingredient in a food because consumers should not choose to buy a food or not based on the presence or absence of one ingredient," she says. We may want our nutritional advice to be as simple as possible, but then, she points out, "it backfires and you realize that really isn't the way to go."

Encouragingly—and ironically, thanks in part to diet fads such as Atkins—consumers, even as they fret about one nutrient or another, are learning how to better strike a healthy balance. Their attitudes "have transitioned," Andrews says. "I think that what the low-carb fad did was bring about an awareness of 'good' carbs and 'bad' carbs." True, even the scientific community may not agree as to which is which, and the same unsettled environment characterizes our understanding of "good" (i.e. monounsaturated and omega-3) versus "bad" (*trans* and saturated) fats. But the mere public acknowledgment of these distinctions shows that at least consumers are thinking.

Instead of stripping all the "bad" stuff from snacks, product developers can add value by formulating with what consumers consider good—like protein. "We have seen a steadily growing market interest in providing snacks that offer higher protein levels," notes Luping Ning, applied technology manager, The Solae Company, St. Louis—an interest driven "by the positive perception that protein as a macronutrient enjoys in the marketplace." He says soy proteins "have come a long way in the last five to 10 years," as flavors and functionality have both improved. The fact that the majority of nutrition bars contain soy protein, he notes, "speaks to their flavor and functional performance in this category."

Design and delivery innovations also open the door to more healthfully formulated snacks made with whey proteins, notes Sharon Gerdes, technical support consultant, Dairy Management Inc.™ (DMI), Rosemont, IL. DMI, in conjunction

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with Utah State University, Logan, and Grande Custom Ingredients Group, Lomira, WI, has developed a process that allows for the extrusion of significant amounts of whey protein into a crisped form similar in taste and texture to regular crisped grains that's ripe for application in bars and snacks. "So now, instead of just snacking on starch and carbohydrates, now you can have a higher percentage of protein," she says. The technology can pack protein amounts from 30% to 80% into the crisps, and adjustments to the twin-screw extrusion process yield variable sizes and shapes. "They're very versatile," she says. "They work in your more traditional nutritional and protein bars to equilibrate the moisture and add some textural variety, and they also can be stand-alone snacks. You can put all sorts of different flavors with them." Cinnamon and cheese seem to be particularly popular, she notes.

The whey protein crisps illustrate the close relationship between ingre-

dients and technologies that emerge to take advantage of them, and that relationship continually stimulates snack product development. The quest for new snacks, as well as associated ingredients and technologies, "allows us to make snacks from organic, non-GMO ingredients, and with value-added ingredients such as fiber, protein, healthy fats, etc.," says Kumaresh Chakraborty, marketing director, J.R. Short Milling Company, Kankakee, IL. These ingredients, "plus the added benefit of baked extruded snack pellets as opposed to frying, all help to create the new, healthier snack alternatives to traditional frying. With today's new technologies, the baked or puffed products rival the flavor characteristics of the fried products."

But we don't necessarily have to change snacks much to make them more healthful. Notes Rieman, "As part of a healthy diet, snacks have a place without modification." For example, simply controlling the portion

size via packaging sends the all-important signal that calories are what really count. "Portion-controlled packaging to limit the snack quantity to 100 calories is a move that would benefit consumers and that does not require any changes to the snack," he says.

Katic agrees. "As guidelines for people, I generally say that a snack should be anywhere from about 150 to 200 calories," she says. "So if you can fit it into that parameter, you're looking at a snack. And if you can get a baked snack, a whole-grain snack, or even a packaged fruit snack, you're doing a lot better. That's why companies are saying, 'Okay, if that's what people want and if they're going to buy it, we're going to invest in it.'"

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