

by Donald E. Pszczola

The 'Not So Rocky Road' of Ice Cream

Ice cream is a frozen food made from a mixture of dairy products, containing at least 10% milkfat. (This amount of fat varies, of course, depending on the product's label—"reduced-fat," "light," "low-fat," and "nonfat.") In addition to milk solids and milkfat, a formula can contain such components as sweeteners, flavorings, emulsifiers, and stabilizers.

In the cold light of standard of identity, it all sounds pretty simple, and one might not expect a great deal of innovation in this category. But ice cream, like other frozen desserts (yogurt, ice milk, sherbet, ices, novelties, and other such products), keeps evolving, sometimes taking nontraditional directions as it reinvents itself to provide new opportunities in flavor, texture, stability, and health. (In terms of flavor alone, as we will soon see, ice cream presents opportunities that go well beyond those of vanilla or chocolate.) The result: options ranging from those that offer decadent indulgence to better-for-you qualities to a combination of both.

Every year, the Ice Cream Technology Conference of the International Dairy Foods Association honors the top frozen dessert innovations in the dairy industry. In 2011, *Salted Caramel Chocolate Pretzel* ice cream, developed by SensoryEffects Flavor Systems (www.sensoryeffects.com), was selected as the most innovative prototype flavor. The salty-sweet treat consisted of a



Tomorrow's frozen desserts, including ice creams, will be shaped by new flavors and flavor pairings, a wider range of textures, eye-catching colors and inclusions, and better-for-you benefits.

Photo courtesy of Kerry Ingredients & Flavors

is not for children." A new company, SnoBar (www.snobarcocktails.com), introduced an alcohol-infused premium ice cream and ice-pops that are said to deliver about 4% alcohol by volume. Varieties of the ice cream include *Pink Squirrel* (brandy, amaretto, and crème de cacao); *Grasshopper* (brandy and crème de

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combination of dark chocolate flakes and textured swirls of salty pretzel variegate added to caramel ice cream in a natural dulce de leche base and egg custard base.

Perry's Ice Cream (www.perrysicecream.com) won the most innovative ice cream flavor (*Red Velvet*, an ice cream with a red velvet cake base and cream cheese swirls) and most innovative novelty (*Sour Buddie Bars*, sour green apple or sour blue raspberry sherbet with a vanilla ice cream center).

A quick sampling of the ice cream formulations in today's marketplace further demonstrates some of the nontraditional directions that these frozen desserts have taken. The package of one such product, for example, reads: "This product contains alcohol and

menthe), and *Brandy Alexander* (brandy and a mix of crème de menthe and crème de cacao). Ice pops are offered in *Cosmopolitan* and *Margarita* versions.

Since Ben & Jerry's (www.benjerry.com) introduced its first flavor (vanilla) more than 30 years ago, the company has created a number of concoctions that are certainly distinctive. Some recent formulations included light coffee and malt ice creams with whiskey caramel swirls and English toffee pieces; vanilla ice cream with a hint of rum and containing fudge-covered rum balls and milk chocolate malt balls; and a salty-sweet combination of vanilla ice cream with salted caramel swirl and fudge-covered potato chip clusters.

Clemmy's (www.clemmysicecream.com) is said to

The 'Not So Rocky Road' of Ice Cream continued...

offer ice cream bars that have the taste and creaminess of premium ice cream but are free of sugar, lactose, and gluten. Each bar is 70 calories, has 5 g of fiber, and contains 3 g of total fat. New flavors include orange crème, strawberries 'n crème, cherry vanilla, and chocolate fudge. Other companies such as Tofutti Brands Inc. (www.tofutti.com) offer an assortment of dairy-free frozen dessert treats made using soy ingredients. *Tofutti Cuties* is its version of the ice cream sandwich, available in such flavors as vanilla, chocolate, mint chocolate chip, and others.

PreGel America (www.pregelamerica.com), a U.S. subsidiary of an Italy-based specialty dessert ingredient manufacturer, developed new frozen desserts and beverages that are shelf-stable, instant, ready-to-use powdered mixes requiring only the addition of water or milk. (Sugar, flavor, stabilizers, and emulsifiers are already blended into the mixtures to ensure consistency.) The new mixes include *Yogurttone™* (for producing a frozen yogurt-style dessert that can be swirled with a fruit juice of choice or layered with granola) and *Fruittone™* (for producing a frozen dessert drink that can combine strawberry, pink grapefruit, and pear flavors with a shot of fruit juice).

Imagine in tomorrow's frozen desserts flavors such as bacon or Thai ice tea (black tea, vanilla, star anise, cloves, cinnamon, and orange peel). Or how about a "hot" ice cream? Sounds like a misnomer, but in England, there's a mustard-flavored ice cream. And other global flavors might include a mix of fruit and beans, young coconut and tropical fruit, corn and cheese, and jackfruit and cashews. These formulations may not be to everyone's tastes (you may still prefer your vanilla, chocolate, or strawberry), but nonetheless, it is evident that ice creams are evolving and new ingredient developments are making that possible. This month's article will follow this winding path (or should I say "not so rocky road") that may lead to tomorrow's icy creations.

Around the World in 80 Licks

Some of the possible future directions for frozen desserts were demonstrated in prototypes developed by David Michael & Co., Philadelphia, Pa. (phone 215-632-3100, www.dmflavors.com), and showcased at the company's Innovation Roadshows. I'm



This sorbet prototype combines the flavors of the hibiscus flower with that of agave, a natural low-glycemic sweetener. A natural red color adds to its distinctiveness.

Photo courtesy of David Michael

sort of reminded of the movie *Around the World in 80 Days*, as we take our own trip around the world with these frozen dessert concepts which incorporate flavors from places such as Turkey, China, the Caribbean, South America, and Mexico.

Drawing its inspiration from chewing gum, two varietal mint ice creams (*Blackberry Spearmint Stretchy Ice Cream* and *Vanilla Wintergreen Stretchy Ice Cream*) were created at the 2011 show. While a variety of mints are available in chewing gum, previous ice creams primarily used only one—peppermint. However, wintergreen and spearmint can also provide refreshing—and sophisticated—flavor opportunities for ice cream, especially when blended with flavors such as blackberry or vanilla. Furthermore, these two prototypes have a chewing gum-like texture, based on a Turkish-style ice cream called "dondurma" that is best described as stretchy. (Some regions of Turkey are known for this particular product and create varieties that can be hung and cut, and eaten with a knife and fork.) Dondurma continues to get stretchier—becoming almost dough-like—the more the consumer plays with it. And it melts very slowly, making the eating experience fun for children and adventurous adults. »»

The 'Not So Rocky Road' of Ice Cream continued...

While a wild orchid root, salep, is responsible for the unique texture of Turkish dondurma, the ingredient is in short supply and illegal to export. Lacking this ingredient in the U.S., David Michael uses its *Michtex*® stabilizer systems to mimic the texture of dondurma.

A prototype sorbet formulation combines the flavors of the hibiscus flower and agave. A popular flavor in the Caribbean and Latin America, hibiscus can be paired successfully with such flavors as lime, blackberry, and pomegranate in frozen desserts. Agave, made from the same plant that produces tequila, is a natural sweetener with a low glycemic index.

Other examples featured ice cream formulations inspired by authentic Chinese flavors—*Sweet Date (Jujube) Ice Cream* and *Lychee Ice Cream*—and *Coconut Water Ices*, which use coconut water as a frozen treat base and combine it with tropical flavors including *Maqui Berry*, *Island Punch* (with rum flavor), and *Tequila Lime*.

Previous Innovation Roadshows presented an ice cream made with vanilla, Thai red curry, and coconut milk; a molded ice cream novelty, flavored with lucuma, a

sweet fruit from Peru; and an ice cream that incorporates the flavor of *Chongos Zamoranos*, a traditional Mexican dessert similar to a sweet cheese pudding.

Reconstructing Ice Creams

At the 2011 International Dairy Show, Kerry Ingredients & Flavors, Beloit, Wis. (phone 608-363-1200, www.kerry.com), launched a new feature flavors program, *Chill Café!* Each of the 10 ice cream prototypes demonstrated how flavors and ingredients from the company were used to create frozen desserts aligned with mainstream and consumer-driven trends.

John Namy, Kerry's Vice President of Sweet Applications, provided a history of ice creams in the marketplace, the ingredients they used, how they evolved over the years, and the directions that they may take for the future. In his presentation, "Health and Indulgence: Striking the Right Balance," he emphasized that ice creams can no longer be confined within any one marketing category. Rather, because of the fusion of such ingredients as snack, bakery, confectionery, and even savory, today's formulations are reconstructed (and in

some cases, deconstructed) to span across many product sectors as well as different eating occasions.

Take, for example, "snack ice creams" where chocolate-covered potato chips or popcorn are incorporated into the ice cream, observed Namy. From the bakery sector, cake frosting variegate, cookie dough, red velvet cheesecake pieces, cookies, macaroons, cupcakes, and pies can be used as ingredients (as inclusions or sprinkles) in ice cream to create "bakery ice creams" such as cupcake ice cream or brownie ice cream where these ingredients can provide a baked-in texture and flavor to the formulation. Pie ala mode (a scoop of ice cream on a piece of pie) is a traditional idea, but today specialized restaurants are becoming more sophisticated, serving ice creams with an assortment of other bakery items. It is even possible that ice creams can be paired with savory foods as well (and that someday your choice of ice cream may even depend on your choice of entrée).

As a way of illustrating, Namy guided attendees on a sampling sojourn of Kerry's ice cream concepts. For example, *Whoopie Pie* (whipped cream base with mini chocolate whoopie cookies and

blended with swirls of chocolate sauce variegate) is designed to take consumers on a sentimental journey back to their childhood. The cookie inclusion can provide a smooth and airy texture to the ice cream. Another prototype, *Blondie Brownie* (caramel base with blondie brownie pieces and a peanut butter swirl) suggests that brown flavors have made a comeback, largely because of the buttery notes they offer.

Hot Chocolate Mint (hot chocolate base with peppermint candy pieces and a whipped cream ribbon variegate) is especially appropriate as temperatures outside decrease. In fact, the different seasons offer product opportunities for new formulations and flavor extensions alike. "Defining new flavors and new occasions will be the way forward for manufacturers looking to capitalize on times when consumers want new products," noted Namy. (And I might add that *Hot Chocolate Mint* is especially cool looking with its red pieces against the dark background of chocolate.) *Sugar & Spice*—(sugar and spice base with blondie brownie chunks and swirls of sweet vanilla cream variegate) would be another good example of a seasonal formulation—a winter spice ice cream.

Comfort flavors such as cinnamon and vanilla can play an important part for holiday fare or for indulgent desserts throughout the year.

Cotton Candy (sweet cotton candy base and bits of cotton candy crunch) uses ingredients that may evoke memories of childhood, but the finished formulation is not the same dessert that consumers ate as a kid. Chefs, food marketers, and home bakers are experimenting with ingredients to give a new life to old favorites, such as cotton candy, which is finding use in the creation of wasabi-flavored cotton candy, chocolate-covered cotton candy, cotton candy macaroons, and pink and blue swirled cotton candy cupcakes. It wouldn't surprise me if some of these products, in turn, could be used as ingredients in ice cream.

Other featured concepts included *Salty Caramel Toffee* (brown sugar base blended with swirls of salty caramel variegate and toffee candy); *Sticky Bun Cheesecake* (cheesecake base with sticky bun dough pieces and a cinnamon streusel ribbon); *Peanut Butter Monster Cookie* (peanut butter base packed with monster cookie pieces and swirls of chocolate sauce variegate); *Red Velvet Cheesecake* (cheesecake base with



a duo of red velvet cake and cheesecake pieces); and *Snickerdoodles & Cream* (a Bavarian cream base blended with Snickerdoodle cookies and a buttery toffee sauce).

So are these ice creams? Bakery products? Snack items? Side dishes for a main meal? Whatever category or categories you may put them in, these frozen fusions suggest the next stages of the evolution of ice cream.

Vegetable or Ice Cream?

A line of specialized vegetable extract blends, unveiled under the name *Vegeceuticals*™ by Wild Flavors Inc., Erlanger, Ky. (phone

As ice creams evolve, they fuse ingredients from a variety of food categories including bakery, snacks, and confections such as the peppermint candy pieces featured in this Hot Chocolate Mint prototype.
Photos courtesy of Kerry Ingredients & Flavors

The 'Not So Rocky Road' of Ice Cream continued...



Frozen dessert novelties can take advantage of sweet and savory flavor pairings, floral flavors, and even vegetable extract blends that can deliver key nutrients or colors. Photo copyright © iStockphoto.com/Juanmonino

859-342-3600, www.wildflavors.com), can deliver key phytonutrients of vegetables into yogurts and frozen desserts. The line currently includes two versions, both available in liquid and dry form. An orange blend provides beta-carotene from carrot, pumpkin, sweet potato, paprika, and Reishi mushrooms. A red blend provides anthocyanins from purple sweet potato, purple maize, purple carrot, beet, rhubarb, tomato, and red cabbage. The standardized blends are visually appealing, imparting vibrant colors of orange or red to the formulation.

Also recently launched by the company is a line of new floral flavor developments, including jasmine, lavender, cherry blossom, mimosa, iris, rose, orange blossom, chamomile, hibiscus, and chrysanthemum. These flavors make possible the development of frozen desserts with floral components combined with an array of complementary

fruit and spice flavors.

At the 2011 Food Expo, Wild showcased frozen ice pops that demonstrated the trend toward upscaling fun children's treats for an adult audience. These prototypes included such interesting flavor pairings as *Cucumber-Vanilla-Cardamom*, *Ginger-Plum Green Tea*, and *Green Apple-Jalapeno*.

The 'In' Side of Ice Cream

"Ice cream shows no signs of slowing down," noted Tracy Schrepfer, Research & Development Manager for QualiTech, Chaska, Minn. (phone 952-448-5151, www.qualitechco.com). "We see flavors such as bacon, encapsulated sea salt, green tea, avocado, ginger, and veggie-centric flavors such as beet ice cream." One example of a decadent dessert with unusual pairings is vanilla ice cream with olive oil and sea salt drizzled over the top.

Inclusions can provide not only the necessary delivery systems for these flavors, but they can impart a variety of textures and colors to the ice cream formulation, as well. Schrepfer explained that the company's inclusions and particulates can help solve a number of formulation challenges in ice cream. A good example is its Flavor Islands chocolate and mint ice cream. Real chocolate and mint can freeze and be too hard to bite, but as inclusions they can stay soft inside the ice cream. In addition to functionality, inclusions can add important nutritional benefits, such as fiber, omega-3s, protein, flax, açai berries, probiotics and micronutrients, and even chia seeds to the ice cream formulation without compromising the quality of the product.

Blueberries continue to work up a blue streak in ice cream. According to the U.S. Highbush Blueberry Council, Folsom, Calif. (phone 650-824-6395, www.blueberry.org), formulators are taking advantage of the associations that blueberries bring (wholesomeness, comfort, nutritional benefits, distinctive color,

sweetness, texture, and, of course, flavor), to create new frozen dessert opportunities for this berry. And the use of blueberries in formats such as powders, concentrates, or purees makes for fruit-flavored creations, no matter the season.

For starters, from Haagen-Dazs, there's the limited edition *Blueberry Crumble*, a comforting, creamy, indulgent ice cream. Blueberries are folded into the dense blueberry ice cream with rich, buttery cobbler crust crumbles. Or from Elena's, how about "Blueberry Pie," a rich vanilla ice cream laced with blueberries and bits of flaky pie crust. And on the web, recipes abound, including those for blueberry muffin ice cream, blueberry-mint ice cream sandwiches, blueberry cheesecake ice cream, and blueberry lavender ice cream.

Hammons Products Co., Stockton, Mo. (phone 888-429-6887, www.black-waluts.com), recently conducted an ice cream project in which it tested the consumer appeal of the American Black Walnut when used in creative ice cream formulations. This ingredient was found to blend well with chocolate, cinnamon, fruits such as peach, and in other combinations. Products studied in the marketplace included *Peach Cobbler Ice Cream with Caramelized Black Walnuts* and *Chocolate Ice Cream with Maraschino Cherries and Black Walnuts*.

And there's been a breakthrough regarding chocolate inclusions. Switzerland-based Barry Callebaut (phone +32 53 73 05 67, www.barry-callebaut.com), launched *ChocMelts™*, a 100% chocolate inclusion for ice cream. Unlike standard compound-based drops (which contain vegetable fats other than cocoa butter), this new generation of soft-melting ice cream chocolate bites offers the intense flavor and texture of genuine chocolate while providing "the perfect melting behavior required for use in ice cream." Because they melt together with ice cream, these inclusions release a much richer, more intense flavor

experience than regular chocolate ice cream inclusions. The crystalline structure of the cocoa butter ensures a pure chocolate experience, even at the low temperatures of ice cream. The inclusions—available in dark, milk, and white chocolate—can be developed to match any taste profile.

Ice Creams Spring into Season

As ice cream evolves, new strategies on how to position it to consumers emerge. One strategy increasingly used is the launching of limited edition products specific to the season (spring or winter, for example) or specific to a holiday (Easter, Halloween, or Christmas).

Inspired by the spring season, Firmenich Inc., Princeton, N.J. (phone 609-425-1000, www.firmenich.com), launched its latest ice cream demo with the trendiest of “now” and “future” flavors.

These six flavors included *Caramel Apple* (an ice cream with a caramel apple flavor with a caramel apple swirl); *Grasshopper Pie* (chocolate mint flavor ice cream with graham cracker and chocolate flake inclusions); *Strawberry Cheesecake* (ice cream with a strawberry cheesecake base with cheesecake pieces and a strawberry swirl); *Orange Rice Candy* (ice cream that combines orange flavor with the flavor of the Japanese Botan rice candy, with the addition of a citrus marmalade swirl); *Lavender Lemon Berry* (lemon-berry ice cream featuring the strong floral notes of lavender accompanied by a raspberry swirl); and *Saskatoon Berry Vanilla* (ice cream with a sweet Saskatoon vanilla base combined with a Saskatoon berry swirl). Each of these prototypes has a formulation sheet describing ingredients, usage amounts, and processing procedure.

Ice Creams That Aren't Afraid of the Dark

A new range of *Gerken's*[®] cocoa powders from Cargill, Minneapolis, Minn. (phone 952-742-9246, www.cargill.com), may be particularly suitable for luxurious desserts and ice cream. Described as the result of a substantial investment by Cargill's cocoa and chocolate business in its Netherlands-based Wormer facility, the Dutch Dark cocoa powders combine an intense dark color with a smooth chocolatey taste, and are available in a variety of high- and low-fat versions.

According to the company, the range provides a real opportunity to innovate and develop new recipes in different applications. One example for use in ice cream is *Gerken's Holland DS150*, which would impart a premium dark color to the formulation. The smooth taste of the powders also means that there is no need to use sugar

to mask the bitterness that can be associated with dark powders—a great benefit for those wishing to develop recipes with less sugar.

Snacking on Nutritional Ice Cream?

Further enhancing nutrition in ice cream/frozen treats provides a benefit for consumers who

The 'Not So Rocky Road' of Ice Cream continued...



A reduced-fat, English toffee ice cream prototype contains sufficient probiotic cultures to deliver a health and wellness benefit. Photo courtesy of U.S. Dairy Export Council

indulge in those products. "By offering a more nutritious alternative using dairy ingredients, manufacturers can help consumers strike a balance between satisfying their cravings for something sweet and delicious and helping them boost their nutrient intake to help meet established guidelines," said Vikki Nicholson, Senior Vice President, Global Marketing, U.S. Dairy Export Council, Arlington, Va. (phone 703-528-3049, www.innovatewithdairy.com).

There is an untapped opportunity in the industry to leverage the nutrition components and label benefits with frozen dairy as a healthy snack/food item instead of a dessert. Technology has advanced such that many of the low- and no-fat, low- and no-sugar-added frozen

dairy products are not necessarily desserts but rather could qualify as healthy snack/food items now. Product innovators could explore this opportunity and bring to market a healthy frozen product utilizing the nutritional benefits of dairy.

"It seems many still want to sell these products as an ice cream dessert item, but they should also consider that in many cases, the elderly, who have a difficulty swallowing and a minimal appetite, might prefer to get their protein, calories, and other nutrients in such a frozen creamy-textured product," noted Phillip S. Tong, Professor and Director, Dairy Products Technology Center at California Polytechnic State University, San Luis Obispo, Calif. "I see this as a growth area for the industry."

Today, some culture houses are working to improve the viability of probiotic cultures in frozen food applications, added Tong. There is evidence suggesting that dairy is an ideal delivery vehicle to preserve the viability of the probiotic when cultured in milk products.

This may eventually create greater opportunities for frozen yogurt and ice cream with sufficient probiotic cultures to deliver a health and wellness benefit. One prototype recently developed by the center that demonstrates this potential was an *English Toffee Reduced-Fat Ice Cream with Probiotics*. This tasty frozen treat contains 27% less fat than regular ice cream and the skim milk that it uses provides an ideal vehicle to deliver probiotic bacteria in sufficient numbers to help support digestive health. The formulation also contains nonfat dry milk, which imparts a clean, mild flavor and improves body and texture as proteins bind moisture to control ice crystal size. Cream in the formulation also aids in emulsification, aeration, and smooth texture while adding richness.

The U.S. Dairy Export Council, in partnership with the Wisconsin Center for Dairy Research (WCDR) at

University of Wisconsin at Madison, created a delicious, creamy smooth frozen prototype, *Protein Chiller*, which at 12 g of protein, provides an excellent source of protein in a 120-calorie serving. According to Kimberlee "K.J." Burrington, Dairy Ingredients Applications Coordinator at WCDR, the protein content was achieved using whole milk, milk protein concentrate, and whey protein isolate. These ingredients also helped with flavor and texture. This nutritious, tasty frozen item (part cocoa powder and part vanilla extract, is served on a stick, making it a fun, grab-and-go snack.

Licking Frozen Dessert Challenges

A new approach from Denmark-based Danisco A/S (phone +45 3266 2000, www.danisco.com) can provide an opportunity to manufacture artisan ice cream without pasteurization or homogenization. According to the company, an emulsifier and stabilizer system, *Cremodan® 500 Coldline*, is specially designed to boost the quality of traditional handmade ice cream.

"Most emulsifiers and stabilizers used in ice cream production have little or no functionality without proper heat treatment," said Finn Madsen, Principal Scientist at Danisco. "Our intense research has enabled us to identify the right raw materials and processes for an ingredient system that matches the crucial needs of the artisan ice cream industry."

Made with cold-soluble, vegetable-derived components, the system releases its full functionality without any need of heat treatment. The result is a highly stable ice cream with reportedly outstanding freshness and flavor release. Furthermore, it has ideal flexibility for small-scale and industrial artisan production, being suitable for addition to ice cream mix or ice cream powder. The low dosage required ensures manufacturers an excellent cost in use.

New opportunities for the ice cream industry to make premium

water ice with a refreshing texture are also possible. DuPont™ Danisco® has created what it describes as the first solution on the market to distribute fruit chunks evenly and securely in water ice. A stabilizer system, *Cremodan® FruitPro*, provides ice cream manufacturers a way to process innovative new products on a standard water ice line. Until now, producing high-quality water ice with an even distribution of fruit, cereal, or vegetable inclusions has required expensive equipment for adding the inclusions and freezing the water ice. “Fruit, cereal, or vegetable pieces can be simply added to the water mix, and the stabilizer system does the rest,” said Finn Hjort Christensen, Group Manager of Ice Cream at DuPont Nutrition & Health (phone +45 8943

conventional stabilizer systems for

water ice, this stabilizer also maintains the refreshing mouthfeel of the final product. An additional advantage is the improvement in meltdown properties. A water ice concept was developed that includes free-floating chunks of mango or strawberry.

Incorporating *Grindsted® IcePro 2515 LF*, *GODO-YNL2 Lactase*, and *Yo-Mix™ ABY-2C* yogurt culture, Danisco also developed a Greek-style frozen yogurt that offers increased protein content and a significant reduction in lactose. With two times the protein of traditional frozen yogurts and more than 95% reduction in lactose, this indulgent dessert has a rich baklava flavor, a caramel honey swirl, honey oat almonds, and baklava pieces.

Adding Fiber to Ice Cream

According to NMI’s Health and Wellness Trends Database 2010,

nearly half the population seeks out foods and beverages that are high in fiber, and fiber is the top ingredient that consumers would like to get more of in their diets. This would, of course, suggest that frozen dessert products, including ice cream, might present an opportunity for fiber fortification, especially because of their indulgent taste and potential for snacking occasions.

However, increasing fiber and reducing fat creates ice cream product formulation challenges. Often the desired flavor and texture are not achievable and could possibly increase manufacturing costs while adding an undesired taste. Cargill, Minneapolis, Minn. (phone 952-742-9246, www.cargill.com), developed an indulgent ice cream bar prototype with digestive health benefits, such as increased fiber, without compromising on taste or

The 'Not So Rocky Road' of Ice Cream continued...

texture. The prototype incorporates *Oliggo-Fiber*® inulin, which provides a good source of fiber that delivers digestive health advantages, satiety benefits, and enhanced calcium absorption. Functioning as a prebiotic, it supports the natural, healthful bacteria in the lower gastrointestinal tract, and it is suitable for use in diabetic/low glycemic diets.

And because of its functionality as a fat/sugar replacer, it can be used in products formulated with a lower fat content and fewer calories.

The natural soluble fiber, made from chicory roots, is said to be virtually undetectable in the formulation. Inulin provides fat mimetic properties and maintains an indulgent flavor while reducing fat 45%. (The reduced-fat ice cream bar contains 7 g fat compared to 12 g fat in a full-fat ice cream bar. Inulin also serves as a bulking and masking agent, as well as enhancing the ice cream's body, flavor, and mouthfeel.

Other companies are also exploring the concept of fiber fortification in frozen desserts. For example, ADM/Matsutani, Decatur, Ill. (phone 217-451-4377, www.fibersol2.com), developed *Fibersol LQ*, a corn syrup that can increase the level of fiber in

frozen desserts such as ice cream, frozen novelties, and frozen fruit bars. The soluble corn fiber has been specially designed for applications where added sweetness and humectancy are beneficial, as well as for the ease of handling of a liquid product. It contains 75% soluble dietary fiber on a dry solids basis.

Dairy Protein System for Frozen Yogurt

Frozen yogurt is a popular choice for those consumers looking for a low-fat, nutrient-rich alternative to ice cream. To create a fresher-tasting experience, Glanbia Nutritionals recently launched *OptiSol*™ 1030, a high dairy protein concentrate designed for frozen yogurt systems. The ingredient harnesses the high nutritional value of protein for consumers who want to manage their weight and improve satiety levels.

Combining the functionality of high dairy protein with improved flavor and a smoother texture, the highly soluble ingredient can be easily incorporated into frozen yogurts and is particularly suitable for use in Greek-style high-protein frozen yogurt. In addition, manufacturers can benefit from the

better cost-in-use systems and a simpler formulation process.

Stevia's Potential in Frozen Desserts

Consumers today are looking for healthy indulgence—reduced sugar and calories without a sacrifice in taste and eating quality, noted Heidi Adams, Technical Service Manager for Corn Products International, Westchester, Ill. (phone 708-551-2592, www.corn-products.com). Trends also show continued strong desire for natural ingredients. The company's stevia sweetener, *Enliten*® *Reb A*, can play a significant role in overall sweetener systems to help achieve both of these goals in ice cream and frozen dessert products of the future.

Providing sweetness without adding calories, this ingredient is stable over a wide range of conditions and, since the usage level is low, it has negligible impact on critical parameters such as freeze point depression. Furthermore, somewhat slower sweetness onset gives other flavors a better opportunity to come through.

"Flavor trends are always evolving, and finding the right flavors that are complementary to the sweetness

IngredienTalk:

Food trucks are becoming increasingly popular across America. Inside these mobile restaurants, new ingredient trends are being shaped that may have an impact on future formulations. If you're an IFT member—visit www.ift.org, type in your name and password, click on the IFT Community Button, and go to the blog section. Talk to me, good buddy. My handle: IngredienTalk.

Breaker One! Breaker One! Come in, Good Buddy!

When I was a little kid, one of the neatest sounds was that of the ice cream truck coming down the block. No matter what I was doing—and where I was in the house—I

knew what that tinkling bell meant. Ice cream. That truck was like a little store on wheels: a store devoted to the selling of one type of pleasure—ice cream in many different flavors and formats.

Of course, what I didn't know at the time was that this truck was sort of an omen or harbinger of more sophisticated things to come. I'm referring to the growing popularity of food trucks and the "convoys" they are forming on streets all across America. Especially around lunch time, these trucks appear, giving people access to ingredients and flavors from a variety of cultures, which are then fused into more mainstream fare. The result: products that range from Middle Eastern steak sandwiches to Korean tacos to Caribbean subs, depending on what that individual truck supplies. And that means, of course, a variety of different tastes, smells,

textures, and sights that go far beyond what a traditional fast food establishment can offer.

When you think about it, food trucks can offer a number of advantages. (Even as a kid, I knew that it was a lot easier and more convenient to run after that ice cream truck where an unlimited number of frozen treasures awaited than expecting to find those same choices in your mom's freezer, which was mostly filled with meats and other items not necessarily interesting if you're a kid.)

From a business perspective, it's certainly a lot cheaper to operate a truck than open a restaurant, particularly in this unstable economic climate. And if a customers' interests should wane (for whatever reason), it's less expensive for a food truck to move on than the closing of a restaurant. Interestingly, some food trucks are extensions of a restaurant so instead of finding time to visit a

profile of stevia will assist innovation efforts,” said Adams. “Also critical to innovation are the inclusions in ice cream—from cookie pieces to fudge swirls to fruit gummies. These are additional applications where sweetness from *Enliten Reb A* can play a key role in formulating new ice cream products of the future.”

Stevia sweeteners are most often used in conjunction with bulk sweeteners to fully replace the functionality of sugar. Corn Products assists customers in developing optimal blends for use in advancing the creation of new ice cream formulations.

Stabilizers Create New Frozen Dessert Concepts

As the popularity of frozen yogurt and Greek-style yogurts continue to increase, Tate & Lyle, Decatur, Ill. (phone 217-421-2331, www.tateandlyle.com), developed a prototype, *Black Raspberry Greek-style Frozen Yogurt Create™*, that demonstrated how customers can bring a new product to market that covers both of these trends. The formulation uses the company’s stabilizer systems to provide a rich, creamy texture with a characteristic tart Greek yogurt

flavor. The innovative dessert is higher in protein and lower in fat, providing 140 calories per serving.

In a second prototype, *Vanilla Ice Cream Optimize™* with starch stabilizer systems, the company showed how a product developer can formulate an ice cream without the use of traditional hydrocolloids and emulsifiers, allowing for a label with advantages. In addition to a simpler ingredient listing, the ingredient system provides savings compared to traditional ice cream stabilizers in a standard 10% hard-pack ice cream formulation. The system imparts a smooth and creamy mouthfeel, while delivering 130 calories per serving.

For manufacturers looking for solutions to lower both the fat content and control the cost of their ice cream products, Tate & Lyle developed its ice cream *Optimize* prototype. Although dairy is key to the mouthfeel of ice cream, using a newly launched starch *Creamiz* can supplement the indulgent mouthfeel of traditional ice creams, while reducing an ice cream’s fat content by 20%. The ingredient is said to use a special starch modification technology that will not affect the creaminess of the formulation,



Using stabilizer systems, this dessert concept combines the traits of a Greek-style yogurt with those of a frozen yogurt. With a black raspberry flavor, this product offers a rich, creamy texture with a characteristic tart Greek yogurt flavor. Photo courtesy of Tate & Lyle

but rather complement and enhance their existing texture, creating a rich and full-bodied flavor.

Potential Candidates for Mainstream Ice Cream?

Innovative ingredients for use in ice cream applications are available from Taiyo International Inc., Minneapolis, Minn. (phone 763-398-3003, www.taiyoint.com). These products can range from a popular flavor found in sushi restaurants to preparations derived from exotic

particular place which may be very crowded, all you have to do is stop by at your local food truck. Also, within the confines of that truck, it would be easier to do more innovation and experimentation, responding to new food trends, fueling them along, and possibly even creating a few new ones along the way. From a food writer’s point of view, the potential there is particularly interesting as these food trucks can become a gauge for trends to come and the different ingredient influences on these trends.

Today’s trucks are benefitting from specialization—one truck can be geared for desserts, another for tacos, and another for bakery products. They can make the customer familiar with foods from different cultures that they would otherwise not be acquainted with. I mean where else but food trucks can you find sausages such as *Chicken*

Masala, *Moroccan Lamb*, *Boerewors*, *Chakalanka*, and *Campfire Bison*? Since so many people today are surfing or Twittering or Facebooking, it would be easy for food trucks to promote their products. And since they’re constantly on the move, all they have to do is use the social media to broadcast their location and time, and then move on again. Reminds me of those movies where the trucker says, “Breaker one. Breaker one. Come in, good buddy.” When I was a kid, all I had to alert me of the presence of an ice cream truck was the tinkling of a bell. Times sure have become more sophisticated, but in some ways the message is essentially the same: I’m in your area now, come by and indulge in my hidden pleasures.

When I walk down the street and see several food trucks parked, I think of a convoy. But someday areas may host food events

consisting of food trucks grouped together, creating what could be described as a literal food truck stop.

Now you may ask if your home town would be the right location for food trucks. You may argue that food trucks are some kind of phenomenon reserved for the East or West Coasts. But my guess is that, judging by the long lines I’ve seen outside food trucks, Anytown U.S. could be a truckie kind of town. And from an ingredients perspective, some of the trends being shaped in these trucks may transport over to supermarkets and the processed food area, in the same way that culinary and restaurant trends have done for years. Don’t be surprised if one of those “loads” may be found someday in your local supermarket aisle.

So climb aboard and talk to me, good buddy. That’s a ten-four.

The 'Not So Rocky Road' of Ice Cream continued...

fruit such as the Indian gooseberry.

Matcha powder is the finely milled leaf of green tea. Unlike green tea extract, which has a distinctively bitter taste, Matcha provides a special taste that can be described as "deliciously earthy" and adds an interesting bright green color. *Green Tea Ice Cream* is a common dessert in sushi restaurants, but perhaps as ice cream formulations continue to evolve, matcha powder will find more of a place in the mainstream.

Consumers are well aware of fruits flavors such as strawberry or peach in their ice creams, but what about Alphonso mango or gooseberry (also known as amla fruit)? These fruit preparations have application in ice creams and frozen desserts, and are offered in puree, chopped fruit, and microwave-dried versions.

A soluble dietary fiber, *Sunfiber*® provides healthy satiety through

its prebiotic effect. When used in ice cream, this partially hydrolyzed guar gum helps to produce a smooth texture and achieves a desirable thickening effect at temperatures near the freezing point. The fact that it is tolerated much better by consumers than other dietary fibers is important to consider when adding fiber to formulate a "light," "low-calorie," or "high-fiber" ice cream product.

Ingredients Worthy of an Extra Scoop

As frozen desserts continue to evolve, certain ingredients will play an increasingly important role in shaping the directions that these products take.

For example, ice creams of tomorrow will especially benefit from new texture approaches—some of these will try to recreate textures of desserts from around the

world, making mainstream consumers more familiar with them.

TIC Gums Inc., White Plains, Md. (phone 410-273-7300, www.ticgums.com), recently launched its comprehensive lexicon for describing texture and evaluating benchmarks for achieving texture in a product. With the company's expertise in developing stabilizer systems, this new approach will certainly benefit the creation of new ice creams. For example, its *Dairyblend IC EZ Creamy*, a blend of emulsifiers and hydrocolloids, allows for a smooth, creamy texture and taste associated with the newer "churn style" ice creams on the market today.

A collaboration between Fiberstar Inc. and Gum Technology Corp., Tucson, Ariz. (phone 520-888-5500, www.gumtech.com), has resulted in a new line of texturizing ingredients that have application in frozen desserts.

The new generation of texturizers, *Hydro-Fi*, combines Fiberstar's citrus fibers with Gum Technology's functional hydrocolloid-based stabilizer blends. In reduced-fat ice cream and sorbet, the ingredient systems reduce ice crystallization, improve texture, increase overrun, and delay melting. According to Dale Lindquist, Fiberstar's President and CEO, "The two companies' combined expertise and ingredients have enabled the emergence of an entirely new line of texturizers. Amalgamating the textural benefits of hydrocolloids with the unique properties of citrus fiber presents a new generation of ingredients that provide benefits well beyond the proven performance of their individual constituents."

At the 2011 International Dairy Show, Penford Food Ingredients, Centennial, Colo. (phone 303-649-1900, www.penx.com), demonstrated

how its starch-based ingredients can help ice cream formulators "top their texture." Highlighted prototypes included a reduced-fat vanilla soft-serve ice cream made with *PenCook*® 37, a waxy rice starch; gluten-free ice cream toppings, *Chocolate Crumble* and *Chocolate Chip Cookie*, both made with *PenTechGF*, a gluten-free starch system; and a fiber-enriched crumble topping, *Vanilla Almond Biscotti Ice Cream Topping*, incorporating *PenFibe*™ resistant starch.

Whey ingredients from Grande Custom Ingredients Group, Lomira, Wis. (phone 920-269-7188, www.grandecig.com), may be used to replace milk fat in ice cream and frozen novelties, improving texture and reducing costs. The company's new yogurt powder can add stability while increasing yogurt flavor in frozen desserts.

As demonstrated by a number of

ice cream prototypes highlighted in this article, flavors and flavor pairings will also provide the necessary licks to propel ice cream into the future. Bell Flavors & Fragrances, Northbrook, Ill. (phone 847-291-8300, www.bellff.com), recently revealed its 2012 top 10 sweet flavors, which included salty caramel, red velvet, strawberry jasmine, cinnamon chipotle, eucalyptus, taro/sweet potato, roasted coconut, Café de Olla, lucuma, and white sesame. Any one of these flavors could make for an interesting ice cream. In fact, several of these have been mentioned already in this article (for example, salty caramel, red velvet, and lucuma). Others seem to have ethnic associations—taro/sweet potato with Japanese ice creams; white sesame with Indian desserts; roasted coconut, possibly Thai; and cinnamon chipotle and *Café de Olla*, (a Mexican hot beverage

The 'Not So Rocky Road' of Ice Cream continued...



As new ingredient developments are further explored, opportunities for ice cream formulating will continue to expand and become more sophisticated. Expect in the future to see frozen desserts with more exciting textures, flavors, and colors. Photo courtesy of TIC Gums

brewed from dark-roasted coffee beans, a Mexican dark brown sugar, and cinnamon), both with definite south-of-the-border connotations. I imagine a strawberry jasmine sorbet would be very refreshing or how about a eucalyptus ice cream possibly blended with honey?

According to Innova Market Insights, the rise of the "superfruit" has been increasingly in evidence over the past decade, with new fruits emerging on the horizon as well. These flavors, as they grow in popularity, should create new opportunities for frozen desserts, especially in combination with more traditional fruit flavors. Also, fruits may provide the basis for functional ingredients. Kiwifruit paste from Stratum Nutritional, St. Louis, Mo., may have application in frozen desserts. The multifunctional ingredient, called *ApuraGreen*, is said to help minimize ice crystallization.

New sweeteners may find use as alternatives to sugar. One example is stevia, which was already discussed in this article. In January 2011, Connecticut-based Iskream Inc. introduced its first low-fat, no-sugar-added ice cream made with stevia. Another possibility is the sugar replacer isomalt, a polyol derived from sugar beet, available from Beneo, Morris Plains, N.J. (phone 973-867-2140, www.beneo.com), a division of the Sudzucker Group.

When used in ice cream, claims such as "no sugar added" or "reduced in calorie" can be used. Minimum changes need to be made to existing ice cream recipes because it is very similar to sugar. The ingredient replaces sugar in a 1:1 mass ratio and is used where not only the sweetness but also the texture and mouthfeel of sugar is required.

New developments in creating low saturated fat ice cream may also be possible. According to researchers from the University of Guelph in Canada, ice cream formulated with an emulsion containing unsaturated oil showed no differences in melting properties as ice cream made with saturated fat. The researchers reported that two streams of ice cream made from a mixture of fractionated palm kernel oil, high-oleic sunflower oil, and glycerol monooleate favored the formation of "desirable ice cream."

Some ice cream manufacturers are setting their products apart by fortifying them. The addition of fiber is one example that this article discussed. Other components might include omega-3s, vitamin A, beta-carotene, vitamin E, and conjugated linoleic acid. In addition to fortification, there is continuing work on developing products for the lactose intolerant, including those that are based on plant proteins. Beneo, for example, developed *Nutriz MIC* powder based on rice and rice starch that may be used to create dairy-free and lactose-free ice creams. Because of its

very small starch granules, which mimic the feeling of fat globules in the mouth, rice starch is a suitable fat replacer in dairy desserts and ice cream, offering a superior mouthfeel and creamy texture.

One last trend that can have an impact on future ice cream formulating is the interest in creating simpler labels. As discussed in the December 2011 *Ingredients* section, Palsgaard Inc., Morris Plains, N.J. (phone 973-998-7951, www.palsgaard.com), launched new emulsifier lines for ice cream which ensure eating qualities, functionality, and shelf life, while reducing the number of ingredients on the label. Eggs can also provide a simplified label, as noted by the American Egg Board, Park Ridge, Ill. (phone 847-296-7043, www.aeb.org). Egg yolks are a particularly desirable ingredient in ice cream mixes that do not contain hydrocolloids or synthetic emulsifiers. Not only do the yolks create a stable oil-in-water emulsion, but the proteins in egg yolks can help control density, hardness, and texture by encouraging the formation of small ice crystals. All of this contributes to a smooth, non-gritty frozen treat.

As these ingredient developments are further explored, opportunities for future ice cream formulating will continue to expand and become more sophisticated. It's all quite progressive for a product that consists primarily of water (from milk and cream), sweeteners, flavorings, emulsifiers, stabilizers, milk solids, and milk fat. **FT**

Next month's Ingredients section will take an extended cookie break as it looks at how new developments, such as whole grains, sweeteners, gluten-free flours, texturizers, and inclusions, are helping to reformulate the cookie and impacting the future of this consumer favorite.



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