

Executive
Summary

▶ Formulating fermented dairy beverages.

▶ Using hydrocolloids for stability,
texture and flavor.▶ Enhancing the health profile
of cultured dairy drinks.

Culture Splash: Fermented Dairy Beverages

BY KIMBERLY J. DECKER
Contributing Editor

The list of global fermented dairy drinks runs to dozens of entries from at least as many countries, taxing the pronunciation skills of even the most multilingual among us. Danish *kærmemelk* and Polish *zsiadłe mleko* sidle up against Rwanda's *ikivuguto* and Iran's *doogh*. Meanwhile, Scottish *blaand* leaves one wondering whether its name reflects its Viking origins or stands as a commentary on the fermented whey beverage's flavor.

That so many cultures across so many generations could embrace so many variations on “spoiled” milk—and that they continue to do so long after refrigeration and GMPs brought spoilage under control—testifies not only to the universality of these beverages, but to the palate's ability to adapt to what nature (and lactic-acid bacteria) throw its way.

And though today's fermented dairy drinks are a far cry from their ancestors in everything from flavor profile to processing, product developers still build upon time-tested traditions in their formulations. Get the details right, and these 21st-century cultured beverages will stand the test of time too.

Come a long whey

To grasp just how diverse the world of cultured dairy drinks is, consider the difference between, say, a Danimals Rockin' Raspberry smoothie and Central Asia's beloved *kumis*: The former is sweet, fruity and designed to pacify Junior's taste buds; the latter is alcoholic, fizzy and made from mare's milk. What more need we say?

To be sure, notes Mukul Juneja, product manager, Givaudan, Cincinnati, "Outside the United States, most traditional drinks are not as sweet" as the yogurt beverages common in our own supermarkets. But even this distinction may evaporate as more cultured dairy products drift toward a generalized Western-style sweetness.

A case in point is Indian *lassi*, which Juneja says is traditionally tart like yogurt and "prepared simply with salt, pepper and maybe some cumin." But, he continues, "The more modern versions have more sugar added. And now the most popular versions are fruitier."

Cultured dairy drinks have evolved in other ways, too. On the plus side, they're more consistent. "One of the necessities of mass production for recognizable commercial brands, as opposed to traditional homemade or cottage industry, is consistency," Juneja says. "That is probably one of the most significant areas of improvement."

We can trace a good chunk of that improvement to the widespread use of specially selected and cultured fermentative strains that replace the "starters" small-scale producers would harvest from one day's production for



use in the next. "Now we have companies dedicated to developing proprietary strains of microbial cultures designed to be stable in modern manufacturing facilities," Juneja says.

They're also fine-tuned to enhance in the drinkable-dairy medium. According to Jonathan Hopkinson, Ph.D., senior applications scientist, DuPont Nutrition

& Health, New Century, KS: "Generally, lower-viscosity cultures are used. They make acid and flavor, but produce fewer exopolysaccharides," which are the large polymers that can overwhelm the texture of a drinkable product. With fewer exopolysaccharides, you get a decrease in viscosity, and your drinkable yogurt stays drinkable.

Standard time

As for which cultures we're actually allowed to use in yogurt drinks, the *Code of Federal Regulations (CFR)*, surprisingly enough, has nothing to say. In fact, the *CFR* doesn't specify standards of identity for yogurt drinks at all—let alone for "smoothies." But don't go taking that as a signal to label liberally, as the yogurt portion of any "yogurt drink" labeled as such must fit the federal definition of yogurt.

That means it must contain the lactic acid-producing bacteria *Lactobacillus bulgaricus* and *Streptococcus thermophilus*, and a minimum of 3.25% milkfat, 8.25% milk solids not fat and 0.9% titratable acidity (expressed as lactic acid)

prior to the addition of bulky flavors. These standards, laid out in greater detail in 21 *CFR* 131.200, also apply to yogurt-and-juice-based smoothies, while milk-and-juice blends are permitted to contain any directly acidified milk product.

This still leaves manufacturers substantial room to differentiate their products. As Kimberlee (K.J.) Burrington, dairy ingredient applications coordinator, Wisconsin Center for Dairy Research (WCDR), University of Wisconsin-Madison, says, "You can find levels of fat ranging from nonfat to full fat, but protein levels don't vary a lot." Sugar levels are lower in "light" beverages, she continues, but higher in meal-replacement types; as for total solids content in drinkable yogurt, it's lower than in spoonable.

Furthermore, according to the article "Culturally Speaking: Making Yogurt Drinkable" published in the June 2004 issue of *Dairy Foods*, fruit content can rise as high as 30% in these products. While flavor levels vary, natural fruit flavors usually come in at between 8% and

15%. And, given the variety of stabilizer options and functionalities, their levels also fluctuate, with a spread from 0.01% to 0.5% not uncommon.

Keeping it together

Stabilizers might just be the linchpin to the industry's ability to produce reliable, acceptable, consistent drinkable yogurts; like streamlined cultures, they represent a technology leap that has boosted cultured dairy to a more advanced stage of maturity.

"The appearance of the traditional product often included considerable whey on top of a casein layer," Hopkinson says. "With the advent of stabilizers, this separation is a thing of the past." To make sure it stays a thing of the past, formulators can use negatively charged hydrocolloid stabilizers, like high-methoxy pectin, which interacts with the positively charged casein proteins to keep them from aggregating and squeezing out the whey.

Hopkinson stresses the importance of dispersing the pectin thoroughly during the homogenization of the

yogurt mass—which is the one step in drinkable yogurt production that most diverges from that of its spoonable cousin. While the goal with cup-set yogurt is to protect the coagulated mass, yogurt drinks go through a final homogenization that reduces their particle size and distributes their stabilizer systems.

The greatest challenge in manufacturing drinkable yogurt, Hopkinson says, is "getting people to add the slurry of pectin and sugar at the proper time—after fermentation—and then homogenize with the right shear."

Stabilizing sensory appeal

Stabilizers aren't all about stability, of course. They're also tools for achieving proper drinkable yogurt texture. As Donna Klockerman, Ph.D., dairy food scientist, TIC Gums, Belcamp, MD, says, "The texture characteristics of drinkable yogurts are controlled by a combination of processing parameters and stabilizer systems."

Harold Nicoll, marketing manager, TIC Gums, believes that such textural manipulation "is one way



that developers can manage how consumers experience these drinks.” He says the company developed a stabilizer to accommodate the single-step processing that some smoothie manufacturers prefer. It allows manufacturers to adjust finished-beverage viscosity toward either “the thicker, heavier-bodied smoothies that have emerged as consumer favorites, or the original thin-bodied drinkable yogurts,” he says, adding that the stabilizer “helps impart the creamy, smooth mouthfeel and texture associated with high-quality drinkable yogurts, and also allows for superior flavor release.”

Which underscores another fact: Stabilizers are flavor, as well as textural, tools. As Klockerman explains, “they influence the delivery of sweet ‘yogurt’ and fruit flavors through control of sipping-suction resistance, the texture inside the mouth and the experience following swallowing.” She adds that manufacturers can match their drinkable yogurt’s texture to “different flavor combinations of sweet and savory to deliver the desired finished-product characteristics.”

How sweet it’s not

The improvements we’ve seen in flavor are “another area where technology has advanced significantly,” says Scott Harris, segment head, Givaudan. He points to the ability of flavor ingredients “to deliver a very complex profile that, in some cases, would have been impossible in some parts

of the world in the past, especially in areas where weather didn’t allow access to a vast variety of fruits.”

But flavor may in fact be holding drinkable yogurts back. Despite the “strong, uninterrupted growth” the broader yogurt category has enjoyed over the past five years, according to Mintel’s “Yogurt and Yogurt Drinks—US—August 2012,” 58% of U.S. adults eat yogurt an average of 7.5 times a month. “Drinkable yogurt’s food, drug and mass-merchant sales for 2010 will just surpass \$300 million, down one-third from 2006, according to Mintel data,” Nicoll notes.

Why? Harris and others postulate that excess sweetness may have something to do with it. “Health and convenience certainly attract people to drinkable yogurts,” he says, “but most of the products in the past have been too sweet and very high in total calories.” That may be changing, though, as “the acceptance of Greek yogurt and the move in foodservice away from frozen yogurt that tastes like ice cream to that with a more tart yogurt profile means that consumer recognition and demand will change,” he says.

Taste of things to come

Harris is confident that yogurt drinkers’ palates will “evolve their level of exploration and acceptance from core vanilla and strawberry to trending profiles, such as pomegranate—especially popular when superfruits were

at their height—and even to the presence of savory drinks across varied day parts. Mango, dark berry and banana are all flavors he thinks have potential.”

But some popular profiles may never find their footing in fermented dairy drinks. As Juneja says, “Sweet brown, nutty and indulgent flavors like chocolate, caramel and peanut butter tend to be challenging due to their incompatibility with the tartness of the product.”

Going with the grain

Beyond flavor, product developers are bringing new attention to drinkable dairy via other innovations. For example, Harris raises the banner of health as a strategy that can attract more consumers to drinkable yogurts; after all, it’s what brought so many to the category in the first place.

“Cultured dairy drinks inherently have live bacteria for gut health, but modern technology allows us to



advance the benefits to a much higher level, where targeted strains can deliver unique benefits like a boost in immunity,” Harris says. “Health-focused drinkable



► Color My Yogurt

“Health” is one of those words whose definition really is in the mind of the beholder. While some things are indisputably healthful—a low-sugar, low-fat, probiotic-rich fermented dairy beverage, for instance—others coast along on mere fumes of assumed healthfulness.

Such may be the case with “natural” colors (more accurately described as colors that are exempt from certification). A colorant extracted from, say, carrot or beetroot certainly sounds better-for-you than a synthetic like FD&C Red 40. And, for a fermented dairy product, the so-called natural colors can keep the healthy halo from slipping in the mind of many consumers.

Nevertheless, says Rajesh Cherian, manager, technical support, Roha USA, LLC, St. Louis, “It is true that U.S. consumers are demanding healthier foods and beverages with fewer artificial ingredients. There is an increasing demand for exempt colors, which can provide a clean-label declaration.”

Presumably, many of the same consumers who value those clean labels also buy fermented dairy beverages; does this signal the death knell for FD&C colors in cultured dairy drinks? Cherian isn’t playing taps yet: “While we have seen an increased demand for exempt colors, we have observed that demand for artificial colors has not decreased. It has remained very consistent and we expect to see that trend continue.”

Simply put, synthetic colors have the advantage in ease of use, stability, achievable shades and cost in use—especially in dairy. Consider the “clouding effect” of dairy, Cherian says. Because of their white background, dairy products “comparatively need a higher use rate of color to achieve the expected intensity.” When using pricey exempt colors, the costs can mount rapidly.

Similarly, fermented dairy products can tax exempt colorants such as anthocyanins because “the higher pH may cause a shade change,” he says. This shifts what the manufacturer may want to be a red or pink hue to a blue or even gray tone. By contrast, he says, “Certified colors are stable in a wide range of pH.” The key, as always, is to balance cost and functionality with consumer appeal. Doable, but easier said than done.

products, such as probiotic shots designed to target specific health benefits, may grow in the future as consumers look to food and beverages to fulfill their needs for healthier lifestyles.”

Harris praises kefir, in particular, for adding excitement to the drinkable yogurt shelf. But kefir is actually an ancient beverage with a tradition rooted in the herding societies of the North Caucasus. As the story goes, shepherds noticed that the fresh milk they carried in leather pouches would ferment over time and develop a light carbonation. We now know this results from the fermentative action of kefir “grains,” which are actually not grains at all, but lumpy little clumps of bacteria, yeasts, sugars, proteins and lipids.

Twenty-first century kefir producers eschew the old-fashioned grains and opt instead to use controlled starter cultures that produce the predictable flavor, texture, health benefits and quality that commercial

manufacturing requires. Nevertheless, producers like Lifeway Foods, Inc., Morton Grove, IL, stress that their products are still made in the genuine kefir tradition.

“Kefir is cultured for 14 to 16 hours, whereas most yogurts are cultured for just two to three hours,” says Fallon Fleishman Morgan, operations director, Lifeway Foods, Inc. “It’s that extra time that gives kefir its high probiotic activity count—7 to 10 billion CFUs per serving—and its delicious effervescent taste.”

Fleishman Morgan says the company’s kefir contains 12 different strains of probiotic cultures that “may boost the immune system and help the digestive system.” The company raises the stakes with a probiotic blend that delivers “20 billion units of probiotic activity in each bottle,” per the company’s website.

The blend’s organisms are *Bifidobacterium lactis*, which can aid immune and digestive health by encouraging a beneficial intestinal microflora, and

Lactobacillus reuteri, which in clinical studies has shown the ability to increase the “activity of natural cells that kill harmful bacteria and the phagocytic activity of peripheral blood mononucleotides,” among other benefits the website lists.

“Our top flavors are strawberry, blueberry, plain, pomegranate, peach and raspberry,” Fleyshman Morgan says. “Pomegranate shot through the rankings when antioxidant and pomegranate research came out as being super-beneficial to the body. The same is now happening with our açai flavors. We have an organic pomegranate-açai kefir that is doing very well.” Echoing Harris, she notes that public acceptance of Greek yogurt is rubbing off on the company’s plain kefir, too, which “is becoming hugely powerful. There is no added flavor or sugar—just the cultured milk. It’s very tart and tangy and is delicious when mixed with fruit or honey.”

Sounds like it might make a good breakfast—and, as Burrington points out, that’s exactly what kefir often

does. “Some people put kefir on their cereal instead of milk,” she says. “Drinkable yogurts are sold in Europe in large cartons for that purpose.” Perhaps that’s another way to focus consumers’ radars on the growing, improving range of cultured dairy drinks.

“I think you could position a yogurt drink as a breakfast beverage to get your day started right,” Burrington says. “There are a lot of people who might not drink a glass of milk, but might drink a yogurt.”

Kimberly J. Decker, a California-based technical writer, has a B.S. in consumer food science with a minor in English from the University of California, Davis. She lives in the San Francisco Bay Area, where she enjoys eating and writing about food. You can reach her at kim@decker.net.



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