

Functional Ingredient Update

by Donna Berry

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Dairy foods remain a choice delivery vehicle for functional ingredients.



Dairy foods remain a choice delivery vehicle for functional ingredients such as antioxidants, fatty acids, fiber, probiotics, whey proteins and more. Why? Because refrigerated and freezing temperatures assist with keeping many functional ingredients active. Further, fresh dairy foods' limited shelf life ensures that most fragile ingredients won't degrade prior to consumption.

Some foods are inherently rich in the same functional ingredients commercially produced for addition to other foods and beverages. Indeed, all foods are functional at some physiological level.

It is the position of the American Dietetic Association, Chicago, that functional foods, which include whole foods and fortified, enriched or enhanced foods, have a potentially beneficial effect on health when consumed as part of a varied diet on a regular basis, at effective levels. ADA supports research to further define the health benefits and risks of individual functional foods and their physiologically active components. Health claims on food products, including functional foods, should be based on the significant scientific agreement standard of evidence and ADA supports label claims based on such strong scientific substantiation.

As the world's largest organization of food and nutrition professionals, ADA is committed to improving the nation's health and advancing the profession of dietetics through research, education and advocacy. ADA's position on functional foods, published in the April issue of the Journal of the American Dietetic Association, encourages food and nutrition professionals to continue to work with the food industry, allied health professionals, the government, the scientific community and the media to ensure that the public has accurate information regarding functional foods.



ADA's position statement and accompanying paper were written by Clare Hasler, executive director of the Robert Mondavi Institute for Wine and Food Science at the University of California-Davis, and Amy Brown, associate professor of medicine, Department of Complementary and Alternative Medicine at the University of Hawaii's John A. Burns School of Medicine. The paper is available for download to non-members for a nominal fee at www.adajournal.org.

The paper includes definitions of the term as used in different countries and notes “functional foods” is not a legal term but a marketing term. Further, ADA defines functional foods as those that “move beyond necessity to provide additional health benefits that may reduce disease risk and/or promote optimal health. Functional foods include conventional foods, modified foods (fortified, enriched or enhanced), medical foods and foods for special dietary uses.”

The paper identifies broccoli, nuts and tomatoes as examples of conventional food with functional properties. Modified foods include calcium-enhanced orange juice, folate-enriched breads and foods formulated with bioactive ingredients like fish oils, plant sterol esters or lutein. Medical foods include PKU formulas free of phenylalanine. Foods for special dietary uses include gluten-free and lactose-free foods.

ADA's position paper reviews various aspects of functional foods. For example, it looks at factors driving the growth of the functional foods industry, such as increased consumer interest in controlling one's own health, rising health-care costs and scientific research linking diet to chronic disease reduction. It reviews the regulation of functional foods in the United States, noting that “boundaries between what is a food and what is a medicine have been challenged by both consumers and manufacturers since the mid-1980s,” leading to “dramatic changes in food regulation that have fueled a so-called functional foods revolution.” The paper emphasizes that health claims on the benefits of functional foods and their physiologically active components should be based on the standard of significant scientific agreement.

“The study of how diet impacts disease prevention and health promotion is more important than ever. Consumer interest in the health benefits of foods and food components is at an all-time high and will continue to grow,” the authors conclude. “Food and nutrition professionals are uniquely qualified to interpret scientific findings on functional foods and translate such findings into practical dietary applications for consumers, other health professionals, policy makers and the media. Food and nutrition professionals must continue to be leaders in this exciting and ever-evolving area of food and nutrition.”

Top-five functional foods



Soon after the paper was published, the New York State Dietetic Association surveyed its leadership and asked them to choose the top-five functional foods based on health benefits and value. Nutrition experts chose salmon as the top functional food for omega-3 fatty acids.

Omega-3 fatty acids not only raise good high-density lipoprotein (HDL) cholesterol and lower bad low-density lipoprotein (LDL)

cholesterol, they may also lower the risk of heart attacks and strokes. The American Heart Association suggests that people with coronary heart disease consume about 1 gram of omega-3 fatty acids daily. They do not recommend supplements for healthy people; instead, they recommend eating fish twice a week. Of course, fortifying dairy foods with omega-3 fatty acids is becoming increasingly more common.

Second on the list were oats, which were chosen for their fiber content. This powerhouse nutrient, known for aiding with digestion, also helps fight disease, and may lower risk for high cholesterol, heart disease, diabetes and cancer.

Oat fiber, as well as other soluble and insoluble fibers, has application in dairy foods. Many fiber ingredients have also been shown to possess other functional properties including improving absorption of nutrients as well as functioning as a prebiotic in the gastrointestinal tract.

Coming in third, blueberries were chosen for their high level of antioxidants, which are thought to help protect the body against the damaging effects of free radicals and the chronic diseases associated with the aging process. Blueberries are among the fruits with the highest antioxidant activity, some of which comes from the high levels of select inherent vitamins including vitamins C and E.

Blueberries complement many types of dairy foods, including all types of yogurt, frozen desserts and even cheese spreads. Choosing blueberry ingredients that contain whole fruit provides the perception of being less processed.

Low-fat milk came in fourth for both its calcium and vitamin D content. Of course, vitamin D is not inherently present in milk, but milk has come to be recognized as one of the most reliable sources of this bone-building vitamin. Vitamin D is now being added to milk used in the manufacture of dairy foods including cheese and yogurt. Further, vitamin D has been shown to reduce the risk of developing certain cancers, heart disease and diabetes.

Rounding out the top-five functional food list is low-fat yogurt with probiotics, which NYSDA describes as the only truly fortified food on their top-five list.

"While yogurt is already a good source of calcium, protein, vitamin B12, vitamin D, potassium and magnesium, the addition of probiotics, which aids digestion, increases its health benefit," says NYSDA president J. Elizabeth Smythe.

Innovative introductions

Greg Miller, executive vice president of research, regulatory and scientific affairs for Dairy Management Inc., Rosemont, Ill., says, "Nutrient-rich dairy foods are well positioned to be a

competitive force in the health and wellness market. Plus, consumption of dairy foods like milk, cheese and yogurt is increasing as they make their way into grab-and-go packaging for active lifestyles.”



Palm Beach Gardens, Fla.-based Attitude Drinks Inc., believes that dairy should own the functional foods market. Building upon decades of experience in the formulation, production, marketing and sales of milk and dairy-based drinks, the company is introducing two unique and innovative milk drinks. These formulations deliver the benefits of milk, using technology and science never before introduced in the beverage industry.

The Phase III Recovery drink addresses the growing need for sophisticated, exercise recovery solutions. Designed to exploit the scientific evidence favoring low-fat chocolate milk as a highly efficient sports recovery drink, Phase III Recovery provides a research-proven, targeted solution. Formulated with a focus on delivering the most effective protein-to-carbohydrate ratio in addition to measured levels of recovery-enhancing vitamins and minerals, Phase III Recovery is the first protein drink utilizing “Mother Nature’s most perfect food” in delivering this function, according to Roy Warren, chief executive officer.

The Just! Metabolic Health drink targets consumers interested in achieving improved metabolic health. Recently announced scientific studies indicate that significant health benefits, including weight management and heart health, are derived from improved metabolic health. Just! Metabolic Health contains Innutria, a proprietary blend of ingredients naturally found in milk that have been shown to assist with fat burning and reduction of oxidative and inflammatory heart stress.

Beyond dairy food applications, functional dairy proteins are making their way into all types of foods and beverages. For example, New Zealand’s Fonterra Co-operative Group is rolling out Whole, a water beverage enhanced with whey protein isolate and claiming to induce satiety. Satiety — the feeling of fullness — is a concept that is rapidly growing in profile in the functional nutrition industry. Increasingly, consumers are trying to manage their nutrition and calorie intake in a world of convenience and processed foods. While a diet requires ongoing discipline, products such as Whole offer an alternative by building satiety into everyday snacking goods.

Whole provides a healthy snack option, as it contains 5 grams of protein and 1.5 grams of fiber, yet only 2.5 grams of sugar and 30 calories. It contains three times the protein, and almost as much fiber as a banana, with only one-quarter of the calories.

Here’s a functional beverage from a dairy, yet is all fruit. WhiteWave Foods Co., Broomfield, Colo., a wholly owned subsidiary of Dean Foods Co., Dallas, has teamed up with Hero of Lenzburg, Switzerland, to manufacture Fruit2day in the

United States. Fruit2day is a drinkable and edible fruit snack with real fruit bits in a bottle. Fruit2day is already a favorite in Europe.

“We are excited to introduce Fruit2day to U.S. consumers and believe it is a unique new way to get fruit in your diet,” said Hanno Holm, president and CEO of Hero-WhiteWave, the joint venture formed to market the brand. “People tell us they are open to new ways of fitting fruit into their busy and on-the-go lives. Fruit2day is compact and portable for anytime you want to enjoy a fruit snack.”

Fruit2day provides natural fruit nutrition without peels, pits, bruising, spoiling or even sticky fingers. It is made with a combination of real fruit pieces, fruit puree and fruit juice without any added sugar or preservatives. Each bottle of Fruit2day packs in two servings of fruit and antioxidants in 6.75 ounces, with only 110 to 120 calories, depending on the flavor.

From inherently functional fruit to concentrated whey proteins, the products just described span the spectrum of foods that qualify as being functional. NYSDA's Smythe sums it up, “Functional foods describe foods that, in addition to being nutritious, offer distinct health benefits.”

The Cost of Manufacturing Functional Foods



A recently completed corporate location study by The Boyd Co., Princeton, N.J., compares the cost of operating a functional food and nutritional beverage facility in 35 U.S. and Canadian cities. The study analyzes all major geographically variable operating costs that are most pivotal to a corporation's decision where to locate new bioscience research and production operations.

Surveyed costs include skilled labor, including scientific workers with advanced degrees in food technology, biology, chemistry and other life sciences, utilities, taxes, construction, shipping, corporate travel and other occupancy cost factors. Operating costs are scaled to a representative 60,000-square-foot facility housing research and processing functions and employing 150 workers.

Findings of the study show total annual operating costs ranging from a high of \$18.8 million in New York/Nassau County, N.Y., to a low of \$12.5 million in Sioux Falls, S.D. Among the Canadian cities, annual operating costs range from a high of \$14.7 million in Toronto to a low of \$12.7 million in Saskatoon.

“In today's difficult economy, comparative costs are ruling the corporate site selection process. For most bioscience companies, improving the bottom line on the cost side of the ledger is much easier than on the revenue side due to the credit squeeze, rising research and development costs, soaring litigation costs

from civil lawsuits, the long and expensive regulatory process and government's heightened efforts to rein in health-care costs," says John Boyd, president. "The new 2009 study includes six Canadian cities housing significant concentrations bioscience operations. North American free trade is forcing U.S. companies to conclude that they must not only be cost-competitive with their domestic peers but also with Canadian-based operations which benefit from that country's favorable exchange rate, now 80 cents on the dollar. Moreover, Canadian bioscience firms have significantly lower fringe benefit costs than their U.S. counterparts owing to Canada's national health-care plan."

One of the reasons for variable operating costs at facilities in different regions was the proximity to ethanol production and access to byproducts of this process. Boyd says that the massive increase in ethanol production in the United States has resulted in a similar increase in its most valuable residual product: DDG (distiller's dried grain). "In the Midwest alone, ethanol producers generate over 10 million tons of DDG annually," he says. "Functional ingredients such as phytosterols, lecithin, as well as carotenoid antioxidants such as lycopene, are some of the ingredients that are being researched and expected to be mass produced from DDG for the functional foods and nutritional beverage industry."

The top five most economic sites:

- Sioux Falls, S.D. (\$12.6 million in annual operating costs)
- Saskatoon, Saskatchewan (\$12.8m)
- Salt Lake City/Provo, Utah (\$13.1m)
- Winnipeg, Manitoba (\$13.1m)
- Des Moines, Iowa (\$13.2m)

At the other end of the scale, the most expensive cities to operate a functional food facility in ascending order were Boston; Los Angeles; San Jose, Calif., San Francisco; and New York/Nassau County, N.Y., the latter of which recorded estimated annual operating costs of \$18.8 million.

For more information, visit www.theboydcompany.com.

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Product Development Editor Donna Berry applies her expertise in dairy innovations in each month's Ingredient Technology feature.