

## Boosting Nutrient Profiles

By Cindy Hazen, Contributing Editor

With nutrition labeling under increased scrutiny by consumers and regulators, product designers may want to consider employing more of the increasing range of nutrient-boosting ingredients, and look at ways to limit calories, fat, cholesterol and sodium.

### Prominently protein

Protein's healthy halo is especially well-recognized, but protein choice can impact texture, flavor, water binding or solubility. And ingredients can be application-specific.

Soy proteins rate a perfect 1.00 on the PDCAAS scale: They contain all nine essential amino acids. And, while soy is nutritionally comparable to egg, milk and fish, it is "typically the most cost-effective protein ingredient," says Russ Egbert, Ph.D., director of protein research, ADM, Decatur, IL. "It is the only protein that has a health claim. At levels high enough to yield 6.25 grams of soy protein per serving, and if the product is low in fat and meets the general health-claim requirements, you can claim that it can reduce the instance of cardiovascular disease."

In beverages, the pH of the system will determine precisely which soy protein isolate to use. Whether the beverage system is powdered or RTD is also an issue. "We have over 25 isolated soy proteins in our line, and each one of them has unique functional characteristics for a particular application," Egbert says. "In an acid beverage, the protein will be stabilized with pectin, so you're looking for a protein that's going to provide minimal viscosity changes to the overall beverage."

Soy flour, soy concentrate or crisps can add protein to baked goods, meat analogues, snacks and meal-replacement bars. Soy flavor decreases as the protein value increases. Soy protein isolate with 90% protein (dry basis) contributes less flavor than soy flour containing 50% protein.

Lorraine Niba, Ph.D., regional marketing manager, Americas, FrieslandCampina Domo, Paramus, NJ, suggests boosting protein by way of a glutamine-rich, wheat-derived protein hydrolysate. Protein content of the company's product is 79% on a dry weight basis. "It can be used in RTD beverages, instant mixes and powders, and bars," she says. "Usage levels range from 1% to 4%. For products aimed at post-exercise recovery, the higher use level is recommended, since glutamine plays a significant role."

When formulating with any protein, consider potential interactions with other ingredients in the system. Proteins can bind flavor, for example, requiring additional flavor enhancement. Often, protein interactions can contribute desirable physical properties, allowing a reduction of functional ingredients. But sometimes the end goal is simply increased protein content. In this case, casein is worth looking at. It is the most stable of all of the milk proteins. Caseinates, produced by treating casein with an alkali, are soluble.

Milk protein concentrate is available with 70% protein in the United States. Stable to heat and shear processing, milk protein is suited to neutral-pH systems. An instantized total milk protein with 87% protein on a dry basis is available. Its clean flavor suits it for use in “a range of products, such as beverages, soft bars and shakes,” says Niba.

“Whey proteins can tolerate a wide range of pH levels from acidic to neutral,” says Grace Harris, manager, applications and business development, Hilmar Ingredients, Hilmar, CA. “This makes them good for acidic applications, such as yogurts, drinkable yogurts and sports beverages.”

In a variety of foods, whey protein can bring valuable functional properties, such as emulsification, moisture binding, gelling and aeration. In baked goods, whey proteins are subject to browning. “Because whey proteins are often modified to enhance certain functional attributes, it’s best to confer with your supplier,” says Harris.

Whey protein concentrates range from 34.0% to 78.5% on an as-is basis. They can be added to protein bars, baked goods, dairy and frozen desserts, soups, sauces, and dressings. Whey protein isolates contain 94% protein on a dry basis. They can fortify juices, sports beverages and nutrition bars.

## Trimming the fat

Not all proteins are used just as protein. “Our functional whey protein can be used to enhance mouthfeel and creaminess in food applications by creating a fatlike mouthfeel and texture while contributing an almost unnoticeable amount of fat,” says Michelle Ludtke, senior food technologist, Grande Custom Ingredients Group, Lomira, WI. Depending on the application, usage ranges from 1% to 2%. “It can also be used to replace fats, oils and eggs in bakery products,” she says. In meat applications, it helps to create a lower-fat product while retaining moisture and juiciness.

Another approach to fat reduction comes from dried plums. Depending on the amount of dried plums used, it can boost fiber and potassium levels while fat and calories are reduced. “There are already examples of dried plums used to improve the nutrition and functionality of digestive-related products due to both the sorbitol and fiber in dried-plum ingredients,” says James Degan, consultant, California

### Label Watch

*The FDA is steadfast in its mission to educate consumers about how to read and use the Nutrition Facts panel. Moreover, the agency is aggressively analyzing health claims and Front of Package (FOP) Labeling, especially as they relate to nutritional labeling. Guidance for Industry, issued in Oct. 2009, says: “FDA’s research has found that, with FOP labeling, people are less likely to check the Nutrition Facts label.... The agency is currently analyzing FOP labels that appear to be misleading. The agency is also looking for symbols that either expressly or by implication are nutrient content claims.”*

Dried Plum Board, Sacramento. “We have also developed reduced-carbohydrate baked goods using dried plums, as the sorbitol adds to sweetness without contributing to carbohydrates.”

Because dried plums contain virtually no sucrose, they can be used in low-glycemic formulations. Calorie reduction is an added benefit. “The total amount of calories per gram of dried-plum carbohydrate is a little over 2 calories per 100 grams,” says Degan. “This is due to two characteristics of the d’Agen plum. One is the virtual absence of sucrose in dried plums, resulting in the available sucrose in the fresh plum being hydrolyzed to glucose and fructose during the drying process. The other characteristic is the amount of natural sorbitol, which is about 15% to 17% in dried plums.” This adds sweetness with minimal calories.

In powdered form, dried plums contain 62% insoluble fiber and can be labeled as “fruit fiber.” It absorbs as much as six times its weight in water. Dried plums in powder, paste, purée, bits and diced forms can be added to snack products, energy bars and baked goods.

### Boosting fiber

Most adult Americans fall far short of the FDA recommendation to consume at least 25 grams of fiber in a 2,000-calorie daily diet. Incorporating vegetables into dishes can add fiber while positively affecting the ingredient statement. “Label statements such as ‘provides a full serving of vegetables’ will help consumers select products that fit their nutrition needs,” says Amy Marr, vice president, marketing, Gilroy Foods & Flavors, Omaha, NE. The company offers frozen vegetables with reduced water. These vegetables can “deliver one vegetable serving with 33% less vegetables as compared to IQF,” she says. “The controlled-moisture properties of the vegetables mean they do not weep into application. This can be particularly useful for eggs and dough-enrobed products where excess moisture can be devastating to product quality.” The reduced-moisture red bell peppers contribute 3.2 grams of fiber per 100 grams, green bell peppers 2.8 grams and Roma tomatoes 2.7 grams.

Whole-grain ingredients can naturally impact the fiber declaration on the nutrient panel. Whole grains contain insoluble fiber, with the exception of oats and barley, which contribute small amounts of soluble fiber.

Mike Veal, vice president of marketing, ConAgra Mills, Omaha, NE, says their whole-grain barley product is “the highest-fiber whole grain, with three times the total fiber and three times the soluble fiber of oats. Available as flakes and ultra-fine flour, this product can be used in bars, cereals, pasta, meat emulsions and a variety of baked applications.” Also, the company’s white whole-wheat flour “provides over four times the fiber of refined flour, yet delivers the texture, taste and appearance of refined flour,” he says. It can be used as a partial or complete replacement for refined flour.

“Formulators may need to increase water or other moisture to compensate for the moisture absorbed by the additional fiber found in whole-grain flours,” Veal says. “Formulators may also find that they need to add gluten or alter their dough conditioner to carry the additional fiber and maximize volume. They also need to be careful not to overmix, which can result in damage to the gluten structure of a dough, as well, leading to lower volumes.”

Those seeking a more-direct route to fiber fortification may choose from a variety of plant-based, or cellulose, fibers. Economically, cellulose fiber has no contenders. It is also the whitest of the fibers and contributes insoluble fiber, which provides the added benefit of reducing calories. Insoluble fiber adds bulk, but contributes zero calories per gram. Soluble fiber typically contributes 4 calories per gram, the same as carbohydrates. When increasing the fiber content of any product, it's important to consider the water-binding capacity of the fiber.

Prebiotic fiber, such as inulin or fructooligosaccharides (FOS), adds soluble fiber with an added digestive benefit—it enhances populations of naturally occurring beneficial microflora. These fibers do not absorb as much water as other fibers. Developers hoping to reduce calories should note that FOS is compatible with high-intensity sweeteners.

Product designers can also consider a nonviscous soluble fiber solution: digestion-resistant maltodextrin. This ingredient contributes only 1.6 calories per gram. Yuma Tani, vice president, Matsutani America, Inc., Itasca, IL, suggests that, by adding this maltodextrin to food applications that already contain small amounts of fiber, the fiber content can be raised enough to make a “good source of fiber” or even an “excellent source of fiber” claim without any other changes in the formula. “It is very easy to use in all kinds of applications,” he says. “It can be added anywhere in the process. It is stable in severe conditions of high heat and acid.”

## Building bones

Recent science related to bone health and immunity has driven a significant increase in the number of products with added vitamin D, notes Todd Sitkowski, senior marketing manager, DSM Nutritional Products, Inc., Human Nutrition & Health, NA, Parsippany, NJ. “Vitamin D is being added to ‘allowable’ foods and beverages at a good (10%) to excellent (20% to 25%) source of the Daily Value (400 IU),” he says. “Types of products in which vitamin D is permissible include juices and juice drinks with the addition of the appropriate calcium fortification, processed cheese, hot cereal, and nutritional bars that are positioned as either meal

### Miscellaneous Fortificants

*Many essential nutrients are available for food and beverage products.*

*“Vitamins A, C, D, as well as the mineral iron, can be sourced in powdered forms suitable for multiple product applications, from beverages to nutritional bars,” says Gus Castro, senior technical marketing manager, DSM Nutritional Products, Inc., Human Nutrition & Health, NA, Parsippany, NJ.*

*“The specific recommended product forms will depend on the application, its processing conditions, and formulation factors such as taste, color and possible interactions with other ingredients.” Considerations are also given to the final product packaging type and storage conditions, such as dry shelf, refrigerated or frozen, as well as shelf life.*

*Adding multiple micronutrients “lends itself to formulating and providing a nutritional premix where nutrients are delivered in an analyzed powdered form for direct batch addition suitable to the finished product’s shelf life,” Castro continues. “The added amounts depend on the product being formulated, but as an example, a dairy-based beverage containing 10% RDI of vitamins A, C and D and iron would need anywhere between 35 to 120 mg per serving of premix, depending on what nutritional forms are used.”*

*Vitamin A can also be delivered via the use of beta-carotene, which also offers antioxidant and color benefits.*

*“In most instances, adding the above nutrients at a good (10%) to excellent (20% to 25%) source is a great, responsible way to contribute to the recommended daily intakes of each nutrient in processed foods and beverages,” says Todd Sitkowski, senior marketing manager, DSM.*

replacements or for special dietary use.”

FDA allows a claim of calcium, or calcium and vitamin D, with a reduced risk of osteoporosis if the food contains at least 200 mg of digestible calcium. Vitamin D must meet or exceed 80 IU to qualify for this claim.

A patented mixture of calcium acid pyrophosphate and monocalcium phosphate, anhydrous, designed primarily as a 1:1 drop-in replacement for sodium acid pyrophosphate (SAPP) to cut sodium levels, provides a calcium boost to baked goods (the ingredient contains 18,000 mg calcium per 100 grams). “Proper leavening choice will help formulators reach their goals for healthier baked goods,” says John Brodie, technical service, baking, Innophos, Cranbury, NJ. The ingredient “will reduce sodium content and significantly increase calcium content to 10% to 25% of the FDA’s RDA.” In a standard muffin formulation, he notes, formulators can increase calcium from less than 1% to 10% RDA, which allows for a “good source of calcium” label claim. Other products, such as biscuits or pancakes, have seen calcium content increases to 25% RDA.

The daily reference amount of calcium is 1,000 mg. When considering calcium sources, “formulators should be careful not to confuse solubility with bioavailability. Inorganic calcium sources are negligibly water-soluble,” says Nadeen Myers, food phosphates specialist, ICL Performance Products, St. Louis. “However, the inorganic calcium sources are just as bioavailable as the water-soluble sources once the calcium source reaches the gut, which is acidic. Additionally, inorganic calcium sources, such as tricalcium phosphate (TCP), have a much-higher calcium concentration than those calcium sources that are water-soluble, making them more cost effective.”

Additionally, “TCP not only adds calcium, but also phosphorous, which is another critical element necessary for good bone health,” Myers says. “With a high calcium content of 34% to 40%, TCP provides up to four times more calcium than other calcium-fortification alternatives that have between 9% to 11% calcium.

“Calcium fortification can be seen across the food industry,” continues Myers. “No longer is it primarily focused on meal-replacement beverages or vitamins and supplements. Calcium fortification is now found in baked goods, cereals, snack products, dairy products, beverages, condiments and candies.”

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