



The Dairy Herald

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The Whey to Product Innovation

**Breath strips that pack a protein punch.
 High-protein snack chips.
 Granola-type bars with more than 30g of protein.**

These innovative products are poised to make an impression in the marketplace as whey protein steps boldly into the mainstream. Not only does the dairy ingredient answer consumer demand for high-protein products, it is becoming widely known for its health benefits.

Whey fits right into the hugely popular high-protein, low-carbohydrate diets. "This trend is expanding from drinks and bars to cookies and ice cream and beyond. It is widespread, growing and seems that it's here to stay. Whey proteins provide an ideal profile of nutrition, flavor and physical characteristics in these foods," says whey manufacturer Steve Dott, vice president, Grande Custom Ingredients, Lomira, WI.

More products are hitting store shelves touting whey's health benefits. "Consumers have no negative perceptions of whey proteins, and a rapidly growing number value the natural origin and high quality of whey proteins. This perception started years ago with athletes and bodybuilders, but has now expanded to include a growing number of health- and nutrition-conscious consumers," observes Dott.



NOVEL WHEY INGREDIENTS, NOVEL PRODUCTS

At the 2003 Institute of Food Technologists (IFT) Annual Meeting and Food EXPO®, attendees experienced unique prototypes showcasing whey that ranged from chips and cookies to fruit leather, cereal and breath strips.

Breath strips packed with intense flavor and breath-freshening ingredients have been giving mints and drops a run for their money. Davisco Foods, Eden Prairie, MN, added a protein twist to the strips, sampling spearmint-flavored breath strips made with its BIPRO® whey protein isolate.

Dairy Management Inc.™ (DMI) showcased a protein-enriched brownie and nutritious fruit leather for kids. Both prototypes would give consumers added protein and nutrition in their diets through indulgent and tasty snacks. The brownie provides 4g of protein per serving. In addition, it has no added sugar, making it perfect for those consumers who are trying to reduce carbohydrates.

"By listening to the marketplace and seeking out a solution, we were able to create a brownie with a chocolate, sweet flavor but fortified with whey protein and nonfat dry milk," says Carolyn Podgurski, dairy ingredients specialist for the California Dairy Products Technology Center, California Polytechnic State University, San Luis Obispo, CA.



HELPING CHILDREN'S NUTRITION

With more than 80% fruit and 5% protein, the strawberry fruit leather presented by DMI serves as a healthier alternative to its commercial cousins on the grocery store shelves. It also provides 40% of the suggested daily value of vitamin C, making it a great product for providing nutrients important for children's diets. The formulation uses a blend of naturally sweet applesauce and strawberries.

"Snacks like the fruit leather have always been perceived by parents as healthier than candies such as lollipops or chocolate bars," says Kimberlee "KJ" Burrington, dairy

ingredients applications center coordinator, Wisconsin Center for Dairy Research, Madison, WI. "Now, DMI has packed the power of protein into a fruit leather, offering a healthy alternative for families on the go."

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In one of the show's technical sessions, Sharon Gerdes, technical support consultant, DMI, presented examples of novel products using

Whey in the marketplace



Cold Fusion Protein Bars contain 10-11g of whey protein.

The product is a frozen protein juice energy bar that uses whey protein isolate as its primary protein source to help provide muscle recovery and repair for sports enthusiasts.

In June 2003, the company launched Power Pops for schools, universities and other foodservice segments. Each 2.5-oz Chocolate Fantasy Power Pop contains 7g of whey protein, 2g of fat and 110 calories.

Cold Fusion Foods, Los Angeles, CA

U-TURN™, ONEWAY™ and DETOUR™ Bars use Designer Whey™ as their protein source. Each bar provides 30g of protein. U-TURN is a caramel whey protein energy bar, ONEWAY is a peanut butter whey protein candy bar and DETOUR is a caramel peanut whey protein energy bar.

Next Proteins Inc., Carlsbad, CA



WHEY COMPONENT	POTENTIAL BENEFITS
Lactoferrin <small>a casein-derived peptide found in cheese whey</small>	May increase iron absorption and transport, enhance immunity, stimulate growth of beneficial intestinal bacteria in the intestinal tract, function as an antimicrobial.
Glycomacropeptide <small>a casein-derived peptide found in cheese whey</small>	Helps to reduce dental caries, is a protein source beneficial for patients with phenylketonuria, stimulates growth of beneficial bacteria in the intestinal tract, enhances immunity by binding of cholera and E. coli enterotoxins.
Immunoglobulins	Have shown antimicrobial activity and may neutralize toxins and viruses.
Alpha-lactalbumin	Used in infant formula to make more similar to human milk. Believed to have immune-enhancing activity.
Beta-lactoglobulin	A retinal-binding protein thought to play a role in absorption and availability of vitamin A.
Lactoperoxidase <small>a secretory enzyme</small>	A natural antimicrobial agent with potential use in dental products to inhibit caries.

texturized whey, extruded whey protein, whey protein edible films and whey-starch polymers. Davisco Foods handed out whey protein chips, just one example of the possibilities. Products already on the shelves tempting consumers with added protein include whey crisps from Nuvex Ingredients[®] and Lean Protein Bites from Breakthrough Nutrition.

NUTRITIONAL WHEYS

Consumers are catching on to whey's emerging nutritional benefits, appreciating whey both for what it provides and what it does not. For example, with all of the publicity about new labeling requirements for trans fatty acid content in foods, consumers are looking for little to zero trans fats in the products they purchase. Whey ingredients shine in this situation, as they typically have a very low trans fatty acid content.

Emerging research shows whey can play a role in:

- **Sports nutrition.** Whey proteins made their claim to fame in the nutritional field with their high level of amino acids, particularly the branched chain amino acids (BCAAs), leucine, isoleucine and valine. These BCAAs are metabolized in such a way that provides muscle with a readily available energy source to athletes.
- **Weight management.** Whey protein fits into the high-protein diet market perfectly. High-quality proteins like whey may also help to preserve lean muscle tissue.



- **Heart health.** Previous studies have found that various components in whey protein helped to reduce elevated blood pressure. A 2002 study at the University of Minnesota found that a specific whey protein isolate (BioZate[®]1) with bioactive peptides reduced blood pressure with as little as one week of treatment. Both systolic and diastolic blood pressure dropped and the positive change remained throughout the study. In addition, several animal studies have shown that whey proteins helped to reduce cholesterol levels.
- **Bone- and teeth-building calcium.** There are approximately 500mg of calcium in every 100g of whey protein concentrate.



Whey Cool[™] Café serves up innovation

When DJ Anderson, founder of Whey Cool Café, began searching for a way to make a lowfat frozen dessert that consumers would love, he zeroed in on protein.



"I started by looking at sources of protein because I knew that [my product] had to be high in protein and low in sugar and other carbohydrates," says Anderson, who started his business in 1999. He compared whey protein, which he had used for years as a healthy supplement, to soy protein and found that whey protein had a significantly higher biological value rating of 104 compared to 70 for soy protein. Biological value is a measure of protein quality that expresses the rate of efficiency with which protein is used by the body.

In Anderson's opinion, "When it came to flavor, whey protein concentrates and isolates easily tasted much better than soy proteins so the choice for using whey proteins was easy."

BUSINESS EXPANDING

The first Whey Cool Café opened in March 2003 in the Retail Concourse of the Illinois Center in Chicago. New cafes will soon be opening in Marshfield, Madison, and Milwaukee, WI; Minneapolis, MN; and Tampa, FL.

The company offers a line of desserts and beverages that tout great taste along with extremely high biological value ratings. Product offerings include soft serve, shakes, packaged and hand-dipped frozen desserts, and creamy hot protein coffee and tea beverages. Sugar-free chocolates in bulk, bars and molded shapes as well as specially enrobed truffles and bonbons with high-protein centers are also offered.

Whey Cool frozen desserts are low in sugar, saturated fat, cholesterol and net carbohydrates while high in protein content.

"The consumer response to Whey Cool in its variety of forms has been overwhelmingly positive. People love it and they often return with their friends to introduce them to these healthy desserts too," says Anderson. "The typical customer is aware of the recent trends in nutrition with more emphasis on high-protein, low-carbohydrate foods, and the desire to limit added sugar in their diets, and they clearly want to have more" choices that fit this eating style.

Whey Offers Key Functionalities to Food and Beverage Manufacturers

Even beyond its nutritional benefits to consumers, whey stars in product innovation because of its versatility in foods and beverages.

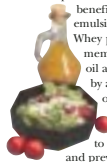
"Whey is multifunctional and comes as a complete package," says Kimberlee "KJ" Burrington, dairy ingredients applications center coordinator, Wisconsin Center for Dairy Research, Madison, WI. "You don't just get one functionality, but an ingredient that is made of protein, carbohydrates, minerals and a little bit of fat. All together, you have properties that include emulsification, gelation with heat, good aeration properties and high solubility. You also have the ability to provide browning to a product."

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All of these properties give a formulator the ability to develop foods that are appealing in taste, mouthfeel and appearance.

- **High solubility.** "The unique thing about whey protein, in comparison to other food proteins, is its solubility over a wide pH range," says Burrington. Whey proteins have high solubility even at an acid pH. This is important for fruit-flavored beverages and salad dressings.
- **Emulsification.** Salad dressings, soups, sauces and confections benefit from whey's emulsifying properties. Whey proteins form membranes around oil and water globules by adsorbing at the oil/water interface. The protein partially unfolds to stabilize the globule and prevent oiling off.



- **Water-binding capacity.** When whey proteins are heated, the bonds that are responsible for the globular structure break down. As the molecule unfolds, additional water binding sites are created, which in turn increases viscosity. The water-binding properties enhance the mouthfeel of lowfat products and add thickness and texture stability to yogurts, processed meats and bakery dough.
- **Foaming.** Whey proteins can stabilize foam, partially replacing or extending eggs in bakery products. Foam stability is essential for whipped toppings, marshmallows, icings, ice cream and frozen yogurt.
- **Gelation.** Under specific conditions, whey protein forms non-reversible gels. Whey's gelling properties maintain moistness in baked goods and meats, add opacity to beverages and dairy products, and improve texture and mouthfeel in lowfat products, bakery products, processed cheese, yogurt, puddings, custards, chopped meats and seafood.



- **Maillard browning.** The lactose and protein in whey provide the necessary components for the development of heat-induced browning. Whey's browning ability helps boost the appeal of baked goods and caramel confections.
- **Clean flavor.** Whey's bland flavor makes it applicable for all food types. Whey has a clean flavor that does not need to be masked and also works well with other flavors.

Another major advantage for food product developers is that whey, particularly whey proteins, can fulfill the functionality of other ingredients, according to Burrington. "The added functionality provided by whey can reduce the need for other emulsifiers, stabilizers or structure-forming ingredients and could result in significant cost savings."

With whey's multifunctionality, it is easy to see why formulators choose it as their protein source. "Typically, food scientists already rate whey protein as the highest quality protein. However, a variety of other factors such as flavor and functionality in a food or beverage will almost always enter into their decision," says Steve Dolt, vice president, Grande Custom Ingredients.

For sample formulations, information about whey suppliers and help in creating your own new or improved products using whey, visit www.doitwithdairy.com or call the DMI Technical Support Hotline at 1-800-248-8829.

Do it with dairy.

You can do more than you think with the power of dairy ingredients.

DMI DAIRY MANAGEMENT INC.

Call our Technical Support Hotline: **1-800-248-8829** Visit our Web site: **www.doitwithdairy.com**

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