Wisconsin whey muscles its way to global food importance

By Joe Taschler and Karen Herzog of the Journal Sentinel
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Got whey?

From infant formula and protein supplements to sports drinks and nutrition bars, whey - the nursery rhyme food that was once a ditch-dumped byproduct of cheese making - is taking on growing clout as a global food ingredient. And food scientists, including researchers at the University of Wisconsin-Madison, are seeking even more uses for the protein-dense product that can help build muscle and lean bodies.

Finding new uses for a cheese byproduct is a big deal in Wisconsin, where the value of the dairy industry is estimated at $26.5 billion.

The Wisconsin Center for Dairy Research at UW-Madison last week picked up a $1 million grant from the U.S. Department of Commerce to develop higher-value whey products for export, including new products for fast-growing Asian markets. Researchers also will be working to develop healthier dairy-based alternatives for school lunches in the United States.

The timing of the $1 million research grant couldn't be better: Technology is helping unlock more of the nutritional value of whey as the number of mouths to feed grows across the planet.

Wisconsin last year exported whey valued at $94.5 million, according to the state Department of Agriculture, Trade and Consumer Protection. That's more than triple the $28.8 million value of whey the state exported in 2006.

Wisconsin was the nation's top whey exporter through the first six months of 2012 in terms of dollar value.

"The technology is advancing to the point where it's becoming even more of a valuable product for the dairy industry than it was even five years ago," said Jen Pino-Gallagher, ag market development manager for the state agriculture department.

The value comes from separating the protein in whey from its less valuable lactose, minerals and fat.

Currently at the top of the whey value chain is 90%-plus protein powder, followed by 80% protein powder, 34% protein powder, sweet whey and dried lactose-mineral permeate, said Dean Sommer, a cheese and food technologist at the Wisconsin Center for Dairy Research.
Search on for new uses

Cheese is made by adding enzymes to milk, causing it to separate.

The curds that form are used to make cheese, leaving behind whey protein in the liquid part. The liquid whey is then pasteurized and typically dried into a powder.

Increasingly, cutting-edge technology isolates the protein from the liquid whey and captures it for high-value uses.

K.J. Burrington, dairy ingredient applications coordinator at the UW dairy research center, spends a lot of time in a laboratory figuring out new uses for whey, including its less in-demand components.

For instance, 80% of permeate - the lactose-mineral mix left after protein is isolated from whey - is now used for animal food. Only 20% goes into people food. But recently, researchers have been working on developing permeate into a healthier alternative to salt, because it has a salty flavor.

"The reduced sodium (in permeate) was kind of a surprise," said Burrington, who has worked on whey for 15 years. "It wasn't really on anyone's radar" until around 2000, she said.

Whey research at the UW center and elsewhere has evolved over the past 20 to 30 years. Whey initially was dried and sold as a relatively inexpensive protein filler in foods, and was fed to animals, said Sommer.

"That was before we realized the nutritional benefits and functionality of whey," he said.

Whey protein has a clean, neutral flavor, so when it's used in food manufacturing, it adds little or no taste, Sommer said.

"Whey proteins are the most nutritionally complete proteins known," Sommer said. "That's why body builders use whey proteins for muscle building and muscle repair, and recovery after strenuous exercise."

Products with whey protein as a major source of protein list "whey protein isolate," "whey protein concentrate" or "hydrolyzed whey protein" near the beginning of the ingredients list. Look for it in smoothies, oatmeal, soups, sauces, dips and baked goods.

Whey powder also fuels the UW Badgers football team, which consumes protein whey shakes and smoothies, according to Sommer.

The low-carb movement of the early 2000s put protein in the spotlight to stay. But the focus has evolved.

A diabetic watching his or her glycemic index, or someone trying to lose fat while preserving
muscle, may benefit from whey protein.

**Growing global demand**

While whey protein nutrition bars, Greek yogurt and shakes and smoothies are big business, harnessing whey's benefits isn't cheap.

"To do a whey plant is about $20 million to $40 million," said Paul Bauer, general manager of the Ellsworth Cooperative Creamery, a 102-year-old co-op in western Wisconsin made up of nearly 500 dairy farms.

The creamery manufactures 30 million pounds of whey powder a year as a product of its cheese making and now exports 20% to 30% of that.

Some of the increased value of Wisconsin's whey exports may be attributed to market prices for whey. But most is a result of an increase in the amount of whey being exported, said Pino-Gallagher, of the state department of agriculture.

The state exported 101.4 million pounds of whey products in 2011, up from 62.8 million pounds in 2006, according to state figures.

The top five markets for Wisconsin whey exports are Canada, China, Malaysia, Thailand and Vietnam.

"The growing global demand for whey products is an integral part of Foremost Farms' business," Joan Behr, director of brand management for the Baraboo-based dairy cooperative, said in an email. Foremost Farms USA is one of the top 10 dairy co-ops in the nation, with 2,100 dairy farmer members in Wisconsin, Minnesota, Iowa, Illinois, Indiana, Michigan and Ohio generating annual revenue of about $1.4 billion.

"The growth in global population, and the ability for more people to purchase better quality food products, are also driving the growing demand for all types of whey," Behr said. "We see promise for whey protein in products used for healthy aging, sports nutrition, infant and child nutrition, medical nutrition and weight management.

As food processing technology continues to grow in capability and complexity, so will the variety of products that can be derived from whey.

"If you look at any ingredient statement, one of the first couple words is either maltodextrin, which is corn, or whey, which is derived from milk," said Jim Pekar, co-owner and president of First Choice Ingredients in Germantown, whose products help infuse flavors into meats, bakery products and many other foods. "There's a lot of value in it. We use a lot of it."

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