

Say Low-fat Cheese

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Contributing Editor

Consumers are demanding healthier prepared foods, including lower-fat entrées and snacks. Historically, one common way for food processors to cut fat content has been to reduce or remove cheese from their offerings. This practice, however, can lessen the product's nutritional value, detract from the flavor and impact consumer interest.

Major research efforts now underway aim to produce low-fat natural and process cheeses addressing the flavor, texture, functionality and fat-content challenges faced by food manufacturers. Through its unified National Dairy Foods Research Center Program, Dairy Management Inc.™ (DMI) has organized a panel of expert cheese researchers to develop low-fat cheeses with wide consumer appeal.

"It is easier for manufacturers to create low-fat products if they can reduce fat in all the major components—the cheese, dough and meat—instead of reducing just one component or removing it completely," says Donald J. McMahon, professor, Department of Nutrition & Food Sciences, Utah State University, Logan, and director of the Western Dairy Center. "Keeping the cheese in the product can create better flavor and value. This research will allow manufacturers to keep the cheese and still cut the fat content."

What consumers want

Today's consumers are attuned to health and wellness, and read food product labels. A consumer research study, "Consumer Perception of Low-Fat Cheese," commissioned in 2007 by DMI and conducted through the Department of Food, Bioprocessing & Nutrition Sciences at North Carolina State University's Southeast Dairy Foods Research Center, Raleigh, shows that almost 70% of adults want to cut down on fat. Overall, half of consumers are interested in low-fat cheeses with desirable attributes.

FDA regulations state that, to be labeled low-fat, cheese must contain no more than 6% fat. In the case of Cheddar, this represents over an 80% reduction from the full-fat ver-

sion. A reduced-fat label requires a 25% fat reduction.

"Flavor, texture and price are the most important attributes, both for consumers who now use reduced-fat cheeses and those who do not," observes MaryAnne Drake, professor, Department of Food, Bioprocessing & Nutrition Sciences, North Carolina State University, Southeast Dairy Foods Research Center, which is part of the DMI-sponsored National Dairy Foods Research Center Program. "Current users of reduced-fat products are interested in low-fat products, but remain skeptical."

The consumer survey also found that those who already use low-fat cheese would be willing to pay more for such cheeses that have flavor and texture more comparable to that of full-fat cheeses.

Meeting the definition

Reducing the fat content to 6% presents formidable challenges to cheesemakers in maintaining flavor, texture, body and functionality. In the consumer perception survey, consumers commented that low-fat cheese tends to be rubbery, slick, translucent, sticky and lacking in flavor, and does not melt properly.

For food product manufacturers, lower-fat cheeses present additional challenges, as they are too viscous to flow readily in pumps and other equipment. "It also sticks to itself in slice-on-slice applications. Many processors will omit cheese rather than use a lower-fat product that is difficult to handle," says Lloyd Metzger, associate professor and Alfred Chair in Dairy Education, South Dakota State University, and director of the Midwest Dairy Foods Research Center.

Solving these problems is the goal of coordinated research being conducted as part of the DMI-sponsored National Dairy Foods Research Center Program, which combines the resources of five research centers, plus application laboratories and universities, in an effort to speed dairy innovation.

Improving natural cheeses

Cheddar and mozzarella are the focus of the low-fat natural cheese research.

The low-fat Cheddar cheese research aims to create flavorful yet functional low-fat Cheddar cheese in block form to be shredded or sliced at the processor level. Reducing the fat in Cheddar cheese also reduces the buttery flavor notes, changes the texture, and affects the way flavor compounds are released in chewing—thus changing consumers' flavor perceptions.

As part of the DMI-sponsored National Dairy Foods Research Center Program, researchers at the Wisconsin Center for Dairy Research (WCDR), University of Wisconsin-Madison have made great strides in turning a functional base cheese into a low-fat mozzarella that is shown to work well on pizza.

In pizza-making, low-fat mozzarella tends to dry out rapidly when exposed to high-temperature convection ovens. Instead of melting, the cheese shreds dehydrate and take on the appearance of dried noodles. In addition, the low-fat cheese shreds and slices poorly, limiting its use.

In current research, WCDR researchers, led by John Lucey, associate professor of food science, added mono- and diglycerides to the base cheese. They developed a special procedure for making a direct-acid type of skim milk-base cheese where sufficient calcium was removed during the manufacture of the base.

“However, when we added glycerides during processing, we found that the resulting cheese was white and chewy enough, yet not sticky, with a very nice melt and flow,” Lucey says. “Those are all desirable baking characteristics, especially on pizza.” The cheese also slices and shreds well, and contains just one gram of fat per serving.

Improving process cheeses

The research on low-fat process cheese focuses on both loaf and slice-on-slice type products.

The technology developed by Lucey also can be used to make the loaf form of low-fat process cheese. This is achieved by replacing the melting salts normally used in process cheese with emulsifiers like mono- and diglycerides. The researchers found that doing so gives them the ability to make a reduced- or low-sodium cheese. The researchers have applied for a patent on the process.

The technology developed by Metzger is leading to

the development of a slice-on-slice process cheese. Process cheese research mainly addresses challenges in machinability and handling. Removing the fat from slice-on-slice process cheese makes it stickier and difficult to handle.


“During the manufacturing process, the manufacturer must be able to cut the cheese into strips and stack it, which means the cheese must have very specific viscosity, as well as a lot of elasticity to be able to be machined in a proper fashion on the production line,” says Metzger. “The answers to those challenges are fat substitutes and processing aids.”

Protein-based fat substitutes, or fat mimetics, enable low-fat cheese to perform more like a full-fat product in full-scale manufacturing. Fat substitutes also help keep low-fat slice-on-slice process cheeses from sticking together and provide a smooth, creamy mouthfeel similar to that of fat. Processing aids, such as lecithin, are applied to manufacturing surfaces to keep the cheese from sticking as it cools.

Readying for market

The first in a new generation of low-fat cheeses could be available to food processors as early as next year. Potential applications are numerous, encompassing pizzas, sandwich pockets, frozen cheese snacks such as mozzarella sticks, and a wide range of frozen entrées.

In the next year, researchers expect to conduct a commercial run to check performance of slice on slice low-fat processed cheese. This year, low-fat mozzarella is expected to be ready for market for pizza applications and other products. In addition, research on low-fat Cheddar for entrée applications should be complete within two years.

Food processors can soon plan to incorporate these cheeses in lower-fat products and deliver the healthful, good-tasting convenience foods that today's consumers increasingly demand. 

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