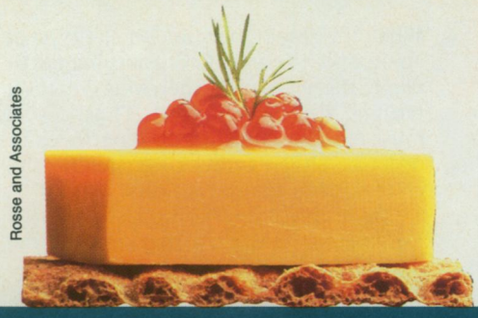

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# Designer Fats

By TINA ADLER

## Companies offer to satisfy fat cravings without wrecking arteries

You take a spoonful of your favorite ice cream. Mmmm. It melts slowly on your tongue and fills your mouth with its smooth, flavorful sweetness. Yum!

Then you glance at the fat content listed on the container and remember what your doctor said about your cholesterol. Whoops.

So you buy some guiltfree, fatfree frozen dessert and take a bite. Whoops again. It tastes odd, and it feels weird on the tongue, too.

Low-fat and nonfat foods appear to have taken over grocery store aisles as fat's reputation for clogging arteries and adding calories has made it an outlaw in many kitchens. In fact, reduced-fat items made up almost 7 percent of new processed foods introduced in 1993.

Companies trying to replicate fat's role in food have a big job. The substance plays a key part in making what we eat taste good. It can even mask bad flavors. It helps in the looks department, too, by adding sheen and holding color. In the important category of texture, fat can make food tender, flaky, or creamy. It helps the body absorb fat-soluble vitamins and feel full.

In most reduced-fat comestibles, various combinations of water, air, proteins, starches, and carbohydrates mimic fat. But the shortcomings of these fake-fat mixtures have forced food chemists to look beyond fat mimetics. Some companies are spending considerable research sums restructuring fat molecules to formulate "better" fats — those that satisfy without saturated fats and calories.

"[These] are designer fats more than fat replacers," says George H. Pauli of the Food and Drug Administration.

Not long ago, many food experts thought someone would produce a miracle fat alternative—the NutraSweet of the fat industry, says Karen A. Penichter of FMC Corp., a chemical and machinery producer in Philadelphia. But none has come along and probably won't, she predicts. "There is not one panacea," agrees Leora C. Hatchwell of NSC Technologies, a research and development division of NutraSweet Co. in Mount Prospect, Ill. Instead, companies rely on mixtures of familiar ingredients to get the fat effect.

"One of the oldest fat substitutes is air," points out Michael F. Jacobson, executive director of the Center for Science in the Public Interest (CSPI) in Washington, D.C. Water is also popular.

Various modified starches and gums, as well as proteins that manufacturers chop into tiny pieces, make up the bulk of fake fats, according to a December 1993 report on the food sciences from the National Academy of Sciences' Institute of Medicine.

For example, McDonald's restaurants use carrageenan, extracted from red algae and mixed with water, to help retain

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*Manufacturers of low-calorie salad dressings use cellulose gel to help create the texture of real fat.*

juices in their McLean Deluxe reduced-fat hamburgers, says Penichter, whose company makes carrageenan.

One of the earliest products designed to replace fat is a whey-protein concentrate called Simplesse, manufactured by NutraSweet and approved by FDA in 1989. Its many microparticles, which range in diameter from 0.1 micrometer to 3 micrometers, give foods the creaminess of fat, researchers say. People perceive particles smaller than 0.1 micrometer as watery and those larger than 5 micrometers as powdery or chalky, according to NutraSweet.

Most of these common alternatives to fat, including Simplesse, have one major drawback in the eyes of industry, however. They fail to stand up to the intense heat needed to fry foods. Also, although companies claim their nonfat or low-fat delicacies taste as good as their full-fat cousins, "fatfree" often means a gustatory catastrophe, according to some food experts.

"We have managed to simulate the texture of fat, but we haven't been able to work out the flavor," says Hatchwell, a flavor applications expert. The problem lies not so much in the effects of the fat substitutes on flavor as in the absence of fat.

Most aroma chemicals, which greatly influence flavor, are soluble in fat and escape only gradually when consumed. That's how sinfully rich ice creams impart their scrumptious raspberry or chocolate tastes. But when people eat nonfat frozen desserts, they "get slapped in the face with the flavor and then [the flavor] is gone," explains Hatchwell.

The taste of cheese depends largely on the byproducts of its resident microbes, which "chew up and spit out" the fat. In the absence of fat, the microbes consume carbohydrates and proteins. "Then you get a very offensive flavor," she warns.

Hatchwell finds most foods with fat replacements "disappointing," although some brands of low-fat yogurt, cream cheese, and sour cream taste okay, she says.

From a health standpoint, Jacobson and other researchers say, many of the ingredients used to mimic fat, such as emulsifiers and thickening agents, are safe. Whether they actually help consumers eat less fat has yet to be determined.

Companies say that the designer fats now under development will help solve the problems facing today's fat substitutes. One group of stand-ins sounds good on paper, food scientists say. Called sucrose polyesters, they can't be digested, hence provide neither fat nor calories. Yet these synthetic fats can be substituted for traditional grease and butter in many uses, even frying.

"Sucrose polyesters are the great hope of the diet-food industry," notes Jacobson.

Olestra, a sucrose polyester made by Procter & Gamble Co., is currently under

Source Food Technology, Inc.

*New oil, Appetize, leaves french fries free of the cholesterol-raising* trans *fats found in most vegetable oils used for frying.*

review by FDA for use as a food additive. It "is a really novel, new kind of thing," according to FDA's Pauli.

The agency's decision on olestra "will be very precedent-setting," predicts J. Bruce German of the University of California, Davis. Olestra would constitute the first true substitute for a major human nutrient approved by FDA, he says. Other companies developing similar fake fats are eagerly awaiting the word from FDA on olestra.

Conventional fats consist of one to three fatty acids attached to glycerol. Olestra has six to eight fatty acids, all derived from vegetable oils, attached to sucrose. Enzymes in the human body fail to break down the sucrose bond, so the fatty acids pass through the body undigested, ignoring such comfortable resting places as the hips and paunch. Olestra has been evaluated in 100 animal studies and 25 clinical trials, the results of which show the product to be safe, the company claims.

"It's a very safe material and could make a difference, especially with fried foods," contends Joseph F. Borzelleca of the Medical College of Virginia in Richmond. He reviewed Procter & Gamble data on olestra a few years ago.

But is it a magic bullet? Probably not.

No one knows whether olestra will inspire people to reduce their intake of real fat. Why people crave the substance remains largely a mystery, but fat's metabolic effects, which olestra fails to produce, may be part of it, German suspects.

In addition, products made with nondigestable fatty acids could trap fat-soluble vitamins or drugs, such as oral contraceptives, in the gut and prevent the body from absorbing them, Borzelleca suggests. However, Procter & Gamble asserts that olestra does not interfere with drug absorption, he says. The company states that it will supplement foods with vitamins if needed.

German wonders about the leftovers. Farmers reuse commercial cooking oils in animal feed, and nondigestable fats may not go over well with them. "Thinner cows are not what we're after," he points out.

Rather than designing entirely new fatlike compounds, some companies are simply tinkering with the cholesterol and calorie content of existing fats. For example, the Nabisco Foods Group in East Hanover, N.J., has created a new family of low-calorie fats called SALATRIM. The company intends to use SALATRIM first in chocolate and eventually in ice cream, puddings, yogurt, and baked goods, explains Nabisco's Robert E. Smith. The product can't stand up to frying, however.

Because SALATRIM is made from ingredients already in use, Nabisco does not consider it a new food additive. The company has asked FDA to approve the remodeled fat as "generally recognized as safe," which involves less review than a new additive would.

SALATRIM has 5 calories per gram, as opposed to traditional fat's 9 calories, according to studies in the February AGRICULTURAL AND FOOD CHEMISTRY. Like most dietary fats, SALATRIM consists of three fatty acids attached to a glycerol molecule. But the product includes primarily long-chain stearic acid, which the body absorbs poorly, and either acetic, propionic, or butyric short-chain acids, which have fewer calories than other fatty acids, the studies report. And unlike other highly saturated fatty acids, stearic acid doesn't interfere with the body's ability to remove cholesterol.

SALATRIM has no adverse effects on health, according to studies by Nabisco. Smith would not comment on whether the company had done taste tests.

It "certainly looks like an innocuous substance to me," says Jacobson. But German questions whether SALATRIM will deliver everything its proponents predict. "It's not clear that this will really translate into a significant calorie reduction," he warns. Animal studies that show SALATRIM has fewer calories than regular fat may not apply to humans, who are better fat absorbers.

Consumers are likely to buy foods containing SALATRIM only if they are convinced that those items are more healthful than others. "I don't believe the FDA would permit [a company] to suggest [a person's] diet would be healthier with this in it," German says.

Nowadays, companies proudly label their goods "cooked in vegetable oil." But this oil is often partially hydrogenated vegetable shortening, according to a study done last year by CSPI. Margarines are also partially hydrogenated oils. The problem? Partial hydrogenation produces *trans* fatty acids — unsaturated fats that raise concentrations of cholesterol in the blood, studies conducted since 1990 reveal.

Two scientists from Brandeis University in Waltham, Mass., have helped to create a new fat called Appetize that they say is not partially hydrogenated yet stands up to commercial frying, works well as a spread, can be put in dairy goods, and has less cholesterol than normal fats. One drawback for dieters: Appetize comes with as many calories as normal fat. On the other hand, it has only about 8 milligrams of cholesterol per 100 grams, compared with milk fat's 250 milligrams and beef fat's 100 milligrams, according to Richard D. Kiley, president of Source Food Technology in Burnsville, Minn., which licensed the product.

To make Appetize, the researchers first strip the cholesterol from butter, beef tallow, or lard. They then mix this revised animal fat with various polyunsaturated vegetable oils that contain linoleic acid, which studies suggest lowers cholesterol, says one of Appetize's inventors, K.C. Hayes.

In a recent study, hamsters that dined on Appetize had lower cholesterol concentrations than those eating fats found in the typical American diet or in the American Heart Association's recommended diet, both of which contain *trans* fats, according to a Source Food Technology brochure.

Kiley and his colleagues expect to complete their first study of how Appetize affects cholesterol in humans this fall. The volunteers in the study will be 30 nuns from a convent in Minnesota. The company, which has not asked FDA to review its product, plans to market Appetize this year.

Any avid dieter has surely wondered why so many no-fat foods contain real sugar and sugarfree foods come full of real fat. "It's very, very difficult to take [both] sugar and fat out of a product," explains Ofori J. Amankonah, of the Kelco Division of Merck & Co. in San Diego. Fat and sugar don't actually interact, but they both play such key roles in making what we eat taste, feel, and look good that manufacturers can let only one go at a time.

Food experts and their employers, who have millions of dollars riding on their ability to create designer fats, stand in awe of the real thing. Their appreciation surpasses that of consumers, who extol the virtues of ice cream, chocolate, or pastry but may neglect to credit the butterfat buried deep inside.

"Fat is great stuff," Hatchwell says, with a note of respect in her voice.

"As long as you are not an artery," quips colleague Angela Miraglio, as a reminder of at least one reason that researchers are making such an effort to fake out fat lovers. □