

Fiber and Cholesterol

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Discoveries within the last 10 years at two ARS regional laboratories should make it less of a chore for people to eat more fiber and lower their cholesterol. And there is other good news about cholesterol as well.

Following up on years of SRRC research on extraction of rice bran oil, a team of scientists at the Western lab developed a new process to stabilize the bran. Rice bran is high in vitamins, minerals, proteins, and fiber. Rice oil is high in vitamin E, and in tests with animals, it lowered blood cholesterol. Until recently, the oil in untreated bran turned rancid soon after milling, ruining both oil and bran. For this reason, rice bran has been used either as an animal feed or, in tropical countries, as a fertilizer. In an inexpensive new WRRC process, the freshly milled bran is cooked to inactivate the enzymes responsible for oil deterioration. The cooked bran, still containing from 20 to 22 percent rice oil, can be used as a cereal, or, as an alternative, the oil can be removed to produce an excellent salad oil. (See also "Rice," p. 114.)

The U.S. rice industry has committed itself to adopt the WRRC recommendations for processing and storage of bran, and several Third World countries have begun to install the stabilization systems. From 30 to 40 million tons of rice bran containing 6 to 8 million tons of oil are produced annually around the world.

Studies of oats are also under way at the WRRC to investigate further the ability of that cereal grain to lower cholesterol levels. There are also indications that oat fiber may help control diabetes by preventing erratic swings in blood sugar levels. Researchers speculate that it may accomplish this by slowing the rate of carbohydrate absorption in the intestine.

Meanwhile, a chemist at the Northern lab in Peoria has made a low-calorie, cholesterol-fighting fat substitute from soluble oat fiber. He has named it oatrim and used it as an ingredient in an

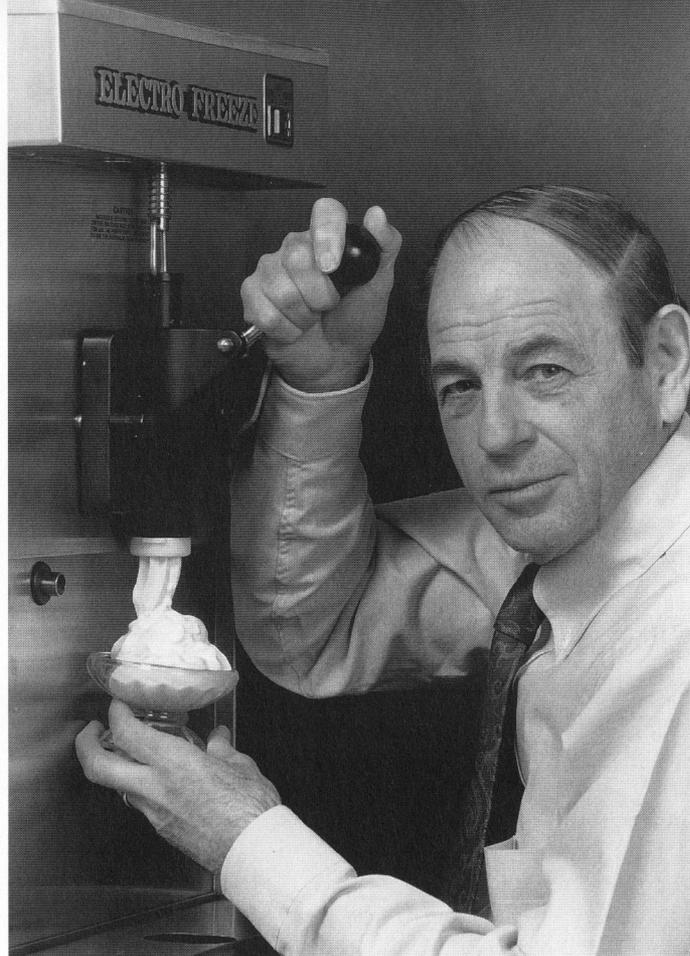
ice cream substitute, among other things. Unlike fat substitutes already on the market, oatrim is a natural fiber made with natural enzymes. It contains beta-glucan, reportedly a contributor to lowering blood cholesterol.

In Peoria, a taste panel rated a frozen vanilla dessert made from oatrim only slightly lower on several characteristics than it did premium ice cream. Several panelists said they preferred the lighter texture of oatrim to the heavy cream taste of the ice cream. A 4-ounce serving of the dessert made with oatrim has 135 calories, less than 1 gram of fat, and 4 milligrams of cholesterol. A similar serving of premium ice cream, says oatrim's inventor, has 298 calories, 22 grams of fat, and 85 milligrams of cholesterol. Several food companies are evaluating production and marketing of the product.

Another Peoria scientist—a biochemist—discovered in 1983 that 12 hours of soaking plant residues in hydrogen peroxide, a hair bleach and household antiseptic, will free the cellulose in the residues from the indigestible lignin. (See "Feeds, Forage, and Fodder," p. 67.) An incredibly complex substance, lignin is the woody natural cement that binds cellulose and prevents its breakdown by enzymes. Released from the lignin, wheat straw, for example, disintegrates into highly absorbent fibers with a pulplike consistency. Similar products are released by treating brans, hulls, stems and stalks, and even corncobs. When first discovered, the process was greeted as an improved source of livestock feed and possibly as a source of industrial materials.

In further experimentation (some of it in his own kitchen), the biochemist found that the "fluffy cellulose" from plant residues can provide a safe, inexpensive source of fiber for human consumption. It contains no metabolic calories and is a flavorless, high-fiber additive that can be baked into bread, cereals, doughnuts, pancakes, and similar foods. One national bakery has already marketed a white bread containing the cellulose, and a rural firm is preparing to manufacture a flour containing fluffy cellulose derived from the outside layer of corncobs.

In research on cholesterol at the Eastern regional laboratory, researchers found that pectins, the substance found in apples that makes jelly gel, may lower blood cholesterol.



George Inglett, an NRRC chemist, prepares a frozen dessert containing oatrim, a low-calorie fat substitute he developed that may help lower blood cholesterol.

In other research, a Wyndmoor scientist found that the human body's own digestive juices appear to provide a defense against potentially cancer-causing compounds produced from cholesterol during cooking and food processing. When cholesterol comes in contact with oxygen at high temperatures, such as during frying, a small part of it is transformed into compounds called cholesterol oxides. Two of these oxides were found to be carcinogenic in animal experiments. If ingested by human beings, however, gastric juices transform the chemicals into other compounds that are noncarcinogenic. "It appears to be one of our natural defenses," comments the researcher who carried out the experiments.