

Rice bran linked to lower cholesterol

Findings that rice bran lowers serum cholesterol in hamsters have sparked U.S. rice millers to encourage further research on this by-product of their industry.

Work recently completed at the U.S. Department of Agriculture's (USDA) Western Regional Research Center (WRRC) has shown stabilized rice bran is as effective as oat bran in lowering cholesterol, at least in hamsters, according to Robin Saunders, research leader for WRRC's Food Quality Research Unit. Saunders said two feeding trials with hamsters by his research unit (research chemist Talwinder Kahlon and research food technologist Antoinette Betschart) have verified the cholesterol-lowering effect of rice bran, much to the delight of the rice milling industry.

These findings sparked a significant jump in the U.S. price of foodgrade stabilized fullfat rice bran to as much as 75 cents a pound during the first three months of 1989. Now, spokesmen are predicting the next year will bring many developments to the U.S. rice bran industry. Already, rice millers and research centers in the U.S. are talking of further trials, including human clinical and swine-feeding trials.

During March, researchers at Mississippi State began swine-feeding trials to determine any effects six different diets have on the blood lipid profile of swine. The six diets are: a control, oat bran, fullfat rice bran, defatted rice bran, pearl barley and whole oats. Melissa Mixon, a human nutrition specialist, and Wanda Dodson, assistant professor of nutrition, both of Mississippi State's Department of Home Economics, are undertaking the project in collaboration with Professors Bill Diggs and Howard Miller of the Department of Animal Science. The project, which will take approximately four months to fatten 72 pigs from 50 pounds to a slaughter weight of approximately 230 pounds, has been submitted to representatives of the rice milling industry for possible funding. Mixon said swine were chosen for the study because they respond similarly to humans in nutrition trials.

Meanwhile, William Haskell, associate professor of medicine at the Stanford Center for Research in Disease Prevention at Stanford Medical School, has designed a protocol and submitted a proposal to the rice industry for human studies examining the effect of various food

substances on cholesterol metabolism. Included would be stabilized rice bran, oat bran and a placebo. "No study on fullfat or defatted rice bran has yet been completed in the U.S. with humans," Haskell said. Saunders noted that human clinical studies in Australia have indicated cholesterol-lowering effects using stabilized fullfat rice bran.

In the WRRC studies, the active component in the stabilized rice bran that causes the cholesterol-lowering effect appears to be in the oil itself, Saunders said. The studies also showed that stabilized parboiled rice bran lowers cholesterol.

Representatives of the rice industry, including the Rice Foundation and the Rice Council, both based in Houston, have been studying research proposals submitted to them and discussing what to fund and how, according to Arlie Bowling, executive vice president of the Rice Foundation. "The general feeling is we need to get the human studies done as soon as possible," he said.

What effect these findings will have on the U.S. rice bran industry is not certain at this point. Some industry watchers predict that the demand for rice bran from U.S. food

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manufacturers will swell. Already, food processors are making inquiries, according to Roger Sande, vice president of marketing for Brady Products Inc. of Redondo Beach, California, which manufactures stabilization equipment and markets stabilized rice bran.

"We are now receiving calls for

the larger capacity units, but recently that has changed. During the past two years, for instance, the company has sold Expandolex equipment to companies in India.

Meanwhile, research at USDA's WRRRC, financed by the U.S. Agency for International Development, and at Colorado State

Riviana Foods currently sells foodgrade stabilized rice bran in the U.S. primarily for bakery and health foods.

stabilized rice bran from food manufacturers in the U.S.," Sande said, noting that his company is looking at U.S. markets both for fullfat and defatted rice bran. "If the rice bran market for human food use takes off in the U.S. as we fully expect it will, we plan to have quantities available," he said.

Riviana Foods currently sells foodgrade stabilized rice bran in the U.S. primarily for bakery and health foods, according to John Hunnell, Riviana's vice president for research and development. Joseph Smith of Oilseeds International Ltd., meanwhile, noted that rice bran tastes better than oat bran and can be used to make "some very nice products."

The development of processes to stabilize rice bran was the key happening that paved the way for such marketing. Because rice bran contains lipase, it must be stabilized immediately after milling to eliminate the formation of free fatty acids in the bran. Anderson International Corp. in Cleveland, Ohio, pioneered work during the 1960s to develop extrusion equipment for stabilizing rice bran. That equipment, however, was geared for a larger capacity than the industry was interested in at that time, according to Maurice A. Williams, Anderson's director of research. And thus, potential rice bran oil extraction in the U.S. did not materialize. Initially, companies abroad also were not interested in

University, Fort Collins, Colorado, during the past decade has produced smaller-scale rice bran stabilization systems. Although the WRRRC project was targeted to help developing countries recover oil from domestically produced rice bran, a number of U.S. rice millers began stabilizing rice bran for export to Japan, Taiwan and Korea where the oil is extracted.

"There now is quite a lot of stabilized rice bran shipped from California to Japan," according to Robert Sayre, a research chemist at the WRRRC, who noted that Japan's demand for rice bran oil exceeds its domestic production of rice bran.

In the stabilization process, the bran is heated immediately after the rice is milled. This process can stabilize the rice bran for several months. Brady Products and Insta-Pro International ST Ltd., based in Des Moines, Iowa, are two companies which sell smaller-scale extrusion equipment for stabilizing rice bran. Insta-Pro reports it has sold its units in 60 countries worldwide, but not all of the units are being used for rice bran. Brady has a joint venture with Food Technologies (India) Ltd. in Chandigarh, India, and with MARKFED of India in the State of Punjab; it is working on a possible joint venture in the People's Republic of China.

According to Sande, rice bran oil has been used in a myriad of

applications in the U.S., most of them industrial. These have included use: as a leather tanning oil (replacing sperm oil); as a textile lubricant by textile mills to keep yarn from fibrillating; as a lubricant in offshore oilwell drilling (replacing diesel oil); as a rust inhibitor, with good penetrating powers for use with metals; in cosmetics, bath oils and hand creams; for some specialty foods (i.e., to provide fat in rice-based baby cereals); as a refined edible oil sold in health and natural food stores; and as a metal cutting oil, for use in metal fabrication shops. In Japan, rice bran oil is used for frying potato chips, rice chips, snacks and tempura shrimp; it's also used in mayonnaise. In Taiwan, it is used as a salad and cooking oil.

Although research in Japan and India has shown rice bran oil may have more of a cholesterol-lowering effect than any other vegetable oil, no one is commercially producing edible rice bran oil in the U.S. However, Archer Daniels Midland Co. (ADM) currently processes rice bran at its cottonseed oil mill in North Little Rock, Arkansas, to produce rice bran oil for domestic inedible uses; the bran is supplied from its rice mill in Weiner, Arkansas. Jack McDonald, president of ADM's Southern Cotton Oil Division, said the company is exploring possible commercial production of edible rice bran oil.

Currently, the ADM facility is the only one commercially extracting rice bran oil. Between the 1950s and the early 1980s, there were a number of commercial U.S. rice bran oil operations, including facilities run by Riviana Foods, Comet Rice Inc. and the Rice Growers' Association of California. Industry spokesmen said a major problem was there was not enough rice bran oil produced to make it attractive for use as an edible oil.

"We were producing 3,500 tons a year at Riviana Foods and the vegetable oil manufacturers told us we needed to produce 10,000 tons a year for human edible oil consumption," Hunnell said. Riviana operated its rice bran extraction facility at Abbeville, Louisiana,

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from 1965 until July of 1983. At that time, the company debated whether to make needed capital investments to keep the plant in shape, build a larger plant or shut it down, and chose the latter. If such a decision had to be made today, Hunnell said, building a larger plant would be a much more attractive option.

U.S. commercial extraction of rice bran oil may increase in the not-too-distant future. There are several pilot plants available where rice bran extraction can be or is being tested; industry spokesmen also said some trial testings are being made at Texas A&M University's Food Protein and Development Center. An underutilized safflower processing plant in Grimes, California, operated by Oilseeds International Ltd., has done trial runs for a number of interested parties and Sande said Brady is interested in processing 150 tons there in the next few months; this will generate approximately 120-125 tons of stabilized defatted rice bran and 25-30 tons of rice bran oil.

"We already have standing orders for a good portion of the defatted rice bran. We haven't decided whether to refine the oil or to sell the crude. I'm sure we wouldn't have any problem marketing this oil in the U.S.," Sande said.

Saunders predicts the industry will spend its energies marketing the rice bran, rather than extracting the oil. However, Sande and others noted that rice processing companies definitely are considering oil extraction. Equipment manufacturers, including The French Oil Mill Machinery Co. and Crown Iron Works, have received numerous inquiries in the past four months concerning possible equipment for extraction facilities, including even talk of building an extraction plant.

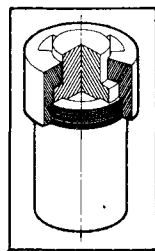
"We've had a tremendous number of inquiries," according to Jeffrey D. Scott, vice president of sales for Crown Iron Works, noting that queries have ranged from small-scale equipment to equipment for a large-scale operation. "There definitely is industry-wide interest in

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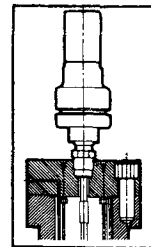


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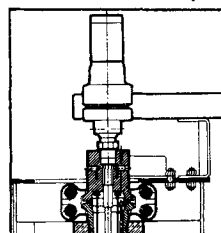
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processing rice bran. They're changing their minds," Scott said.

Sande said Brady Products is interested in building a facility or using an existing plant; even foreign-owned companies have inquired about building a U.S. processing plant or possibly buying an existing plant, according to Smith,

that initial trial runs at the Grimes plant showed success with the Insta-Pro equipment but not with the Brady. Subsequent samples with the Brady process were workable, Smith said.

Anderson's Expandolex process, which uses an expander-cooker and a dryer/cooler, produces a par-

125-150 tons a day and forming pellets prior to solvent extraction, according to Robert Pavlik, product manager of the company's Oilseed Division. Pavlik said the company has sold a number of its Enhanser Press extruders in Japan for that purpose but none yet in the U.S.

French solvent extraction plants have been and are being used in extracting rice bran oil. The ADM facility at North Little Rock, for instance, uses a French extractor. In addition, there currently are two French solvent extraction plants processing rice bran in Pakistan; the two plants each use the French 310 stationary basket extractor to process 100 metric tons per day. Pavlik said the units achieve a cake with less than 1% residual oil; rice bran initially has 16% oil content.

"The pellets from extruders work ideally on French stationary basket extractors. We do not have to modify our extractor at all to take care of fines problems as extruders take care of that problem," Pavlik said.

Meanwhile, Scott said that Crown Iron Works has developed an extractor that can handle rice bran fines. "For rice bran, the shallower the bed in the extractor, the better the drainage," Scott said.

Industry spokesmen said that if U.S. companies do choose to extract the oil, they have the options of selling the crude for industrial applications in the U.S., refining it domestically for U.S. food use, or shipping the crude oil to Japan for refining there.

This article was written by JAOCS News Editor Barbara Fitch Haumann.

"Defatting/deoiling the bran to get both rice bran and oil to sell gives the rice miller added marketing opportunities."

who is president of Oilseeds International Ltd.

Riceland Foods Inc., a major producer of rice bran in the U.S., is among those companies contemplating rice bran oil extraction for edible use, according to Frank T. Orthoefer, Riceland Foods' vice president of research and development. "Anyone that handles rice ends up with a rice bran stream. It's not a major issue to heat-treat the rice bran to stabilize it. Certainly stabilizing the bran is the first step for rice millers. And, as rice bran oil is a very good, stable oil, defatting/deoiling the bran to get both rice bran and oil to sell gives the rice miller added marketing opportunities," Orthoefer said.

Saunders, however, pointed out that modifications may be needed in the preparation of rice bran for possible oil extraction. For instance, he noted that the Oilseeds International facility cannot process the Brady-stabilized rice bran unless it is pelleted first. Smith said

that it is more easily extractable, according to Williams. Units available can handle as little as four to ten tons of rice bran a day, to as much as 200 tons a day. Although the company says it has not seen a great deal of interest in rice bran extraction by U.S. companies, it has received a number of inquiries during the past year. Anderson has a skid-mounted eight-inch (in diameter) Anderson expander which it offers on a rental basis to companies interested in testing materials such as rice bran for extraction. The machine can handle up to 200 tons per day. Williams said the Anderson expander produces collets completely stable against free fatty acid formation. "We've tested samples stored up to 22 months that showed no rise in free fatty acid. The test ended only because we ran out of sample," Williams said.

The French Oil Mill Machinery Co.'s smallest extruder for stabilizing rice bran is an eight-inch (in diameter) unit for stabilizing

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