WESTERN REGIONAL RESEARCH CENTER

COMPREHENSIVE RESEARCH ON RICE

ANNUAL REPORT

January 1, 1987 - December 31, 1987

PROJECT TITLE:	Rice Utilization and Product Development
PROJECT LEADER:	R. M. Saunders Research Leader Food Quality Research Unit Western Regional Research Center USDA Albany, California 94710
WRRC INVESTIGATORS:	M. M. Bean R. Buttery R. H. Edwards A. P. Mossman R. N. Sayre L. Macfarlane
LEVEL OF 1987 FUNDING:	$24,500
PROPOSAL OBJECTIVE:	To carry out research work on California rices that ultimately will lead to new products for domestic and foreign markets.
RESEARCH OBJECTIVE:	1. Stabilized Rice Bran 2. New Product Development

SUMMARY OF 1987 RESEARCH

1. Stabilized Rice Bran

Rice bran stabilized by a procedure invented by USDA is now produced commercially by Farmers Rice Cooperative and Comet Rice, and is being seriously contemplated by other local mills. The bulk of the stabilized bran is being exported to Japan, Taiwan, and Korea, though some is used in rice based food products manufactured in the U.S. WRRC is assisting these efforts by monitoring oil content and stability of final products through working directly with the mills and stabilizer manufacturers. Literally thousands of dollars have been saved by the local rice industry through having USDA do these tests rather than commercial analysts.

In addition WRRC has served in a trouble-shooting role to smooth over several problems in establishing effective quality control on bran for these export markets. The USDA-WRRC Project Leader, through financing by a stabilizer manufacturer and USDA, and with approval of the State of California and the Rice Board, traveled in Asia for a second consecutive year to promote stabilized rice bran. These visits presumably contributed to the export market now developed for the bran.

Widespread publicity coverage of this process and products has been generated by USDA and the stabilizer manufacturers, both at home and abroad. Included here are television, radio, newspapers, magazines, and USDA special reports. It was promoted as a major USDA success story in the Congress during March 1987. All of these activities are benefitting the California rice industry.

2. New Product Development

(a) Foods from rice bran: USDA-WRRC is currently working closely with several major U.S. food producers concerning use of stabilized regular and defatted rice bran in foods. It is more than likely that 1988 will see a significant increase in utilization of bran in this way.

(b) Rice infant foods: During the past year, rat-feeding experiments were carried out on behalf of Dacopa, California Natural Products, Manteca, and another is planned during 1988. This company produces rice sirups. USDA believes the byproduct from their sirup process, a high-protein material, should have potential as an infant food. The feeding tests are to confirm the product nutritional quality, with the goal of establishing a new marketable rice product.

(c) Extending shelf-life: WRRC has met with a Japanese manufacturer of carbon dioxide packaging equipment concerning packaging of rice to prolong shelf-life. Samples of rice vacuum-packed under CO_2 are on hand. There seems no doubt that freshness of rice on supermarket shelves would be enhanced if packed and retailed under these conditions.

(d) Chemicals from rice bran: One of the WRRC investigators (RNS) spent two weeks in Japan to become more familiar with the rice bran oil industry. This included aspects of oil extraction and refining, uses and marketing of defatted bran, and production and marketing of products derived from rice bran. The latter include refined rice bran oil, fatty acids (for paints), inositol (pharmaceuticals, health foods) oryzanol (pharmaceuticals, cosmetics) and phytic acid and calcium magnesium phytates (foods, paints, cosmetics). All of these products represent potential new market development for domestic bran, although at this time to our knowledge, there is no-one in the U.S. producing these materials.

(e) Stable brown rice/increasing head-rice yields: Parboiling of rice increases the head yield and usually inactivates bran lipases. This study was designed to test the effects of high pressure steam application over very short periods of time on lipase activity in brown rice or partially milled brown rice, and on head rice milling yield. An initial experiment was conducted using artificially dried and field dried medium and long grain paddy and brown rice. Rice samples were subjected to 95 psi saturated steam (324°F) for periods of from 5 sec to 5 min. Exposure times of 20 to 30 sec destroyed lipase activity without parboiling the rice, and there was an improved head rice yield.

A second series of experiments was run where steam pressure was varied from 15 to 135 psi and time brackets were established to give enzyme inactivation at each steam pressure. Head yield generally appeared to be decreased under these conditions. There was some indication that a combination of high pressure and short time treatment increased head yield slightly, but results were inconclusive. These attempts to produce a non-parboiled brown or partially milled rice with deactivated lipase require further work. Treated products are currently in accelerated storage to test shelf stability.

PUBLICATIONS

Sayre, R. N., Earl, L., Kratzer, F. H., and Saunders, R. M. Nutritional Qualities of Stabilized and Raw Rice Bran for Chicks. Poultry Science 66: 493-499 (1987).

Sayre, R. N., Earl, L., Kratzer, F. H., and Saunders, R. M. Effect of Raw and Extrusion Cooked Rice Bran on Growth and Feed Conversion of Chickens from Hatch to Broiler Weight (Poultry Science), (1988).

CONCISE GENERAL SUMMARY OF CURRENT YEARS RESULTS

1. Rice bran stabilized by the WRRC-USDA process at two Californian rice mills is being exported in substantial quantities to Pacific Rim countries. Domestically, small quantities of stabilized bran are being incorporated into foodstuffs, and tests are underway by major food companies concerning expansion of this usage.

2. Numerous new extruded rice products are now in the domestic marketplace. Considerable assistance in their development was provided by WRRC staff. Assistance is being provided to a Californian manufacturer of rice sugar sirups, in establishing a market for a high-protein process byproduct.

3. New processes have been developed to simultaneously produce from paddy or brown rice (1) stable brown rice; (2) stable bran; (3) increased head-rice yield.